Hacettepe University Graduate School of Social Sciences

Department of English Linguistics

AN EXPERIMENTAL AND CORPUS BASED ANALYSIS OF TEMPORAL CONVERB CLAUSES IN TURKISH

Doğan BAYDAL

Ph.D. Dissertation

Ankara, 2024

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ACCEPTANCE AND APPROVAL

The jury finds that Doğan BAYDAL has on the date of 24 / 05 / 2024 successfully passed the defence examination and approves his Ph. D. titled "*An Experimental and Corpus Based Analysis of Temporal Converb Clauses in Turkish*".

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Yükseköğretim Kurulu tarafından yayınlanan ***"Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge"*** kapsamında tezim aşağıda belirtilen koşullar haricince YÖK Ulusal Tez Merkezi / H.Ü. Kütüphaneleri Açık Erişim Sisteminde erişime açılır.

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- Enstitü / Fakülte yönetim kurulunun gerekçeli kararı ile tezimin erişime açılması mezuniyet tarihimden itibaren ... ay ertelenmiştir. (2)
- Tezimle ilgili gizlilik kararı verilmiştir. (3)

03/06/2024

Doğan BAYDAL

[1] *"Lisansüstü Tezlerin Elektronik Ortamda Toplanması, Düzenlenmesi ve Erişime Açılmasına İlişkin Yönerge"*

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(2) Madde 6. 2. Yeni teknik, materyal ve metotların kullanıldığı, henüz makaleye dönüşmemiş veya patent gibi yöntemlerle korunmamış ve internetten paylaşılması durumunda 3. şahıslara veya kurumlara haksız kazanç imkânı oluşturabilecek bilgi ve bulguları içeren tezler hakkında tez ***danışmanının*** *önerisi ve* ***enstitü anabilim dalının*** *uygun görüşü üzerine* ***enstitü*** *veya* ***fakülte yönetim kurulunun*** *gerekçeli kararı ile altı ayı aşmamak üzere tezin erişime açılması engellenebilir.*

(3) Madde 7. 1. Ulusal çıkarları veya güvenliği ilgilendiren, emniyet, istihbarat, savunma ve güvenlik, sağlık vb. konulara ilişkin lisansüstü tezlerle ilgili gizlilik kararı, ***tezin yapıldığı kurum*** *tarafından verilir *. Kurum ve kuruluşlarla yapılan işbirliği protokolü çerçevesinde hazırlanan lisansüstü tezlere ilişkin gizlilik kararı ise,* ***ilgili kurum ve kuruluşun önerisi*** *ile* ***enstitü*** *veya* ***fakültenin*** *uygun görüşü üzerine* ***üniversite yönetim kurulu*** *tarafından verilir. Gizlilik kararı verilen tezler Yükseköğretim Kuruluna bildirilir.*
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****** Tez* ***danışmanının*** *önerisi ve* ***enstitü anabilim dalının*** *uygun görüşü üzerine* ***enstitü*** *veya* ***fakülte yönetim kurulu tarafından karar verilir.***

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ABSTRACT

BAYDAL, Doğan. *An Experimental and Corpus Based Analysis of Temporal Converb Clauses in Turkish*, Ph.D. Dissertation, Ankara, 2024.

The studies in cognitive linguistics and psycholinguistics have reported that the positions of main and subordinate clauses in converb constructions are influenced by syntactic parsing, semantic and discourse-related factors (Diessel, 2005, 2008; Verstraete, 2004; Wiechmann & Kerz, 2013). One of the semantic factors is the "iconicity of sequence theory" and the related iconicity theory states that linguistic structures mostly mirror the structure of conceptual order (Croft, 2003). "The processing theory of constituent order" is about word order variations, from a syntactic parsing point of view. It states that words and phrases are arranged in such a way that linear ordering is subservient to constituent-structure recognition (Diessel, 2005). This study aims at investigating the positioning variations in temporal converb clauses in Turkish and analysing if different positions of subordinate and main clause in temporal converb clause constructions cause any significant differences in processing.

There are several converbial suffixes which produce temporal converb clauses in Turkish. In this study, the following nine converb suffixes are analysed: *-(y)IncA (when), -DIğIndA (when), -DIğI zaman (when), -ken (while), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since), -mAdAn önce (before), -DIktAn sonra (after) and -DIkçA (whenever).*

The data of the study were collected from the Turkish National Corpus (TNC) (Aksan et al., 2012). After identifying 9000 samples of temporal converbs, these were first grouped based on the suffixes mentioned above.

For the corpus study; the data were analysed using chi-square test. The 2×3 X^2 analysis was employed to see the correlations between conceptual order and linear structure. The findings of the corpus study show that temporal converb clauses in Turkish generally have a tendency to appear before the main clause. The clauses expressing priority and the clauses expressing simultaneity are found to precede the main clauses, which is in line with iconic clause order. The converb constructions expressing posteriority appear to precede the main clause, which is not supported by the iconicity principle. These findings suggest that the iconicity of sequence does not have a role in the placement of temporal converb clauses in Turkish.

For the experimental study, two self-paced reading experiments were conducted to see whether the different positions of subordinate and main clause in temporal converb clause constructions cause any significant differences in processing. The participants for each study were fifty native speakers of Turkish. They attended the studies voluntarily and did not have any vision problems, neurological or psychological disorders and literacy difficulties. Necessary ethical approval was obtained from Human Research Ethical Committee of Hacettepe University for the studies. Both experiments included thirty-six experimental items and thirty-six filler items as well as seventy-two comprehension questions for those experimental and filler sentences. Both studies were designed to incorporate experimental items with two conditions. In the first condition, converb clauses come before the main clause and in the second condition converb clauses come after the

main clause. PCIbex (Zehr & Schwarz, 2018), which offers a straightforward coding interface for implementing experimental designs and facilitates the sharing of resulting experiments through web browsers, was used in the experiments. For data analysis, the conformity of numerical variables to normal distribution was checked by "Shapiro-Wilk Test" (Shapiro & Wilk, 1965). To compute aggregate means, *t*-tests and Mann–Whitney U tests were performed. The findings of the experimental study show that there is a processing difficulty when temporal clauses in Turkish are in the non-default position.

Keywords: Temporal converb clauses, constituent order, iconicity of sequence, processing theory, Turkish.

ÖZET

BAYDAL, Doğan. *Türkçedeki Zamansıl Ulaç Tümcelerinin Deneysel ve Derlem Temelli Çözümlenmesi*, Doktora Tezi, Ankara, 2024.

Bilişsel ve psikodilbilim alanındaki çalışmalar, belirteç yantümcelerinin bir türü olan ulaç tümce yapılarındaki temel ve yan tümcelerin yerleşiminin; sözdizimsel çözümleme, anlamsal ve söylemsel faktörlerden etkilendiğini bildirmiştir (Diessel, 2005, 2008; Verstraete, 2004; Wiechmann, & Kerz, 2013). Anlamsal faktörlerden biri dizilimin ikonikliği kuramıdır ve bu kuram dilsel yapıların çoğunlukla kavramsal düzenin yapısını yansıttığını ifade eder (Croft, 2003). Tümce yapılarında yerleşim farklılıklarını öngören diğer bir kuram da, sözdizimsel çözümlemeye ait bir faktör olan tümce yerleşimini işlemleme kuramıdır. Tümce yerleşimini işlemleme kuramı; temel ve yan tümcelerin konumlandırılmasında, bileşen-yapıları tanımanın etkili olduğunu vurgulamaktadır (Diessel, 2005). Bu çalışmanın amacı, Türkçedeki zamansıl ulaç tümcelerindeki temel ve yan tümcelerin yerleşimini incelemek ve zamansıl ulaç cümle yapılarındaki yan tümce ve temel tümcenin farklı konumlarının, işlemlemede anlamlı farklılıklara neden olup olmadığını çözümlemektir.

Türkçede zamansıl ulaç tümce yapılarında kullanılan çeşitli son ekler vardır. Bu çalışmada, *-(y)IncA, -DIğIndA, -DIğI zaman, -ken, -(A/I) r...-mAz, -DIğIndAn beri, -mAdAn önce, -DIktAn sonra* ve *-DIkçA* olmak üzere dokuz son ek incelenmiştir.

Çalışmanın verileri Türkçe Ulusal Derleminden (TUD) (Aksan et al., 2012) toplanmıştır. Zamansıl ulaç tümcelerini içeren 9000 veri belirlendikten sonra bunlar ilk olarak yukarıda belirtilen son-ek kategorilerine göre gruplandırılmıştır.

Derlem temelli çalışmada; veriler ki-kare testi kullanılarak analiz edilmiştir. Kavramsal düzen ve doğrusal yapı arasındaki ilişkiyi görmek için 2×3 X^2 analizi uygulanmıştır. Derlem temelli çalışmanın sonuçları, Türkçede zamansıl ulaç yan tümcelerin genellikle ana tümceden önce ifade edilme eğiliminde olduğunu göstermektedir. Öncelik ifade eden yantümceler ile eşzamanlılık ifade eden yantümcelerin çoğunlukla ana tümcelerden önce gelmesi ikonik tümce sıralamasıyla uyumludur. Sonralık ifade eden tümce yapılarında ise yantümceler genellikle ana tümceden önce gelmektedir ki bu durum ikonik tümce sıralamasına uygun değildir. Bu bulgular, sıralamanın ikonikliği teorisinin Türkçedeki zamansıl ulaç tümcelerin yerleşiminde belirleyici olmadığını göstermektedir.

Deneysel çalışmada, zamansıl ulaç tümce yapılarında; yan tümce ve temel tümcenin farklı konumlarının, işlemlemede anlamlı farklılıklara neden olup olmadığını incelemek için iki öz ilerlemeli okuma deneyi yapılmıştır. Her bir deneye ana dili Türkçe olan gönüllü elli katılımcı katılmıştır. Katılımcıların herhangi bir görme sorunu, nörolojik veya psikolojik rahatsızlığı ve okuma yazma güçlüğü yoktur. Deneyler için, Hacettepe Üniversitesi Sosyal ve Beşeri Bilimler Araştırma Etik Kurulu'ndan gerekli etik onay alınmıştır. Her iki deneyde de otuz altı deney cümlesi ve otuz altı dolgu cümlesinin yanı sıra bu deney ve dolgu cümleleri için yetmiş iki okuduğunu anlama sorusu yer almıştır. Her iki deney, iki koşullu deneysel öğeler içerecek şekilde tasarlanmıştır. Birinci koşulda yan tümceler temel tümceden önce, ikinci koşulda ise yan tümceler

temel tümceden sonra gelmektedir. Deneylerde, deney tasarımlarını uygulamak için basit bir kodlama ara yüzü sunan ve elde edilen deneylerin web tarayıcıları aracılığıyla paylaşılmasını kolaylaştıran PCIbex (Zehr & Schwarz, 2018) kullanılmıştır. Veri analizi için sayısal değişkenlerin normal dağılıma uygunluğu Shapiro-Wilk Testi ile kontrol edilmiştir (Shapiro & Wilk, 1965). Toplam ortalamaları hesaplamak için ise *t*-testleri ve Mann-Whitney U testleri uygulanmıştır. Deneysel çalışmanın bulguları, Türkçedeki zamansıl ulaç tümce yapılarının varsayılan doğrusal yapıda konumlandırılmadığında, işlemleme zorluğu ortaya çıktığını göstermektedir.

Anahtar sözcükler: Zamansıl ulaç tümceleri, tümce yerleşimi, sıralamanın ikonikliği teorisi, işlemleme teorisi, Türkçe.

GLOSSES

The glosses listed below have been chosen to reflect the semantic and syntactic functions of Turkish morphemes and are used widely in the literature. They do not reflect the general meanings or the focal uses of the morphemes they stand for. As a result, they might not match the actual uses of the morphemes appearing in the examples presented in the dissertation. If the glosses of Turkish examples given in the dissertation are taken from other sources, they are rearranged according to the list below. Yet, glosses of examples taken from other languages are presented in the same way as they are in the original documents.

List of abbreviations and symbols used

1	first person	LOC	locative
2	second person	NEG	negation
3	third person	NOM	nominative
ABL	ablative	PTCP	participle
ABS	absolitive	PASS	passive
ACC	accusative	PFV	perfective
ADV	adverb	PL	plural
ASP	aspect	POSS	possessive
AUX	auxiliary	PRE	present
CON	converb	PROG	progressive
COP	copula	PST	past
DAT	dative	Q	question marker
ERG	ergative	REL	relative
FUT	future	REFL	reflexive
GEN	genitive	S	subject
INF	infinitive	O	object
IPFV	imperfective	V	verb

List of abbreviations used in examples from Turkish National Corpus (TNC)

S	Spoken data	W	Written data

Typesetting

Italics: Terms defined and / or introduced.

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INTRODUCTION

Language reflects human being's ability to think. (Carnie, 2012). Our ability to use a productive and combinatory language is one of the characteristics that distinguishes us from other animals, including highly intelligent ones such as chimpanzees and elephants. Language plays a significant role in shaping our conceptualization of abstract ideas, or, at the very least, it seems to possess a structure that enables us to express abstract concepts.

Through sentences, we express our thoughts and ideas, so the study of syntax is an important foundation stone for understanding how we communicate and interact with each other as humans. Languages of the world differ in terms of their syntactic characteristics. Turkish, for example, has a word order where adjectives come before the nouns they modify, the object appears before the verb, the dependent genitive is placed before the governing noun, and adverbs precede the adjectives they modify, among many other language rules (Erguvanlı Taylan, 1984). In contrast, Thai adopts a word order structure where nouns are followed by adjectives, verbs are followed by objects, governing nouns are followed by genitives (Erguvanlı Taylan, 1984).

Word order is the order of elements (whether words or, more commonly, phrases) within the sentence, (Matthews, 2007). Comrie (1989) states that it is important to know word order parameters of the languages in order to understand the human linguistic potential and attempt to provide an explanatory account of the nature of human language. Recent studies in cognitive linguistics and psycholinguistics study the word order parameters of the languages from many different perspectives (Diessel, 2008). Greenberg's influential work *Universals of Language* (1963) is the first study that systematically analyses word order correlations of linguistic elements. It investigated thirty languages and revealed about forty-five ordering patterns, giving some notions on association of certain syntactic traits. Comrie (1989) analyses word order correlations among languages in a very detailed way. He starts with order of subject (S), verb (V), and object (O) in sentences, giving rise to six available permutations, namely SOV, SVO, VSO, VOS, OVS, OSV. Then he continues with the ordering options within adjective clauses, relative clauses, possessive constructions and prepositional clauses.

Adverbial clauses are one of the subordinate clauses that perform an adverbial function within main clauses (Göksel & Kerslake, 2005). In Turkish, adverbial clauses can be finite or non-finite. Finite adverbial clauses are all marked by subordinating conjunctions. But the non-finite forms are much more numerous and, in general, more widely used. The verbal marking of non-finite adverbial clauses takes widely differing forms. The verbs in Turkish that occur in non-finite

adverbial clauses are called converbs. Therefore, non-finite adverbial clauses in Turkish are also named as converb clauses. The converb clause and main clause function as the immediate constituents of a bi-clausal structure.

Converb clauses in Turkish are expressed in sixteen categories determined by meaning (Göksel & Kerslake, 2005). These categories are; addition, agreement, concession, condition, conjunction, dismissal, information base for an utterance, manner, means, preference, proportionality, purpose, quantity or degree, substitution and temporal. Of them, temporal converb clauses specify the time of the situation expressed by the main clause by reference to how it relates to the time of some other situation (event or state). The number of the converbial forms in this class far exceeds that in any other, permitting a wide range of temporal relations to be expressed (Göksel & Kerslake, 2005).

Positioning in converbial constructions has been of interest by many researchers. (Haspelmath 1993; Çetintaş Yıldırım, 2004; Diessel, 2005, 2008; Wiechman & Kerz, 2013) By referring to corpora or by employing psycholinguistic experiments, the researchers have been trying to find the reasons behind the ordering patterns of the subordinate and main clauses in the converb clause constructions in different languages. The research related to positioning of the converbial constructions is based on many different approaches. These approaches can be categorised under three headings; (i) syntactic parsing, (ii) semantic and (iii) discourse-pragmatic factors. Syntactic parsing approaches state that human processor prefers linear structures that allow for fast and easy access to the recognition domain (Diessel, 2008). Linear ordering is affected by the complexity of the construction, which in turn affects both production and parsing. Semantic approaches suggest that the meanings of the subordinator have an effect on the positioning of the main and subordinating clauses. For temporal converb clause constructions; priority, simultaneity and posteriority meaning relationships of the subordinators affect the ordering of the clauses. Discourse-pragmatic approaches argue that initial and final adverbial clauses serve different discourse pragmatic functions (Diessel, 2005). Initial adverbial clauses are commonly used to organize the information flow in the ongoing discourse they function to provide a thematic ground or orientation for subsequent clauses.

Considering the advances in corpus based and psycholinguistic data collection tools, studying the factors that affect the positioning of temporal converb clause constructions provide valuable insights into linguistic processes and the interconnections between linguistic constituents.

CHAPTER 1- THE STUDY

This section presents statement of the problem, aims of the study, research questions, limitations of the study, significance of the study and organization of the study.

1.1. STATEMENT OF THE PROBLEM

Ordering of main and subordinate clauses in adverbial constructions has received extensive attention with numerous studies dedicated to investigating the factors that affect the positioning of clauses across various languages. (e.g., Greenberg, 1963; Clark, 1973; Thompson, 1985; Ohtsuka et al., 1992; Hawkins, 1994, 2004; Dancygier et al., 2000; Diessel, 1996, 2001, 2004, 2005, 2006, 2008; Verstraete, 2004; Hetterle, 2007; Haspelmath, 2008; Wiechman & Kerz, 2013). However, although positioning of main and subordinate clauses is an important process in Turkish, the existing studies on positioning are theoretical (e.g., Erguvanlı Taylan; 1984; Koç, 1988; Haspelmath, 1995; Johanson, 1995; Slobin, 1995, Kornfilt, 1997; Çetintaş Yıldırım, 2004, 2010; Demir, 2015; Gračanin-Yüksek, 2015). Therefore, corpus based and experimental studies on the positioning of temporal converb clauses in Turkish are needed to have more comprehensive information about these structures.

By referring to semantic and syntactic parsing theories on the ordering of linguistic elements; it is crucial to study yielding empirical findings to reveal the reasons behind the positioning of temporal converb clause constructions and understand the nature of ordering of linguistic elements in Turkish.

1.2. AIMS OF THE STUDY

The aim of this study is to explore the syntactic parsing and semantic factors that influence the placement of temporal converb clause constructions in Turkish. In terms of semantic factors, the study explores whether iconicity principle has an effect on the positioning of the temporal converb constructions. In other words, the study investigates whether the meaning relations that the converbial endings carry (conceptual order) have an effect on the clause order or not. In terms of syntactic parsing, the study aims to explore whether or not positioning of the temporal converb constructions has any effect on their processing.

1.3. RESEARCH QUESTIONS

In parallel to the aims of the study, this study attempts to answer the following research questions:

1. What are the positions of temporal converb clauses in Turkish based on the converbial suffixes?
2. What is the role of iconicity of sequence in the positioning of temporal converb clauses in Turkish?
3. What are the roles of different orders of subordinate and main clause in temporal converb clause constructions in the processing of temporal converb clauses in Turkish?

1.4. LIMITATIONS OF THE STUDY

This study has some limitations. First of all, although there are two types of adverbial clause constructions, namely finite and non-finite adverbial clause (Göksel & Kerslake, 2005), the study examines non-finite adverbial clauses, namely converb clauses. Finite adverbial clauses are all marked by subordinating conjunctions. These clauses are formed with *diye (thinking that), ki (so that), madem(ki) (seeing that), nasıl ki (just as), (sanki)… -mIş/-(y)mIş gibi (as if)* and *-DI mI (as soon as)*. It should be noted that those formed with *ki (so that), madem(ki) (seeing that), nasıl ki (just as)* and *-DI mI (as soon as)* can only modify the main clause of a sentence. Moreover, adverbial clauses formed with *ki (so that)* share two basic structural features with noun clauses and relative clauses formed with this subordinator: First, they always follow the main clause, and secondly, *ki (so that)* itself always stands at the beginning of its clause. Considering their characteristic features, it is not suitable to investigate the finite adverbial clauses in terms of positioning patterns of the main and subordinate clauses. Thus, this study examines non-finite converb clause constructions. The second limitation of the study is that, although there are sixteen categories in terms of semantic classifications of the converb clauses, this study focuses only on temporal converb clause constructions. The reason of choosing temporal converbs is that iconicity theory which is a subtype of semantic factor affecting the positioning in adverbial clauses is much more related to the linguistic elements that have temporal meaning relationships. Diessel (2008) states that iconicity of sequence, which denotes the temporal dimension of the conceptual order, primarily concerns the ordering of temporally related clauses. Across languages, causes and reasons are commonly expressed in constructions that follow the semantically associated clause, suggesting that iconicity of sequence is not relevant for the positioning of causal clauses. Also, result clauses, referring to the result or consequence of the main clause event; and purpose clauses,

denoting the goal or purpose of the activity expressed in the main clause may not be suitable to be analysed in terms of iconicity principle because of their distributional properties of semantic types. The third limitation of the study is that although there are numerous converbial endings in this type of converbial constructions, only nine temporal converbial endings, namely, *-(y)IncA (when), -DIğIndA (when), -DIğI zaman (when), -ken (while), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since), -mAdAn önce (before), -DIktAn sonra (after) and -DIkçA (whenever)* are investigated in this study. The reason for choosing these converbial endings is that when the data of the temporal converb endings were analysed, their normalized frequency in the corpus is above 404,7, while the normalized frequency in the corpus is less than 27 for *-DIğI sırada (when), -DIğI anda (when), -(y)AlI (beri) (since), -DI…-(y)AlI (since), -(y)IncAyA kadar /değin / dek (until), -(y)AnA kadar (until)* and *-DIğI sürece / müddetçe (throughout the time),* which are other examples of converbial endings. As larger sample size gives more reliable results, the temporal constructions with less than 27 normalized frequency were not analyzed in this study. The last limitation of this study is that among other online methods for experimental study, self-paced reading task was chosen for the analysis. The reason for choosing self-paced reading task is that it is probably the most practical on-line method for sentence processing research and is thus accessible to a wide range of researchers. Self-paced reading is highly portable because there is no special equipment outside the computer that runs the software and perhaps with a small response device, self-paced reading experiments can be conducted virtually anywhere. Also, prosody remains a dynamic process that occurs during implicit (silent) reading, playing a crucial role in language processing (Fodor, 1998).

1.5. SIGNIFICANCE OF THE STUDY

The primary objective of this study is to make meaningful contributions to the field on different levels since it aims to investigate the possible reasons behind the placement of subordinate and main clauses in temporal converb clause constructions. First of all, in addition to the theoretical studies on adverbial clauses in Turkish in the literature, this study is the first one to investigate the phenomena in an experimental way. This experimental psycholinguistic study provides data via studying reading time data to reveal the nature of the processing of temporal converbial constructions in Turkish. It also provides corpus data via analysing samples of converbial constructions, which were produced by speakers of the language. Consequently, the study's findings provide valuable insights into theoretical investigations within the field. Second, the study generates results related to the processing difficulty in the constructions, offering valuable insights into the cognitive processes involved in sentence comprehension. Finally, the findings of

the study may assist educators of Turkish as a second or foreign language in understanding the reasons on positioning of main and subordinate clauses in temporal converb constructions. Consequently, the findings of the study may help them to develop their curriculum in a more informed and effective manner.

1.6. ORGANIZATION OF THE STUDY

The present study includes six chapters. Following the introduction, information about background of the study is presented in the first chapter. Statement of the problem, aims of the study, research questions, limitations of the study, significance of the study and organization of the study are given in the first chapter. The second chapter starts with the explanation of converbial constructions. Subordination in Turkish, types of non-finite subordination in Turkish, temporal converbial constructions and positioning of converb clauses are presented. Then, iconicity theory and processing theory of constituent order are given and studies in the literature related to these theories are presented. After that, information about corpus, the formation of Turkish National Corpus and corpus based studies are presented. The chapter continues with language processing. Self-paced reading is explained in detail in this part. Chapter four includes two parts. The first part gives information about corpus-based study. Data collection tool, data collection procedure and data analysis are presented. The second part gives information about experimental study. Pilot study, participants and setting, materials, data collection procedures of the experimental study are given. The fifth chapter includes the findings and the discussion of the findings while the conclusion of the study is presented at the end of the study.

CHAPTER 2- BACKGROUND OF THE STUDY

This section presents converbial constructions and positioning of elements within sentences in a comprehensive way.

2.1. CONVERBIAL CONSTRUCTIONS

In this subsection, a detailed presentation of subordination in Turkish and types of non-finite subordination in Turkish are provided. It is followed by converbial constructions and temporal converbial constructions in Turkish. Temporal converbial endings are presented one by one.

2.1.1. Subordination in Turkish

Like many other languages, Turkish has simple and complex sentences. Simple sentence consists of a single clause with one verbal or nominal predicate marked for tense-aspect-mood and person/number while complex sentence consists of a main clause with one verbal or nominal predicate marked for tense-aspect-mood and person/number and one or more subordinate clauses (Ögel-Balaban & Aksu-Koç, 2020, p. 5). Sentence (1) below is an example of a simple sentence and sentence (2) is an example of a complex sentence.

1) Kurbağa-yı gör-müş-ler.
   frog-GEN see- PST-3PL
   '(They) saw the frog.'
2) Uyan-dık-lar-ı zaman kurbağa-yı gör-müş-ler.
   wake up-ADV-PL-POSS-3SG time frog-GEN see- PST-3PL
   'At the time they woke up, (they) saw the frog.'

"Complex sentences contain at least one subordinate clause in addition to a main clause. Structurally, the predicate of a subordinate clause can be finite (i.e. identical in form to a main clause)" as can be seen in example (3) (Göksel & Kerslake, 2005, p.123).

3) Maç birazdan başla-yacak de-n-iyor.
   match soon start-FUT say-PASS-IPFV
   'It is said that the match will be starting soon.'

(Göksel & Kerslake, 2005, p. 123)

A finite subordinate clause can be directly connected to the superordinate clause as can be seen in example (3), or it can be linked to the superordinate clause by means of a subordinator as in example (4). The subordinators that link finite clauses to superordinate clauses are the following: "*diye (thinking that)"*, "*ki (so that)"*, "*madem (ki) (seeing that)"*, "*nasıl (ki) (just as)"*, "*mı (as soon as)"*, the clitic "*dA (already)"*, and some other obsolescent subordinators containing "*ki (so that)"*, such as "*ola ki (in case)"*, "*meğer ki (seeing that)"*, "*kim ki (whoever)"*, "*ne zaman ki (whenever)"* (Göksel & Kerslake, 2005).

4) Kalabalık olacağız diye bir ekmek daha almıştım.
crowded be-FUT-1PL as one bread more buy-PST-1SG
'As there were going to be a lot of us, I had bought another loaf.'

(Göksel & Kerslake, 2005, p. 400)

The predicate of a subordinate clause can be non- finite (i.e. containing a verbal predicate with subordinating suffixes). In example (5), the predicate of a subordinate clause is non- finite:

5) Müdür gid-er git-me-z memur –lar iş -lerin-i bırak -tı –lar.
director go-PRS go-NEG-NEG-PRS employee-PL work-3PL-ACC leave-PST-3PL
'As soon as the director left, the employees left their work.'

(Kornfilt, 1997, p. 71)

The subordinators that link non-finite clauses to superordinate clauses employ many endings such as "*-ıp"*, "*-IncA"*, "*-ArAk"*, "*ken"*, "*-An"*, "*-AsI"* etc. (Akkuş, 2019). An example sentence with "*-ArAk"* is given in (6):

6) Ben etraf-ım-a bak-arak yür-ür-üm.
I around-1SG-DAT look -ADV walk-PRS-1SG
'I walk, looking around (myself).'

Example (6) shows a non-finite subordinate clause in Turkish. There are three types of non-finite subordinate clauses according to their functions (Göksel & Kerslake, 2005).

2.1.2. Types of Non-finite Subordination in Turkish

There are several types of non-finite subordination in Turkish. These are explained as follows:

I. Verbal nouns: These are non-finite verbs of noun clauses. Noun clauses occupy the positions appropriate to their grammatical and thematic roles; thus, a noun clause which is a subject will be

in the initial position of the main clause, given that the basic word order is SOV as can be seen in example (7); a noun clause which is an object will be between the main subject and verb as it is seen in example (8).

7) Ahmet-in git-me-si ben-i çok üz-dü.
Ahmet-GEN go-NOM-3SG I-ACC very sadden-PST
'That Ahmet went made me very sad.'

8) Zeynep Ahmet-in git-me -sin-e çok üz-ül-dü.
Zeynep Ahmet-GEN go-NOM-3SG-DAT very sadden-PST
'Zeynep was very saddened by Ahmet's going.'

II. Participles: These are non-finite verbs of relative clauses. Non-finite type of relative clause contains one of the participle suffixes "*-(y)An"*, "*-DIK"*, or "*-(y)AcAK"*, corresponding to the relative pronouns "who", "which", "that", "whom", "whose", "where", etc. in English. All relative clauses precede the noun phrase they modify, in the same way that adjectives precede the noun they modify (Göksel & Kerslake, 2005, p. 380). A related example is given in (9).

9) Burada sat-ıl-an kitap-lar çok güzel.
here sell-PASS-PTCP book-PL very nice
'The books (which are) sold here are very nice.'

III. Converbs: These are the non-finite verbs of adverbial clauses, which function as adverbials. The verbal marking of non-finite adverbial clauses takes widely differing forms. In some cases, e.g. *-(y)ArAk, -(y)IncA*, a distinctively converbial suffix is added directly to the verb as can be seen in example (10). In other cases, (e.g. *-mAk için, -DIğI zaman*) the converbial marker is composite, consisting of one of the multi-functional subordinators, such as *-mAK* or *-DIK*, followed by a case marker and/or postposition or a nominal. A related example is given in (11).

10) Çalış-ır-ken radyo-yu hep açık tut-ar-ım.
work-PRS-CON radio-ACC always on keep-PRE-1SG
'I always keep the radio on while/when (I am) working.'

11) Çocuğ-a dondurma al-mak için para ver-di-k.
child-DAT ice-cream buy-CON for money give-PST-1PL
'We gave the child money to buy an ice cream.'

(Göksel & Kerslake, 2005, p. 406)

As mentioned above, this study analyses converbial constructions in Turkish, which are given below.

2.1.3. Converbial Constructions

A converb is defined as "a non-finite verb form whose main function is to mark adverbial subordination" (Haspelmath, 1995, p. 3). However, its definition has been open to disagreement in terms of components of non-finite, verb form, adverbial and subordination. Therefore, it is useful to explain those components and their relationship with converb constructions. A converb is a verb form that is part of the inflectional paradigm of verbs (Haspelmath, 1995). Thus, a converb cannot be easily analysed as a verb plus a complementizer or subordinator. Rather, the verb in the converb form is inherently subordinate. The fact that converb is a verb form means that they are not separate word class, thus they are clearly inflectional rather than derivational forms. Nedjalkov's (1990) study does not consider non-finiteness as a characteristic of converbs. He states that finite verb forms which are used only in adverbial subordinate clauses are also considered converbs. However, this definition is problematic because only a non-finite adverbial subordination can be said to be verbal adverb. In Turkish context, finite adverbial clauses are all marked by subordinating conjunctions while non-finite adverbial clauses have subordinating suffixes on the verb, and in some cases the verb is also followed by a postposition or noun phrase (usually with oblique case marking). The definition criterion of adverbial is primarily intended to exclude verbal nouns and participles. Converbial constructions are generally not arguments but modifiers, and they generally modify verbs, clauses or sentences, but not nouns or noun phrases (Haspelmath, 1995). Lastly, the definition term "subordination" means embedded or incorporated into the superordinate clause, contrasting with coordinate clauses, which are not part of another superordinate clause.

A converb is usually marked by an affix that is attached to the verb stem (Haspelmath, 1995). Since languages show a general preference for suffixes over prefixes and since converbs are apparently particularly common in verb final languages where this suffixing preference is much stronger, it is not surprising that converbial affixes are most commonly suffixes (Greenberg, 1957). A related example is given in (12). Besides inflectional affixes, non affixal particles may also be employed as converb markers, e.g., French "*en"* in the French *gerondif* (Haspelmath, 1995). An example is given in (13).

12) İnsan demir-i döv-e döv-e demirci olur.
person iron-ACC forge-CON forge-CON smith become-PRS
'A person becomes a blacksmith by forging.'

(Haspelmath, 1995, p. 9)

13) C est en forgeant qu'on deviant forgeron.
it is CON forge-CON that.one becomes smith.
'It is by forging that one becomes a smith.'

(Halmøy, 1982, p. 152)

There are many descriptive studies concerning the construction of converbs both cross-linguistically and individually. In his study on English language, Kortman (1995) states that among the Germanic languages, English is the language that uses the non-finite verbless adverbial clauses more than the other languages. Such kind of clauses in English have gone by different names in the literature e.g., free adjuncts as can be seen in example (14) and absolutes which is exemplified in (15). The difference between two is that the letter has an overt subject.

14) I checked my diary and rushed off to my 9 am lecture, *managing to skip breakfast*.
15) The dean turned and went out, *his gown billowing darkly behind him*.

(Kortman, 1995, p. 189)

Sentences (14) and (15) are examples of free adjuncts and absolutes in English and they are formed with a present participle.

In his study on Russian converbs, Weiss (1995) states that the class of converbs in Russian comprises only one series of verbal forms: only the so called *deeprićasttija* (indeclinable adverbial participles), which is a special device for the non-finite expression of adverbial subordination. Sentence (16) is an example of a converb construction in Russian.

16) On vernulsja ulybajas'.
he returned smile-CON
'He returned smiling.'

(Weiss, 1995:241)

In his study on Hungarian converbs, Groot (1995) states that Hungarian verbal forms ending in *"-va* / *-ve"* are called converbial endings. These endings share the properties of the converb constructions. Sentence (17) below is an example for converbial construction in Hungarian.

17) A gyerek-ek ěnekel-ve sětȧl-t-ak.
the child-PL sing-CON walk-PST-3PL
'The children walked singing.'

(Groot, 1995, p. 283)

Haspelmath (1995) states that Lezgian language is rich in non-finite verbal forms that are specialized for converbs. In example (18) below, the Lezgian suffix "*-z*" is an imperfective converb, which expresses a temporal relationship.

18) Am ajvandi-k gazet k'el'iz aqwaz-nawa.
he-ABS balcony newspaper read-CON stand-PFV
'He is standing on the balcony, reading a newspaper.'

(Haspelmath, 1995, p. 417)

In their study on converbs in Japanese, Alpatov and Podlesskaya (1995) state that Modern Japanese provides two main types of converb verbs forms that are specialized for subordination in non-argument position. The first type is the primary converb, which is a non-finite verb form that consists of a stem and an inflection. This structure is exemplified in (19):

19) Sore o sikkari mot-te gakkoo ni it-ta.
it ACC tightly hold-CON school goal go-PST
'Holding it tightly, (he) went to school.'

(Matsumoto, 2021, p. 1)

Another type of converb is secondary converbs, which is a non-finite verb form consisting of a primary converb in combination with agglutinative affixes or function words (postpositions or particles). A related example is given in (20) below:

20) Uchi - ni kaet - tekara, haha - ga imasen.
house-PTCP go. home-CON mom my-PTCP
'After I came back home, mom is not seen.'

(Zulnaidi & Arfianty, 2017, p. 1)

In addition to descriptive studies of other languages, there are studies which deal with converbs in Turkish. The term converb have been defined differently in these studies.

For instance, Johanson (1995) analyses converb constructions in Turkish in a detailed way and states "the converb segment is a non-finite unit which is constructionally subordinate to a base segment" (p. 313). The converb segments, minimally consisting of a verb form, but expandable to full-fledged clauses, are provided with suffixed *subjunctors*. He uses the term subjunctor in the sense of subordinative conjunctions in European languages. In his synchronic analysis of converbs in Turkish, Koç (1988) defines converbial constructions as follows: "a compound sentence containing an adverbial clause in the surface structure is derived from two sentences in

the deep structure which have an abstract time element in common" (p. 581). Example (21) below shows the surface structure while example (22) shows the deep structure of these structures.

21) Ali gel-ince Osman şaşır-dı.
Ali come-CON Osman be. surprised-PST-3SG
'When Ali came, Osman was surprised.'

22) Ali geldi. Osman şaşırdı.
Ali come-PST-3SG Osman be surprised-PST-3SG
'Ali came. Osman was surprised.'

Slobin (1995) analyses converbs in Turkish child language and gives the definition of converbs as follows: "Converbs are derived verb forms and carry out functions of adverbial linking or conjoining between clauses" (p. 349). He states that such forms are commonly referred as a *converb, gerund* or *deverbal adverb* in Western European and American grammars of Turkish, *deeprićasttija* in Russian and *ulaç* in Turkish. He gives the following example to this construction from Old Turkish.

23) İşit-ip uq-ar biz.
hear-CON understand-PRS we
'After hearing, we understand.'

(Slobin, 1995, p. 349)

Treffers-Daller, Özsoy and Van Hout (2007) define converbs as follows: "Converbs are formed by the assignment of one of a number of gerundive suffixes to the embedded verb" (p.13). They state that converb clauses can be marked for agreement as in (24) and that there may be no agreement on the adverbial clause as in (25).

24) Adam-ın kafa-sı şiş-iyor, dışarı çık-tığ-ın-da.
man-GEN head-3SG swell-PROG outside leave-NOM-3SG- POSS-LOC
'The man's head is swelling when he gets out.'

25) Çocuk baba-sın-ı sev-erek ev-e gid-iyor-lar.
child father-3SG-POSS-ACC love-CON house-DAT go-PROG-3PL
'The child embracing his father they go home.'

(Treffers-Daller et al., 2007, p. 13)

Acar (2014) analyses converb clause constructions in terms of discourse roles and defines converbs as "non-finite forms of adverbials which are much more widely used with some other suffixes and postpositions" (p.17). He states that converbs followed by postpositions generate

discourse relations and that converbs without postpositions may encode a semantic relation between abstract objects by taking a small set of suffixes corresponding to English "*while*", "*when*", "*by means of*", "*as if*", or temporal "*since*". He names converbs followed by a postposition as complex subordinators as in (26) while converbs without postpositions as simplex subordinators as in (27).

26) Makine tamir ed-il-dikten sonra yeniden bozul-du.
machine repair-PASS-CON after again break. down-PST
'After being repaired, the machine broke down again.'

27) Makine tamir ed-il-ince düzeldi.
machine repair-PASS-CON work-PST
'After being repaired, the machine worked.'

(Acar, 2014, p. 17)

After mentioning the descriptive studies about converb constructions in other languages and in Turkish, it is better to talk about the classifications of converb constructions. Akkuş (2019) states that there are many meaning relations between clauses in converb constructions, thus, the classifications of those clauses in the literature contrast with each other.

2.1.4. Types of Converbial Constructions

In the literature, there exists an ongoing debate regarding the classification and categorization of converbs. (Akkuş, 2019). These constructions, which connect clauses with various meaning relations, have led to multiple contrasting classifications. The disagreement arises due to the diverse ways in which converbs function and their syntactic roles (Johanson, 1995).

Banguoğlu (1995) states that in converb constructions, the verb takes special forms related to the functions. According to these functions, converbs are divided into six categories: (i) clause-linking converbs, (ii) manner converbs, (iii) concession converbs, (iv) temporal converbs, (v) causal converbs and (vi) comparative converbs.

Kornfilt (1997) classifies converb clauses into seven categories according to the meaning relationships. These categories are: (i) time, (ii) manner, (iii) purpose, (iv) cause, (v) condition, (vi) result, (vii) degree, (ix) place and (x) concessive. The degree category is further divided into two classes, namely; comparative clauses and equative clauses.

In terms of levels of construction, Johanson (1995) classifies them into four major categories. At level (i), the base segment and the converb segment are full predications in the sense that each has its own subject, whether overtly express or not. In example (21) above, "Ali gelince, Osman şaşırdı (*When Ali came, Osman was surprized*.)"; each segment has its own subject. At level (ii), the converb segment and the base segment have the same subject, the base segment just constituting a second predicate. A related example is given in (28).

28) Ali gel-ince şaşır-dı.
Ali come-CON be. surprised-PST-3SG
'When Ali came, he was surprised.'

Johanson (1995, p. 314)

This use of converb segment exemplified in (28) is comparable to the normal uses of English free adjuncts, French *gĕrondifs* and Slavic converbs. At level (iii), the converb segment and the base segment together have a single subject pattern. Insertion of element between them is heavily restricted and there is a strong semantic representation of a one single event. Sentence (29) is an example of such constructions.

29) Al-ıp gel
take-CON come
'to bring'

(Johanson, 1995, p. 315)

At level (iv), the base segment is just part of the predicate core, i.e., of a periphrastic construction in which it functions a grammatical function. Such constructions are exemplified in (30) which is from Kirghiz.

30) Ok-up tur-d-u.
read-CON stand-PST-3SG
'He kept reading.'

(Johanson, 1995, p. 315)

The converbs used at this level are typically aspectual ones of intra or post terminal origin.

Göksel and Kerslake (2005) classifies converbs into thirteen categories determined by meaning. These categories are: (i) addition, (ii) agreement, (iii) concession, (iv) condition, (v) dismissal, (vi) information base for an utterance, (vii) manner, (vii) means, (viii) preference, (ix) proportionality (x) purpose, (xi) quantity or degree, (xii) reason, (xii) substitution and (xiii) time.

In his study of the converbs in the languages of Europe, Nedjalkov (1998) classifies converbs into two semantic groups: (i) taxis (relative temporal) and (ii) nontaxis functions. Taxis functions include, for instance, simultaneity, anteriority, posteriority and contingency. Nontaxis functions include such functions as manner/means, purpose, cause, concession, comparison, degree/extent, graduative and location. Converbial forms may express either (i) only taxis relations, or (ii) only nontaxis relations, or (iii) both taxis and nontaxis meanings.

Kortman (1998) studies semantic space of converbial constructions in the languages of Europe and classifies converbs into two categories. The first category is temporal one. In temporal category, there are nine sub-categories: (i) simultaneity overlap, (ii) simultaneity duration, (iii) simultaneity co-extensiveness, (iv) anteriority, (v) immediate anteriority, (vi) terminus a quo, (vii) posteriority, (viii) terminus ad quem and (ix) contingency. The second category is causal, conditional, concessive and related interclausal relations. This category includes (i) cause/reason, (ii) condition, (iii) negative condition, (iv) concessive condition, (v) concession, (vi) contrast, (vii) result, (viii) purpose, (ix) negative purpose, (x) degree/extent and (xi) exception/restriction.

In his study on usage-based investigation of converbial constructions in heritage speakers' Turkish, Akkuş (2019) categorizes converb clauses into eight categories: (i) time, (ii) manner, (iii) purpose and result, (iv) cause, (v) condition, (vi) degree, (vii) place and (viii) concession. He states that there are a greater number of temporal converbial constructions compared to other categories.

In his study on typological parameters on converbs, Nedjalkov (1995) talks about three main types of converbs. The first group is specialized converbs. These can be sub-divided into two groups: (i) temporal converbs, (ii) non temporal converbs. The second group is contextual converbs. Contextual converbs can express such meaning as simultaneity, anteriority, posteriority, cause, concession, manner, accompanying circumstances, condition, goal, place, and others. The third group is narrative (coordinative) converbs. These converbs can express three or more completed actions in succession that advance the narration.

As it is clearly seen, the classifications of converb constructions vary in the descriptive studies.

2.1.5. Converbial Categories and Endings in Turkish

Akkuş (2019) states that semantic features are implemented to the converbial stems by means of converbial suffixes. Table 1 below shows the converbial endings in Turkish.

Table 1*: Converbial categories with converbial endings in Turkish (Adopted from Kornfilt (1997), Göksel and Kerslake (2005) and Akkuş (2019))*

	Converbial Category	Converbial Endings
1	Addition	*-mAktAn başka, -DIktAn başka (in addition to)*
2	Agreement	*-mAk üzere (on the understanding that)*
3	Concession	*-DIğI/- (y)AcAğI halde,(although) -mAsIna rağmen / karşın (in spite of the fact that)*
4	Condition	*-DIğI takdirde (in the event that), -mAsI halinde / durumunda (in the case of)*
5	Dismissal	*-mAsInA (the fact that)*
6	Information Base for an Utterance	*-DIğInA / -(y)AcAğInA göre (since, in view of the fact that)*
7	Manner	*(y)ArAk, (y)A…-(y)A, -(A/I)r gibi, -(A/I)rcAsInA (as if), -DIğI /-(y)AcAğI/-mAsI gibi, -mAdAn, -mAksIzIn (without)*
8	Means	*(y)ArAk, mAk suretiyle/ yoluyla (by (means of), -mAklA(by)*
9	Preference	*-mAktAnsA (rather than)*
10	Proportionality	*-DIkçA (the more...the more)*
11	Purpose	*-mAk için (in order to), -mAsI için (in order that / for)*
12	Quantity or Degree	*-(y)AcAk kadar / derecede, DIğI / -(y)AcAğI kadar (as)*
13	Reason	*- DIğI/-(y)AcAğI için (because, as)*
14	Substitution	*-(y)AcAğInA, -mAk yerine (instead of)*
15	Time	*-(y)IncA (when), DIğIndA and -DIğI zaman (when), -(y)ken (while, as), (A/I)r…-mAz, -DIğI gibi (as soon as), -(y)AlI (beri), DIğIndAn beri (since), -mAdAn (önce) (before), -DIktAn sonra (after), -(y)IncAyA kadar / dek (until), -DIkçA (whenever), -DIğI sürece/ müddetçe (throughout the time)*

As can be seen in Table 1, "*-Ip*" ending is not treated under the heading of subordination. Kornfilt (1995) states that because this construction mostly functions as conjunctive, it is treated under the heading of "Conjunctions and Coordination." Göksel and Kerslake (2005) hold the same view stating that "the converbial suffix "*-(y)Ip*" has a conjunctive rather than a modifying function, that is to say it conjoins two clauses that are semantically of equal status in the sentence" (p. 410).

Table 1 also shows that the verbal marking of non-finite adverbial clauses takes widely differing forms. In some cases, e.g., *-(y)IncA*, a distinctively converbial suffix is added directly to the verb.

In other cases, (e.g., *-mAk için, -DIğI zaman*) the converbial marker is composite, consisting of one of the multi-functional subordinators, such as "*-mAK*" or "*-DIK*", followed by a case marker and/or postposition or a nominal form.

After categorising converbial constructions according to the meaning relationships, it is better to talk about the structural characteristics of converbial constructions in Turkish in terms of case marking, subject reference, tense and aspect marking etc.

The most important structural distinction among converbs is between those that are marked for person and those that are not. Only those formed with the suffixes "*-DIK*", "*-(y)AcAK*" and "*-mA*" can be marked for person. Except in the cases of *-DIkçA* and *-DıktAn sonra*, where person marking does not occur, this marking is obligatory, and is effected by the possessive suffixes (Göksel & Kerslake, 2005). A related example is given in (31).

31) Otel-den ayrıl-acağ-ınız zaman
hotel-ABL leave-CON-2PL-POSS time
'When you are / were about to leave the hotel.'

There is complete freedom for the subjects of the subordinate and superordinate clauses to be either the same or different in most of the Turkish converbs (Çetintaş Yıldırım, 2004). Related examples are given (32) and (33).

32) Haberi duyduğ-umuz-da çok üzüldük.
news-ACC hear-PST-1PL-CON very be.sad-PST-1PL
'We were very upset when we heard the news.'

33) Haberi duyduğ-umuz-da Ali çok üzüldü.
news-ACC hear-PST-3PS-CON Ali very be.sad-PST-3PS
'Ali was very upset when we heard the news.'

However, there are some exceptions to this rule. Adverbial clauses whose converb includes the subordinator "*-mAK"* cannot contain within them an overtly expressed subject. Sentence (34) is an example of this.

34) Çocuk, dondurma al-mak için biz-den para iste-di.
child ice. cream buy-CON for we-ABL money ask.for-PST
'The child asked us for money to buy an ice cream.'

(Göksel & Kerslake, 2005, p. 405)

Converbs formed with "*-mAsI için*", also expressing purpose, are used with a subject different from that of the superordinate verb. An example is given in (35).

35) Çocuğ-a dondurma al-ma-sı için para ver-di-k.
child-DAT ice. cream buy-CON for money give-PST-1PL
'We gave the child money for him / her to buy an ice cream.'

(Göksel & Kerslake, 2005, p. 406)

The manner converb "*-(y)A…-(y)A*" does not often occur with a subject different from that of the superordinate verb. Where they do, it is usually in contexts where the subject of the adverbial clause is marked by a possessive suffix referring to the subject of the superordinate clause. Sentence (36) below exemplifies this (Göksel & Kerslake, 2005).

36) Palto-su-nun etek-ler-i yer-ler-e sürün-erek yürüyor-du.
coat-3SG-POSS-GEN skirt-PL-3SG-POSS ground-PL-DAT trail-CON walk-PST
'S/he was walking with the tail of his/her coat trailing along the ground.'

(Göksel & Kerslake, 2005, p. 406)

In terms of case marking, the overt subject of most kinds of non-finite adverbial clause is non-case-marked (Göksel & Kerslake, 2005). An example is given in (37).

37) Zehra torununu görmek iste-diğ-i için Bursa'ya uğradık.
Zehra grandson see-INF want-CON for Bursa-DAT stop off-PST-3PL
'Because Zehra wanted to see her grandchild we stopped off in Bursa.'

(Göksel & Kerslake, 2005, p. 405)

However, the subject receives genitive case marking when the clauses have the subordinator "*-Ma*" and the clauses formed with "*-DIğI/-(y) AcAğI gibi*" express manner. A related example is given in (38).

38) Zehra-nın torunu nu gör-ebil-me-si için ne yapabiliriz?
Zehra-GEN grandson see-AUX-CON-3SG-POSS for what do-AUX-Q
'What can we do in order for Zehra to be able to see her grandchild?'

(Göksel & Kerslake, 2005, p. 405)

Tense and aspect marking in converbial constructions in Turkish varies from one type to another. This marking is much more common in clauses expressing concession or reason than clauses of manner and time (Kornfilt, 1997).

Adverbial clauses can be marked for relative tense or for aspect by the use of compound verb forms incorporating the auxiliary "*ol"*. A related example is given in (39).

39) Musa gece geç vakte kadar çalış-mış oldu-ğu için bitkindi.
Musa night late time as work-PERF-PST because exhausted
'Because Musa had worked late into the night he was exhausted.'

(Göksel & Kerslake, 2005, p. 405)

In the case of "*-(y) ken"*, the converbial suffix incorporates the copula *-(y)-* and can therefore be suffixed to a range of tense/ aspect/modality markers on the verb, as well as to non-verbal subject complements as in (40) below.

40) Ali Türkiye'de-y-ken çok mutlu-y-du.
Ali Türkiye-LOC-COP-CON very happy-PST-3SG
'While Ali was in Turkey, he was very happy.'

After giving information about the structural characteristics of converb clause constructions in general, temporal converb clause constructions are presented, including each converbial ending type presented in Table 1.

2.1.6. Temporal Converbial Constructions in Turkish

Göksel and Kerslake (2005) state "the number of converbial forms in this class far exceeds that in any other, permitting a wide range of temporal relations to be expressed" (p. 415). Akkuş (2019) is in line with this view by stating that the most productive and frequently used converbial constructions are formed with temporal converbial endings. Before analysing the converbial endings one by one, it is better to talk about studies on classification of temporal converbial constructions.

Banguoğlu (1995) states that temporal converbial endings are attached to the verbs in the subordinate clauses with a time relation and connect the subordinate clauses to the main clause. He categorizes the temporal converbial endings into seven categories related to meaning relationship. These categories are given as follows:

(i) Successive converbs (gérondif successif): This type of construction shows the judgement in the main clause as a natural conclusion of the subordinate clause. In this temporal relationship, the main clause predicate follows the subordinate clause predicate. *-(y) IncA* (when) is the mostly used ending in this category. A related example is given in (41).

41) Yağmur başla-yınca kaç-tı-k.
rain start-CON run away-PST-1PL
'When the rain started, we run away.'

(Banguoğlu, 1995, p. 433)

(ii) Temporal converbs (*gérondif temporal*): This class of converbs gives the meaning relationship of repetition and continuation. *-DıkçA* (whenever) is the mostly used ending in this category along with *-DIğI müddetçe* (whenever). An example is given in (42).

42) Ankara-ya gel-dikçe biz-e uğra.
Ankara-DAT come-CON we-DAT visit
'Whenever you come to Ankara, visit us.'

(Banguoğlu, 1995, p. 433)

(iii) Simultaneity converbs (*gérondif de coincidence*): This class of construction shows that main clause predicate and the subordinate clause predicate occur at the same time. *DIğIndA* (when) and *-DIğI zaman* (when) and *-DIğI sırada* (when) endings are the mostly used converbials in this category. A related example is given in (43).

43) Dün ara-dığımda siz-i bul-ama-dı-m.
yesterday call-CON you-ACC reach-NEG-PST-1SG
'When I called you yesterday, I couldn't reach.'

(Banguoğlu, 1995, p. 434)

(iv) Initial converbs (*gérondif initial*): This class of converbs shows a starting point meaning relationship for the predicate in the main clause. *-(y) AlI (beri)* (since) and *-DIğIndAn beri* (since) endings are the converbials of this category. Example (44) below is a type of initial converbs.

44) Gel-diğinden beri bir şey ye-me-di.
come-CON since anything eat-NEG-PST-3PS
'Since he/she came here, he/she hasn't eaten anything.'

(v) Limitation converbs (*gérondif limitatif*): These converbs show an ending point meaning relationship for the predicate in the main clause. Converbial endings used with the *dek* (until) and *kadar* (until) postpositional patterns are widely used in this category. Example (45) below is a type of limitation converbs.

45) Siz gel-inceye kadar konuş-ma-yacağ-ım.
you come-CON until talk-NEG-FUT-1SG

'I will not talk until you come.'

(vi) Anteriority converbs (*gérondif d'antériorité*): In this type of converbs, the predicate in the subordinate happens before the predicate in the main clause. *–mAdAn* ending used with or without *önce* (before) or *evvel* (before) postpositional patterns is the converbial of this category. A related example is given in (46).

46) Sen git-meden önce konuş-tu-k.
you go-CON before talk-PST-3PL
'We had talked before you went.'

(vii) Posteriority converbs (*gérondif de postériorité*): In this type of converbs, the predicate in the subordinate happens after the predicate in the main clause. *-DIktAn* ending used with *sonra* (after) postpositional patterns is the converbial of this category. An example is given in (47).

47) Emekli ol-duktan sonra Samsun-a yerleş-ti.
retired become-CON after Samsun-DAT move-PST-3SG
'After he/she was retired, he moved to Samsun.'

Nedjalkov (1998) subdivides temporal converb clause into three classes. The first group expresses simultaneity relationship between the main clause and the subordinate clause. Example (48) is from Udmurt language showing a simultaneity relationship.

48) Uźa-ku-m kuaź zoriz.
work-CON-1SG rain go-PST
'While I worked, it was raining.'

(Perevoscikov,1959, p. 56)

The second group expresses anteriority relationship between the main clause and the subordinate clause. Example (49) is from Mari language which contains an anteriority relationship.

49) Tol-meke-m avam ojla…
come-CON-1SG my mother say-PST
'When I came, my mother said…'

(Isanbaev, 1961, p. 50)

The third group expresses posteriority relationship between the main clause and the subordinate clause. Example (50) is from Evenki language exemplifying a posteriority relationship.

50) Nuŋan ukumni-va emev-re-n, teliŋne suru-mnen.
he milk-ACC bring-PST-3SG then go-PST-CON
'He brought milk, then went away.'

(Konstantinova, 1964, p. 211)

In his study of adverbial subordinators in the languages of Europe, Kortman (1998) classifies temporal converbial constructions into seven categories in terms of semantic space of interclausal relations. In the glosses, *p* stands for the proposition expressed by the converb clause and *q* for the proposition expressed by the main clause.

(i) Simultaneity overlap *("when p, q")*: *p* overlaps with *q*. Example (51) is from Lithuanian, which shows a simultaneity overlap.

51) Saul-ei vtek-ant pasiek-ė-m kryźkel-e.
sun-DAT rise-CON reach-PST-1PL cross road-ACC
'When the sun rose, we reached a crossroad.'

(Haspelmath, 1995, p. 2)

(ii) Simultaneity Duration ("while *p, q*"): p opens up a time interval for the whole or part(s) of which *q* is true. Example (52) is from Diyari language, which shows a simultaneity duration.

52) Nhulu puka thayi-rna nhawu pali-rna warrayi.
he-ERG food eat-CON he die-CON AUX
'While eating some food, he died.'

(Austin, 1981, p. 318)

(iii) Simultaneity Co-Extensiveness ("*as long as p, <q*"): p opens up a time interval for the whole of which *q* is true. A related example is given (53) from Turkish.

53) O ev-de kal-dığı müddetçe mutlu ol-ama-yacak.
that house-LOC stay-CON throughout happy be-NEG-FUT-3SG
'He / she will not be happy as long as he/she stays at that house.'

(iv) Anteriority (*"after p, q"*): *p* simply precedes *q* in time. Example (54) is from Kumyk language, which shows anteriority.

54) Hatta ćyk-ğanly da gör-me-gen-men.
even go.out-CON also see-NEG-PST-1SG
"I didn't even see after he went out."

(Dzanmamov, 1967, p. 43)

(v) Immediate Anteriority (*"as soon as p, q"*): *p* immediately precedes *q*. Example (55) is from Arabana Wankanguru language, which shows an immediate anteriority.

55) Anha nhanhi-limaru kari-ri, partyamda nhikimda-ru ngarri-mda.
me-ACC see-PFV they-ERG all here-ABL fly-PRES
'As soon as they had seen me, they (the cockatoos) all flew up from here.'

(Hercus, 1994, p. 280)

(vi) Terminus a quo (*"since p, q"*): *p* identifies a point or period of time in the (relative) past from which onwards *q* has been true. An example is given in (56) from Turkish.

56) Ali okul-a git-tiğinden beri ev-de yalnız-ım.
Ali school-DAT go-CON since home-LOC alone-1SG
'Since Ali went to school, I have been alone.'

(vii) Posteriority (*"before p, q"*): *p* simply follows *q* in time. A related example is given in (57) from Evenki language.

57) Bu suru-re-v purta-vi sokor-dolo-s.
we leave-PST-1PL knife-REFL lose-CON-2SG
'We went away before you had lost your knife.'

(Nedjalkov, 1995, p. 453)

(viii) Terminus ad quem (*"until p, q"*): *p* identifies a point or period of time in the (relative) future up to which *q* is true. An example is given in (57) from Evenki language.

58) Bi tuksa-ća-v deru-knen-mi
I run-PST-1SG get tired-CON
"I run until I got tired."

(Nedjalkov, 1995, p. 452)

Çetintaş Yıldırım (2004) investigates Turkish temporal converbs in terms of syntactic and semantic ways and states that temporal converbs relates the events in the subordinate clauses to the events in the main clause by giving temporal meanings to the complex sentence. She mentions about three categories in terms of temporal relations:

Simultaneity: For the simultaneity relationship, at least two events which happen at the same time on the timeline are required. This relationship is realized by *-ken (while), -DIğI zaman (when)*, -

DIğIndA (when) and *-DıkçA (whenever)* converbial constructions in Turkish. Simultaneity relationship can be given by means of three different patterns according to the beginning points of the events in the converb and main clauses. In the first pattern, the converb clause event begins before the main clause event, the two events are realized simultaneously when the main clause event begins. Example (59) shows the first pattern.

59) Yol-da yürür-ken para bul-du-m.
road-LOC walk-CON money find-PST-1SG
'While I was walking on the road, I found money.'

In example (59), the converb clause event begins before the event in the main clause. The event of "*finding money*" happens when the event of "*walking on the road*" is still in progress.

In the second pattern, the converb and the main clause begin at the same time, and continue simultaneously till the end together. Example (60) shows the second pattern.

60) Asker-ler marş söyle-ye söyle-ye yürü-dü-ler.
soldier-PL chant sing-CON sing-CON walk-PST-3PL
'The soldiers marched, singing a march.'

(Çetintaş Yıldırım, 2004, p. 122)

In example (60), the two events happen at the same time on the timeline. The actions of "*marching*" and "*singing a march*" happen at the same time.

In the third pattern, the main clause event begins before the converb clause event. Two events are realized simultaneously when the converb clause event begins. Example (61) shows the third pattern.

61) Arkadaş-ım evlen-diğinde bir market-te çalış-ıyor-du.
friend-POSS get. married-CON a market work-PROG-PST-3SG
'My friend was working in a supermarket when he / she got married.'

(Çetintaş Yıldırım, 2004, p. 122)

Anteriority: In the anteriority relationship, the event in the converb clause happens before the event in the main clause. This relationship is realized by *-(y)IncA (when)*, *-DIğIndA (when)*, *-DIğI zaman (when)*, *-(A/I) r…-mAz (as soon as)*, *-DIğIndAn beri (since)* and *-DIktAn sonra (after)* converbial constructions in Turkish. Example (62) below shows the anteriority relationship in *-(y)IncA (when)*, *-DIğIndA (when)*, and *-DIğI zaman (when)* constructions.

62) Misafir-ler gid-ince / git-tiğinde / git-tiği zaman babam içeri geldi.
guest-PL go-CON father-GEN in come-PST-3SG
'When he guests went, my father came inside.'

The converbial endings *-(A/I) r…-mAz (as soon as)* and *-DIktAn sonra (after)* indicate that the main clause event happens immediately after the converb clause event. A related example is given in (63).

63) Yatağ-a gir-er gir-mez uyu-du.
bed-DAT get into-CON sleep-PST-3SG
'As soon as he/she got into the bed, he/she slept.'

The converbial endings *-DIğIndAn beri (since)* and *-(y) AlI (since)* indicate that the converb clause event is the initiator of the main clause event. An example is given in (64).

64) Yönetim değiş-tiğinden beri şirket yeniden yapılan-ıyor.
management change-CON company again renew-PROG
'The company is renewing since the management has changed.'

Posteriority: In the posteriority relationship, the event in the converb clause happens after the event in the main clause. This relationship is realized by *–DığIndA (when), -DIğI zaman (when)* and *-mAdAn önce (before)* converbial constructions in Turkish. Examples (65) and (66) below show the posteriority relationship.

65) Sinema-ya var-dığımda / var-dığım zaman film başlamıştı.
cinema-DAT arrive-CON film start-PFV-PST
'When I arrived the cinema the film had started.'

66) Sinema-ya var-madan önce film başlamıştı.
cinema-DAT arrive-CON film start-PFV-PST
'Before I arrived the cinema the film had started.'

In the next subsection, temporal converbial endings in Turkish, namely *-(y)IncA (when), -DIğIndA (when), -DIğI zaman (when), -ken (while), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since), -mAdAn önce (before), -DIktAn sonra (after) and -DIkçA (whenever)* are analysed one by one.

2.1.6.1. -(y)IncA (when)

Lewis (1967) and Underhill (1976) define *-(y)IncA* as "when". Slobin (1995) states that *-(y)IncA* expresses a sequential relation between two events. A related example is given in (67) below.

67) Maç başla-yınca televizyon-u aç-tı-k.
match start-CON television-ACC turn. on-PST-3PL
'When the match started, we turned on the TV.'

In example (67), first, the predicate of the converb clause happens (*the match starts*) and then the predicate of the main clause (*we turn on TV*) happens. As Banguoğlu (1995) states, *-(y)IncA* always denote anteriority of the converb clause event. Slobin (1995) states that the first event in an *-(y)IncA* linkage must have a right temporal boundary; the second event can be bounded or unbounded, without affecting the reading of the temporal relation between the two events. There are no co-reference restrictions between the two clauses. The only possible interpretation is that the onset of the second coincides with the end of the first event. A related example is given in (68).

68) Köpek düş-ünce başın-da-ki şişe kır-ıl-ıyor.
dog fall-CON head-POSS-LOC-REL jar break-PASS-PRE
'When the dog falls, the jar on his head breaks.'

(Slobin, 1995, p. 352)

Johanson (1995) argues that there is a critical border in the *-(y)IncA* clauses. The critical border of the event in the converb clause is a precondition for the event in the main clause. In example (68), the first event (*falling*) needs to reach its critical border in order for the second event (*breaking*) to begin.

Kornfilt (1997) states that the converbial suffix *-(y)IncA*, which is attached to verbal stems, replaces tense and aspect markers and cannot occur with agreement. A related example is given in (69).

69) Ben tatil -e çık -ınca herkes ev-in-e git-ti.
I vocation-DAT go-CON everybody home-3SG-DAT go-PST
'When I went on vocation, everybody went home.'

(Kornfilt, 1997, p. 72)

In example (69), there is no tense and aspect marker nor an agreement marker on the converbial ending of *-(y)IncA*.

2.1.6.2. -DIğIndA (when)

Çetintaş Yıldırım (2004) states that *-DIğIndA* converbial construction specifically indicates a temporal relationship with the matrix constructions. Göksel and Kerslake (2005) defines *-DIğIndA* as "when" and state that its more characteristic function is to indicate that the situation described by the superordinate clause is/was ongoing at the time of the event expressed by the adverbial clause. An example is given in (70) below.

70) Ev-den çık-tığı-mız-da yağmur yağ-ıyor-du.
house-ABL leave-CON rain-PROG-PST-3SG
'When we left the house, it was raining.'

In meaning relationship, *-DIğIndA* denotes simultaneity, posteriority and anteriority. In terms of the simultaneity meaning of *-DIğIndA*, the predicate of the converb clause begin after the predicate of the main clause, leading to the two events which begin in succession occur simultaneously. A related example is given in (71) below.

71) Hırsız yaka-lan-dığında yemek yi-yor-du.
burglar catch-PASS-CON meal eat-PROG-PST-3SG
'When the burglar was caught, he was eating meal.'

It is important to state that the aspectual properties of the main clause affect the interpretation of the converb clause. In example (71), the main clause verb is marked by past tense marker and progressive aspect, which leads to simultaneity interpretation of the converb clause. As well as aspectual properties, when the main clause is copular sentence, it leads to the simultaneity interpretation of the converb clause. An example is given in (72).

72) Yasemin evlen-diğinde yirmi yaş-ında-ydı.
Yasemin get. married-CON twenty year-COP-PST
'When Yasemin got married, she was twenty years old.'

In addition to simultaneity meaning, *-DIğIndA* also denotes anteriority and posteriority. Example (73) below show the anterior meaning of the *–DIğIndA* ending.

73) Misafir-ler oda-lar-ı-na çık-tığında Mehmet Bey içeri gir-di.
guest-PL room-PL-POSS- DAT leave-CON Mehmet Mr. in come-PST-3SG
'Mr. Mehmet came in when the guests went to their rooms.'

(Çetintaş Yıldırım, 2004, p. 124)

In example (73), the converb clause gets its temporal and aspectual interpretation from main clause temporal and aspectual markers. As well as anteriority meaning, *-DIğIndA* also denotes posteriority. Example (74) below shows the posterior meaning of the *–DIğIndA* ending.

74) Eve git-tiğimde, Ayşe ev-i temizle-miş-ti.
house-DAT go-CON Ayşe house-ACC clean-PFV-PST-3SG
'When I went home, Ayşe had cleaned the house.'

It should be noted that the aspectual properties of the main clause affect the interpretation of the converb clause. In (74), it is clearly seen that the aspectual marker and the past tense marker of the main clause lead to the interpretation that main clause event happens before the converb clause event.

2.1.6.3. -DIğI zaman (when)

Çetintaş Yıldırım (2004) states that *-DIğI zaman* converbial ending relates the events in the subordinating clause to the events in the main clause by giving temporal meanings to the complex sentence. Göksel and Kerslake (2005) state that while in meaning there are no differences between *-DIğIndA* and *-DIğI zaman* converbial constructions, both giving the meaning of "when"; there are differences in morphological structures of the converbial constructions. In *-DIğIndA*, converbial suffix is added directly to the verb while in *-DIğI zaman*, the converbial marker is composite, consisting of the subordinator which is followed by a postposition.

In meaning relationship, *-DIğI zaman* denotes simultaneity, posteriority and anteriority. In terms of simultaneity meaning of *-DIğI zaman*, the predicate of the converb clause begin after the predicate of the main clause, leading to two events which begin in succession occur simultaneously. A related example is given in (75).

75) Öğretmen uyar-dığı zaman yazı yaz-ıyor-du-m.
teacher warn-CON write-PROG-PST-1SG
'When the teacher warned, I was writing.'

As in the situation of *-DIğIndA*, the aspectual properties of the main clause affect the interpretation of the converb clause. In example (75), the main clause verb is marked by past tense marker and progressive aspect, thus it leads to the simultaneity meaning in the converb clause construction. As it is stated in the *-DIğIndA* construction, if the main clause is copular sentence, it also gives simultaneity meaning in the converb clause. An example is given in (76).

76) Ali haber-i al-dığı zaman ev-de –ydi.
Ali news get-CON home-LOC-PST-3SG
'When Ali got the news, he was at home.'

In addition to simultaneity meaning, *-DIğI zaman* also denotes anteriority. Example (77) below shows the anterior meaning of the *-DIğI zaman* ending.

77) Temizlikçi git-tiği zaman yemek ye-di-k.
cleaner go-CON meal eat-PST-3PL
'When the cleaner went, we ate meal.'

In example (77), main clause temporal and aspectual markers give anterior meaning to the converb clause. As well as anteriority meaning, *-DIğI zaman* also denotes posteriority. Example (78) below shows the posterior meaning of the *-DIğI zaman* ending.

78) Okul-a var-dığım zaman sınav çoktan başla-mış-tı.
school arrive-CON exam already start-PFV-PST
'When I arrived at the school, the exam had already started.'

In (78), the aspectual properties of the main clause give a posterior meaning to the converb clause.

2.1.6.4. -(y)ken (while)

Slobin (1995) states "the meaning of *-(y)ken* is simple temporal overlap or simultaneity" (p.354). The first event in *-(y)ken* clause construction must be durative and unbounded, and there is no restriction on the temporal contour of the second event. The only interpretation is that the second event is temporally contained in the first, without any regard to relations between either left or right boundaries of the two events. An example is given in (79).

79) Çocuk uy-urken kurbağa kaç-mış.
boy sleep-CON frog escape-PFV
'While the boy was sleeping, the frog escaped.'

Slobin (1995, p. 354)

Kornfilt (1997) states that *-(y)ken* means "while" and is a cliticized form of the unbound morpheme "*iken*", with the same semantics; the cliticized version is preferred in contemporary Turkish. This morpheme attaches to verbs as well as to predicate adjectives and nominals. An example is given in (80).

80) Müdür tatil-de-yken ofis-i ara-ma-dı-m.
director vacation-LOC office-ACC call-NEG-PST-1SG
'While the director was on vacation, I did not call the office.'

(Kornfilt, 1997, p. 72)

Çetintaş Yıldırım (2004) states that *-(y)ken* has a simultaneity meaning in that the predicate in the converb clause begins before the predicate in the main clause and when the event in the main clause is initiated, two events are realized simultaneously. Example (81) below shows the simultaneous meaning of the *-(y)ken* ending.

81) Oyun oyna-r-ken bilgisayar-ım boz-ul-du.
game play-PRS-CON computer-POSS break down-PASS-PST
'While I was playing computer games, my computer broke down."

In example (81), the event in the converb clause (*playing computer games*) begins first, then the event in the main clause (*the computer breaking down*) happens and they are realized simultaneously.

Göksel and Kerslake (2005) analyses *-(y)ken* morphologically and state that the converbial suffix incorporates the copula "*(y)*" and can therefore be suffixed to a range of tense/ aspect/modality markers as well as to non-verbal subject complements. *-(y)ken* is itself tense/aspect-neutral, and produces converbs whose meaning in terms of relative tense and aspect is determined by what precedes the suffix. When suffixed to an aorist-marked stem or to a nominal, a converb with *-(y)ken* expresses a situation that is either coterminous with, or temporally includes the time of the situation expressed by the superordinate clause. This is by far the most common function of *-(y)ken*. A related example is given in (82).

82) Çalış-ır-ken radio-yu hep açık tut-ar-ım.
work-PRS-CON radio-ACC always keep. on-PRS-1SG
'I always keep the radio on while (I am) working.'

(Göksel & Kerslake, 2005, p. 407)

Aydemir (2014) states that *-(y)ken* ending forms a subordinate clause which is connected to the main clause in terms of temporal relationship. The event in the subordinate clause and the event in the main clause happen simultaneously. An example is given in (83).

83) Muhacirler-i seyred-er-ken iç-i parçalan-ıyor-du kız-ın.
emigrant-ACC watch-PRS-CON heart-ACC rip-CON-PST girl-GEN
'The girl was cut to the heart while watching the refugees.'

(Aydemir, 2014, p. 35)

2.1.6.5. (A/I)r…-mAz (as soon as)

In his study on converb clauses in Turkish, Lewis (1967) states that *-(A/I)r…-mAz* gives the meaning of immediate occurrence of the predicate in the main clause. Morphologically, the juxtaposition of the positive and the negative aorist bases denotes "as soon as". He exemplifies such constructions as in (84).

84) Ben otur-ur otur-maz telefon çal-dı.
I sit-CON phone ring-PST
'As soon as I sat down, the phone rang.'

(Lewis, 1967, p. 182)

Banguoğlu (1995) categorizes *-(A/I)r…-mAz* under the category of successive converbs (*gérondif successif*). He claims that *-(A/I)r…-mAz* shows the judgement in the main clause as a natural conclusion of the subordinate clause. A related example is given in (85).

85) Gel-ir gel-mez ben-i ara-sın.
arrive-CON I-ACC call-IPFV-3SG
'As soon as he comes, have him call me.'

(Banguoğlu, 1995, p. 433)

Kornfilt (1997) defines *-(A/I)r…-mAz* as "a compound form, consisting of the singular aorist of a verb, immediately followed by the negated form of the same verb, with the meaning of as soon as" (p. 71). She further states that this form is not inflected for subject agreement and thus does not alternate with changing values of person and number features for subject. An example is given in (86).

86) Müdür / Ben gid-er git-me-z memur-lar iş-lerin-i bırak-tı-lar.
director / I go-PRS-CON employee-PL work-3PL-ACC leave-PST-3PL
'As soon as the director / I left, the employees left their work.'

(Kornfilt, 1997, p. 71)

Çetintaş Yıldırım (2004) states that *-(A/I)r…-mAz* converb clause has an anterior meaning relationship related to main clause and it does not convey any other meaning relationships, such

as simultaneity and posteriority. It indicates the immediate succession of the main clause in the complex sentence. A related example is given in (87).

87) Çocuk yatağ-a yat-ar yat-maz uyu-du.
child bed-DAT go-CON sleep-PST-3SG
'As soon as the child went to bed, he slept.'

In example (87), the converb clause event (*going to bed*), occurs, and then the main clause event (*sleeping*) occurs immediately.

Göksel and Kerslake (2005) state "the juxtaposition of the positive and negative aorist stems of the same verb in the converb *-(A/I)r…-mAz* gives the meaning of as soon as" (p. 416). An example is given in (88).

88) Su kayna-r kayna-maz altını kıs.
water boil-NEG-PRS heat-ACC turn. down-IPFV
'As soon as the water boils turn down the heat (under it).'

Göksel and Kerslake (2005, p. 416)

2.1.6.6. -DIğIndAn beri (since)

Banguoğlu (1995) states that *-DIğIndAn beri* is under the category of initial converbs (*gérondif initial*). It shows a starting point meaning relationship for the predicate in the main clause. An example is given in (89).

89) Bu iş-i al-dığınızdan beri gör-ün-me-di-niz.
this job-ACC get-CON since see-PASS-NEG-PST-2PL
'You haven't been seen since you got this job.'

In example (89), it is clearly seen that the event in the converb clause (*get the job*) is the starting point for the event in the main clause (*not being seen*).

Kornfilt (1997) defines *-DIğIndAn beri* as "since" and state that the converbial marker is composite, consisting of the subordinator which is followed by a postposition. Çetintaş Yıldırım (2004) defines *-DIğIndAn beri* as a temporal converb whose main function is to present the converb clause event as the initiator of the main clause event. In this sense, *-DIğIndAn beri* conveys the anteriority of the converb clause event. An example is given in (90).

90) Sen git-tiğinden beri yemek ye-mi-yor.
you go-CON since meal eat-NEG-PROG-3SG
'He / she has not been eating since you went.'

In example (90), the event in the converb clause (*going*) happens before the event in the main clause (*not eating*). It should be noted that while the verb in the main clause can have past tense, the progressive and the perfect aspect, it cannot have the future marker *"-AcAk*". If the main clause verb is marked with the future marker "*-AcAk*", it indicates that the event in the main clause has not been realized yet, which leads to ungrammatical sentence. A related example is given in (91).

91) * Sen git-tiğinden beri yemek ye-me-yecek.
you go-CON since meal eat-NEG-FUT-3SG
'He / she will not eat since you went.'

Example (91) is ungrammatical because the event in the converb clause must precede the event in the main clause. The future marker in the main clause verb shows that it will happen in a particular time in the future, which leads to inconsistency of events related to time of the occurrences.

2.1.6.7. -mAdAn (önce) (before)

Gračanin-Yüksek (2005) analyses *-mAdAn önce* in Turkish morphologically and defines it as "denoting temporal antecedence, which correspond in meaning to English clauses headed by the subordinator before" (p. 26). She states that the converbial ending *-mAdAn* is complex in structure in that it consists of the ablative marker "*-dAn"* and the and the morpheme "*-mA"*. It is followed by the postposition "önce" optionally. An example is given in (92).

92) Okul-a git-meden önce yemek ye-di-m.
school-DAT go-CON meal eat-PST-1SG
'Before I went to school, I ate meal.'

Göksel and Kerslake (2005) state that *-mAdAn (önce)* is the converbial counterpart of the postposition "önce" (before). The stress in *-mAdAn (önce)* falls on the syllable before "*-mA*". A related example is given in (93).

93) Sorun-lar ben GEL-meden (önce) başla-mış.
problem-PL I come-CON before start-PFV

‘The problems seem to have started before I came.’

(Göksel & Kerslake, 2005, p. 417)

In example (93), the stress in the converbial falls on the syllable (*gel* (come)) before “*-mA*”.

In their postpositional function, “*önce*” can be modified by an adverbial of quantity or an expression denoting a period of time. An example is given in (94).

94) Ali, baba-sı öl-meden iki ay önce doğ-du.
Ali father-GEN die-CON two month before born-PST-3SG
‘Ali was born two months before his father died.’

(Göksel & Kerslake, 2005, p. 417)

Gračanin-Yüksek (2005) agrees with Göksel and Kerslake (2005) arguing that word stress falls on the immediately preceding syllable before “*-mA*”. An example is given in (95).

95) Müdür tatil-e ÇIK-ma-dan önce ev-i-ni ara-dı-m.
director vocation-DAT go-NEG-CON before home-3SG-ACC call-PST-1SG
‘Before the director went on vocation, I called his home.’

(Kornfilt, 1997, p. 70)

Kornfilt (1997) states that “*-mA*” is an unusual marker in this construction. Although it is a negative morpheme, it does not negate the predicate semantically in this usage. Example (95) also shows that converb construction lacks two of the salient properties exhibited by nominalized clauses: nominal agreement marker on the predicate, and genitive marker of the subject. However, it does bear the typical property of nominals: the subordinate clause carries a case marker.

Çetintaş Yıldırım (2004) states that *-mAdAn (önce)* denotes posteriority of the converb clause event related to the main clause event. She further states that “*önce*” can be deleted from the complex sentence. A related example is given in (96).

96) Ayşe ile okul-a git-meden pratik yap-tı-k.
Ayşe with school-DAT go-CON practice make-PST-1PL
‘We made practice with Ayşe before she went to school.’

Çetintaş Yıldırım’s (2004) views conflict with Kornfilt’s (1997) view on the meaning of “*-mA*”. Çetintaş Yıldırım’s (2004) sees “*-mA*” as a negation marker and states that this marker indicates that the event in the converb clause has not been realized yet at that particular point of time when the event in the main clause is realized. On the contrary, Kornfilt (1997) does not see “*-mA*” as a

negation marker stating that it does not negate the predicate semantically in temporal converbial construction usage.

2.1.6.8. -DIktAn sonra (after)

Göksel and Kerslake (2005) state that *-DIktAn sonra* is the converbial counterpart of the postposition sonra "*after*". The event in the converbial clause happens before the event in the main clause. An example is given in (97).

97) İş-e başla-dıktan sonra iyi para kazan-dı.
work-DAT start-CON after good money earn-PST-3SG
'After he started working, he made good money.'

The stress in *-DIktAn sonra* falls on the syllable after "*-DIk*". The difference between *-DIktAn sonra* and *-mAdAn (önce)* is that *–mAdAn* is followed by the postposition "*önce*" optionally while *–DIktAn* is followed by the postposition "*sonra*" compulsorily.

In its postpositional function, "*sonra*" can be modified by an adverbial of quantity or an expression denoting a period of time. A related example is given in (98).

98) Sınav başla-dıktan iki saat sonra okul-dan çık-tı.
exam start-CON two hour after school-ABL get. out. of-PST-3SG
'He got out of school two hours after the exam had started.'

Akkuş (2019) states that *-DIktAn sonra* only denotes anteriority of the converb clause, it does not convey any other kind of temporal meaning relationship such as simultaneity and posteriority. An example is given in (99).

99) Fatma para-yı al-dık-tan sonra defter-e not al-dı.
Fatma money-ACC take-CON after notebook-DAT take. note-PST-3SG
'After Fatma took the money, she took note on the notebook.'

(Akkuş, 2019, p. 82)

2.1.6.9. -DIkçA (whenever)

Banguoğlu (1995) states that *-DIkçA* is under the category of temporal converbs (*gérondif temporal*) and it gives the meaning relationship of repetition. A related example is given in (100).

100) Görüş-tükçe hatrı-nı sor-ar-ım.
meet-CON about-ACC ask-PRS-1SG
'Whenever we met, I ask about.'

Kornfilt (1997) defines *-DIkçA* as converbial ending which denotes continuous action. Göksel and Kerslake (2005) state that the meaning of *-DIkçA* is "whenever". The event in the converb clause happens at the same time with the event in the main clause. An example is given in (101).

101) Ankara-ya dön-dükçe her taraf-ını değişmiş bul-ur-um.
Ankara-DAT return-CON each side-ACC changed find-PRS-1SG
'Whenever I return to Ankara, I find it completely changed.'

(Kornfilt, 1997, p. 72)

Çetintaş Yıldırım (2004) states that *–DIkçA* gives the meaning of simultaneous action to the converb clause. The event in the converb clause begins before the event in the matrix clause and the two events are realized simultaneously when the main clause event is initiated, which is exemplified in (102).

102) Bağır-ır, bağır-dıkça yüz-ü kızar-ır, göz-ler-i büyü-r.
shout-PRS shout-CON face-ACC blush-PRS eye-PL-ACC widen-PRS
'Whenever she shouts, her face blushes, her eyes widen.'

(Çetintaş Yıldırım, 2004, p. 121)

In example (102), the event of converb clause (*shouting*) begins before the event in the main clause (*her face blushing, her eyes widening*), then the two events are realized simultaneously.

Among the temporal converbial constructions in Turkish, *-(y)IncA (when), -DiğIndA (when), -DIğI zaman (when), -ken (while), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since), -mAdAn önce (before), -DIktAn sonra (after),* and *–DIkçA (whenever)* are the most common ones. Apart from these constructions, there are a few temporal converbial endings which are not frequent in use. It is better to talk about them shortly.

The converbial forms *-DIğI sürece*/(*müddetçe)* mean "*throughout the time*". The forms *-(y)IncAyA kadar/değin/dek* and *-(y)AnA kadar* have two meanings, both involving a terminal point. The first meaning is "*until*" and the second meaning is "*by the time (that…)*". The converbial construction *-(y)AlI (beri)* is the equivalent of postpositional phrase with beri "*since*". *-DIğI sırada* is another temporal converbial construction in Turkish, which means "*at the time (that…)*". Temporal converbial construction *DIğI gibi* also occurs in the temporal sense and it means "*as soon as*".

2.2. POSITIONING OF ELEMENTS WITHIN SENTENCES

Greenberg's ground-breaking research (1963) on language typology concerning the positioning of elements within sentences has acted as an inspiring work for linguistic investigation into word order (Erguvanlı Taylan, 1984). Lehmann (1978) states that the categorization of languages into three primary word-order (S(ubject), O(bject), V(erb)) patterns (SVO, VSO, SOV) has formed the basis for a significant portion of contemporary research in both synchronic and diachronic study of languages. Erguvanlı Taylan (1984) explains classifying languages in terms of positioning as follows:

> "The position of the object with respect to the verb (i.e., whether it precedes the verb or follows it) is a determining factor in classifying a language as either VO (SVO, VSO) or OV (SOV); there is then; a distinct set of properties correlated with each word order type. In VO languages, modifiers follow their head, such that orders of the following sorts are found: verb-adverb; verb-infinitive, verb-obj. complement, N-adjective, N-genitive, N-relative clause. In OV languages, modifiers precede their head and the following orders are found: adverb-verb, infinitive-verb, obj. complement-verb, adjective-N, genitive-N, relative Clause-N. Postpositions are predominantly a property of OV languages, while prepositions are a property of VO languages" (Erguvanlı Taylan, 1984, p. 1).

As well as Greenberg's research, the theory of Functional Sentence Perspective put forth by linguists from the Prague school made a substantial contribution to the field of linguistic understanding regarding word order in sentences (Sgall, 1972). This perspective focuses on delineating how the different levels of communicative dynamism (CD) are distributed across the components of a sentence. CD denotes the quantity of communicative significance conveyed by a component within a sentence. The word order in a sentence (referred to as sentence linearity) serves the communicative intent of discourse. As a result, the order should commence with elements possessing a lower degree of communicative significance and progress towards those with a higher degree of communicative significance. Thompson (1978) added a new perspective to the examination of word order studies. Word order can take on different roles in a language, possibly categorized as either the Grammatical word order type, where the arrangement of predicates and arguments holds grammatical significance (e.g., English), or the Pragmatic word order type, where this arrangement serves a pragmatic purpose (e.g., Russian or Czech). In certain languages, such as Spanish, word order can serve both grammatical and pragmatic functions simultaneously.

Regarding word order typology, Turkish is categorized as a relatively rigid SOV language and we can make reasonably accurate predictions about the arrangement of constituents in specific constructions based on this characteristic. Often, the sentence construction in the language deviates from the standard SOV sequence, though. Erguvanlı Taylan (1984) states that this

deviation is more than just a stylistic alteration of the default word order because (a) there are specific syntactic limitations that operate, (b) pragmatic factors that govern these deviations and (c) psychological circumstances that arise during language processing and production.

Greenberg (1963) states "linguists are, in general, familiar with the notion that certain languages tend consistently to put modifying or limiting elements before those modified or limited, while others just as consistently do the opposite" (p.76). Turkish, exemplifying the first category, positions adjectives ahead of the nouns they describe, situates the verb's object before the verb itself, places the dependent genitive before the governing noun, and positions adverbs before the adjectives they qualify, among other linguistic features. Furthermore, in such languages, there is a tendency to use postpositions for concepts expressed by prepositions in English. An example of the contrasting type is Thai, where nouns are typically followed by adjectives, verbs are followed by objects, governing nouns precede the genitive, and prepositions are used. Most languages do not exhibit such distinct markings in this regard. For instance, in both English and Thai, prepositions are used, and the object typically comes after the verb. However, English shares a similarity with Turkish in placing adjectives before nouns. Additionally, English allows for both orders in genitive constructions, such as "John's house' and "the house of John." More detailed consideration of these and other phenomena of order reveals that the aforementioned factors play significant role in the positioning of elements within sentences.

2.2.1. Positioning in Converbial Constructions

Languages employ different positional patterns for complex sentences comprising of two clauses, serving as the primary components of a bi-clausal structure (Diessel, 2005). Greenberg's (1963) research on the associations among word order shows that in languages with strict object-verb word order, adverbial clauses consistently come before the main clause or predicate. Diessel (2001) states that there are six major positional options for adverbial clauses and develops a classification of the languages based on these. In ADV-S/VP option, adverbial clauses come before the main clause; in S/VP-ADV option, adverbial clauses come after the main clause. This classification includes (a) rigid ADV-S/VP languages, (b) non-rigid ADV-S/SVP languages, (c) flexible ADV-S/VP + S/VP-ADV languages, (d) mixed ADV-S/VP + S/VP-ADV languages, (e) non-rigid S/VP-ADV languages and (f) rigid S/VP-ADV languages.

In languages with rigid ADV-S/VP structures, the adverbial clauses typically come before the main clause or predicate, almost without exception, such as in Lezgian which is exemplified in (103).

103) Küced-aj zwer-iz zwer-iz salaz-z Cükver-ata-na
street-from run-CON run-CON garden-DAT Cükver-come-AOR
'Cükver came running into the garden from the street.'

(Haspelmath, 1995, p. 380)

Haspelmath (1995) states that similar to other subordinate elements, adverbial clauses in Lezgian typically come before their governing verb in the main clause. Because they are often complex or lengthy, they usually appear before all other elements in the main clause. Less frequently, the adverbial clause may be positioned within the middle of the main clause.

Adverbial clauses usually precede the main clause or predicate in languages that are not rigidly ADV-S/SVP, but they can also appear readily at the end of the sentence, such as in Turkish which is exemplified in (104).

104) Orman-da dolaş-ır-ken bir tilki gör-dü-m.
forest-LOC walk. about-AOR-CON a fox see-PST-1SG
'While walking in the forest I saw a fox.'

(Göksel &Kerslake, 2005, p. 416)

Kornfilt (1997) states that normally all types of adverbial clauses in Turkish precede the main clause. Therefore, it is the default position for these clauses. However, the adverbial clause can also appear in a non-default position.

In languages with flexible ADV-S/VP + S/VP-ADV structures, adverbial clauses appear frequently in both positions, before and after the main clause or predicate. A related example is given from French in (105).

105) Les policiers ont disperse les manifestants en burlant.
the policemen have dispersed the demonstrators CON scream
'The policemen dispersed the demonstrators while screaming.'

(Legendre, 1990, p. 106)

Glinert (1989) states that in languages of this kind, adverbial clauses can conveniently come before or after the main clause, and they may also interrupt it.

Languages that have both ADV-S/VP and S/VP-ADV structures show different distributional pattern since adverbial clauses can be positioned both before and after the main clause or

predicate, whereas certain semantic types of adverbial clauses consistently occur either before or after the main clause / predicate. A related example is given from Babungo (except for time and restrictive clauses) in (106):

106) Nwe ɲyin bu fan vəɲ saɲ ɲwe
he run-PST because as they beat-PST him
'He run away because they were beating him.'

(Schaub, 1985, p. 40)

Schaub (1985) states that the position of adverbial clauses depends on the type of adverbial clause in this group. Only the conditional clause is required to come before the main clause. Time clauses and restrictive clauses, comprising two types, can either precede or follow the main clause, though time clauses typically come after it. In contrast, all other types, including manner clauses, cause clauses, result clauses, equative clauses, and circumstantive clauses, must follow the main clause.

In non-rigid S/VP-ADV languages, adverbial clauses are observed to come after the main clause / predicate, but they also frequently appear at the beginning of the sentence. An example from Arabana Wangkangurru is given in (107):

107) Kutha palyi-wityi-ma-yangu, thika-ru karu Muniranha.
water wide-become-SP-PFV go-back-PST there Muniranha
'When the water had flooded right out it flowed back to there, to Muniranha Fish Hole.'

(Hercus, 1994, p. 273)

Hercus (1994) states that in languages falling into this category, there exists a significant degree of flexibility in the relative positioning of subordinate clauses and main clauses. Generally, the main clause comes before the subordinate clause, but the specific arrangement varies depending on the type of clause in use.

There is no example of adverbial clauses that (almost) always come after the main clause/predicate in rigid S/VP-ADV languages (Diesel, 2001).

Thompson and Longacre (1985) mention that the positioning of converbial clauses is a distinguishing feature in certain languages. For instance, languages like Mandarin, Ethiopian Semitic, Turkish, and several others exhibit the characteristic of converbial clauses preceding the main clause. While this notion holds true to some extent, meaning that the default position of a converb clause in a complex sentence is before the matrix clause, it is worth noting that the converb clause can also be positioned within the constituents of the matrix clause or even follow the matrix clause. Regarding the positioning of converb clauses in Turkish, Kornfilt (1997) states

“in an unmarked word order, all types of adverbial clauses are placed at the beginning of the main clause. However, given the general flexibility of word order in Turkish, the adverbial clause can surface in any position, even post-verbally” (p. 68) as can be seen in (108):

108) [Almanya-ya taşın-dığın-dan beri] ondan bir haber al-a-ma-dı-m.
Almanya-DAT move-CON-3SG since him any news get-AUX-NEG-PST-1SG
Ondan bir haber al-a-ma-dı-m [Almanya’ya taşın-dığ-ın-dan beri]
him any news get-AUX-NEG-PST-1SG Almanya-DAT move-CON-3SG since
‘[Since he moved to Germany] I haven’t heard anything from her.’

(Göksel &Kerslake, 2005, p. 416)

Çetintaş Yıldırım (2004) agrees with the idea of Kornfilt by stating that in Turkish, you do not have to place converb clauses at the beginning of a sentence. She further states that the converb clause may precede the matrix clause, can be placed among the constituents of the matrix clause or can follow the matrix clause. The examples below were taken from Turkish National Corpus (TNC) from Mersin University.

109) Bir ses gel-ince aşağı taraf-a bak-tı-m. (W-DA16B4A-3349-1165)
A noise come-CON down side-DAT look-PST-1SG
‘I looked down when I heard a noise.’

110) Ömür-'e ben kız-acağ-ım onu gör-ünce. (S-BEABXO-0093-360)
Ömür-DAT I be. angry-FUT-1SG her see-CON
‘I'll be angry with Ömür when I see her.’

111) Siz gelmeden önce bir telefon görüşme-si yap-ıyor-du-m. (W-TI42E1B-2942-459)
You come-CON a phone call-ACC make-PROG-PAST-1SG
‘I was making a phone call before you came.’

112) Bir seyis-i hastane-ye kaldır-dı-k siz gel-meden önce. (W-QA16B2A-1314-929)
A syce-ACC hospitalize-PST-1PL you come-CON
‘We hospitalized a syce before you came.’

The examples above indicate that the converb clauses in (109) and (111) are positioned at the beginning of the sentence, whereas in (110) and (112), they are situated after the main clause. With this knowledge at hand, it can be affirmed that it is not mandatory to place converb clauses in the initial position of a sentence in Turkish. The positioning of both the converb and matrix clauses within a complex sentence can vary.

Erguvanlı Taylan (1984) analyses positioning in converbial constructions in Turkish by studying two converbial endings namely *–IncA (when)*, which marks temporal clauses and *-(y)AlI*, which marks "*since*" clauses, as representative out of a fairly large number of converbial endings. She states that three syntactic processes operate in sentences with converbial constructions as can be seen in the examples below:

113) [Ali Ankara-ya gid-ince] ben siz-de kal-abil-ir-im.
Ali Ankara-DAT go-CON I you-LOC stay-AUX-AOR-1SG
'When Ali goes to Ankara, I can stay with you.'

114) Ben siz-de kal-abil-ir-im [Ali Ankara-ya gid-ince].
I you-LOC stay-AUX-AOR-1SG Ali Ankara-DAT go-CON
'When Ali goes to Ankara, I can stay with you.'

115) Ben siz-de [Ali Ankara-ya gid-ince] kal-abil-ir-im.
I you-LOC Ali Ankara-DAT go-CON stay-AUX-AOR-1SG
'When Ali goes to Ankara, I can stay with you.'

(Erguvanlı Taylan, 1984, p. 100)

Erguvanlı Taylan (1984) states that main clauses can appear before the subordinating clauses, which is illustrates in example (114) and the converb clause can be placed among the constituents of the matrix clause as can be seen in example (115) above. She further states that this situation distinguishes converbial constructions from nominalizations, infinitives and participle constructions.

In the literature, the positional patterns of adverbial clauses are studied from (a) discourse-pragmatic, (b) syntactic parsing and (c) semantic perspectives. Verstraete (2004) analyses the position of adverbial clauses in English from discourse-pragmatic perspective, arguing that when the adverbial clause is positioned after the main clause, it typically introduces new information or serves as an additional thought. However, when the adverbial clause comes before the main clause, its aim is to organize the sequence of information in the current discourse. Chafe (1984) studies the usage of adverbial clauses in English and states that pre-posed adverbial clauses serve the function of information flow, orienting the listener or reader temporally, conditionally, casually, or otherwise, to the information in the main clause which is to follow. Postposed adverbial clauses appear to serve a quite different function, being more in the nature of coordinated clause which comment on a time, a condition, a cause, etc. Givón (1990) analyses purpose clauses in English in terms of positioning and states that subordinate clauses that come after the main clause usually focus on the motivation of the agents mentioned in the main clause nearby. On the other hand, subordinate clauses placed before the main clause often have a broader

and less specific range of reference, encompassing not only the motivation of the speaker and other participants in the conversation but also potentially generic or impersonal entities. Diessel (2001) studies the positioning of adverbial clauses in English from syntactic point of view and state that those adverbial clause constructions that commonly appear before the main clause or predicate are exclusive to OV languages. Both VO languages and many OV languages have adverbial clauses that are often placed either before or after the main clause. Diessel (2005) analyses the positioning of finite adverbial clauses in English vis-a`-vis the main clause in terms of syntactic point of view and states that typically, subordinate clauses in conditional constructions come before the main clause, subordinate clauses in temporal constructions can appear in both initial and final positions, and subordinate clauses in causal clauses generally follow the main clause. Wiechman and Kerz (2013) investigate the positioning of concessive adverbial clauses in English by assessing the importance of discourse-pragmatic and processing-based constraints. The results of the study indicate that semantic and discourse pragmatic factors are much stronger predictors of clause position than processing-based ones. Diessel (2001) investigates the adverbial clauses in Punjabi language in terms of positioning and finds that the placement of adverbial clauses changes depending on their intended meaning. Adverbial clauses in conditional constructions come before the main clause, adverbial clauses in temporal constructions have a combination of preceding and following positions, and causal, result, and purpose clauses are often found after the related clause. Diesel (2008) analyses the positioning of temporal adverbial clauses in English in terms of semantic forces and states that temporal clauses indicating an event that happened before another event are more frequently positioned before the main clause compared to temporal clauses indicating an event that occurred afterward. The studies related to the positional patterns of adverbial clauses in Turkish are rather limited and the existing ones are theoretical. Çetintaş Yıldırım (2004) focuses on discourse-pragmatic factors in explaining the positioning in converb clauses in Turkish. She states that information structure is a determinant factor in the positioning of temporal converb clauses in Turkish. Topic, focus and backgrounding are the discourse-pragmatic concepts that effect the positioning of elements in temporal converbial constructions. Demir (2015) analyses adverbial clauses in Turkish and states that adverbial clauses can function as the topic, focus, or background element of the main clause and these pragmatic factors play an important role in the positioning of the adverbial constructions. The current study focuses on the semantic and syntactic processing factors in explaining the positioning of temporal converb clauses in Turkish. *Iconicity of sequence theory*, which is based on a semantic perspective and *processing theory of constituent order*, which is based on a syntactic processing perspective, will be dealt in the next chapter.

CHAPTER 3- THEORETICAL FRAMEWORK

This chapter presents a comprehensive explanation of the theoretical framework of the study: Iconicity of sequence theory and processing theory of constituent order. Then using corpus in language studies and language processing method are presented in detail.

3.1. ICONICITY OF SEQUENCE THEORY

Simone (1995) states that the issue of determining how language depicts the world and how the world is mirrored in language has long been a persistent challenge in philosophy. This complexity stems from its interconnection with various other inquiries: How is the structure of reality shaped? Can we meaningfully discuss "facts"? How can we dissect facts? How are they articulated through language? What serves as the bridge between language and reality? What defines the connection between words and tangible entities? and so forth. In Wittgenstein's (1922) view, the world is essentially a collection of basic facts, and each of these facts is constructed from objects identified by unique names. These facts possess a certain organization, allowing them to interconnect and create specific "*states of affairs*" as he calls them. The representation of the factual world occurs through language, specifically in the form of sentences. For these sentences to serve as accurate representations of reality, they must establish some form of connection or relationship with the world. Wittgenstein's standpoint can be considered as the prime example of the "iconic" theory of syntax. This iconicity theory assumes that sentences represent mental or conceptual representations. Greenberg (1963) relates the universals fourteen and fifteen in his universals of language to the same theory by stating that the order of elements in language parallels that in physical experience or the order of knowledge. For example, in the instance of conditionals, although the truth relations involved are timeless, logicians have always symbolized the order "implying and implied" exactly as in spoken language. If modus ponens is used in proof, then we have a pragmatic example which follows the order of reasoning. No one thinks to write a proof backwards. Croft (2003) talks about "*structural coding*" in explaining iconic motivation in syntax. He states that structural coding is related to how the conceptual value is expressed in grammatical structure. The asymmetry underlying structural coding is described as economic and iconic motivation. Economy is the principle that the expressions should be minimized where possible. The intuition behind iconicity is that the structure of language reflects in some way the structure of experience, that is to say, the structure of the world including the perspective imposed on the world by the speaker. The structure of language is therefore motivated or explained by the experience to the extent that the two match. Iconicity motivates symmetry in grammatical

expression, in both structural coding and behavioural potential. Iconicity can be probably linked to the part of Grice's Maxim of Quantity: "make your contribution as informative as is required." (Croft: 2003, p. 102).

Simone (1995) states that a diverse range of activities are facilitated or initiated by language. These activities can only occur if we understand that certain utterances are diagrammatically connected to sequences of actions over time or physical arrangements in space, and so forth. In this scenario, there is an inherent correspondence between the structure of utterances and the structure of the actions being described. Considering the significant biological significance of activities such as carrying out sequences of orders, languages might have evolved a category of utterance - types that appear to be specifically designed to serve these purposes. Simone (1995) gives an example to explain this phenomenon as can be seen below.

116) Take that book and bring it to me.

(Simone, 1995, p. 161)

Comprehending such a statement is feasible only when (a) the clauses forming it are arranged in the identical sequence as the corresponding action units, and (b) the recipient presumes that the actions demanded must be executed precisely in the same sequence as the clauses that express them. Ungerer and Schmid (2006) talk about the relationship between the arrangement of linguistic elements and the structure of events (and other phenomena) encountered in reality by referring to the term iconic sequencing. To explain the theory of iconic sequencing, they give pairs of sentences given in (117) and (118).

117) He opened the bottle and poured himself a glass of wine.
*He poured himself a glass of wine and opened the bottle.

118) He jumped onto his horse and rode out into the sunset.
*He rode out into the sunset and jumped onto his horse.

(Ungerer & Schmid, 2006, p. 301)

It is clear that in the initial form of both pairs of sentences, the arrangement of the two clauses matches the inherent chronological progression of events. On the other hand, the second versions are, at the very least, unusual because they deviate from this natural sequence. In terms of the rules governing syntax itself, there is nothing incorrect about the second versions. However, these sentences are not acceptable due to the fact that the sequence in which the clauses are organized goes against the principle of representing events in an iconic order.

In his study on the relationship between "subordination" and sequential ordering, Thompson (1987) states that the sequence of subordinate clauses in relation to the main clause can often be altered without disrupting the temporal sequence. He exemplifies this situation as follows in (119).

119) When she began to arrange the flowers in a bowl
a small fly flew out.

(Thompson, 1987, p. 441)

It is evident that since the two events are presented in an iconic sequence, it is justifiable to regard them as components of the temporal structure. Placing the subordinate clause before the main clause or after it can be possible only if the iconicity of sequence is left intact. That is, if clause A reports an event belonging to the temporal foreground sequence and clause B reports a temporally background event, then what cannot happen is this: "A" cannot be marked as syntactically subordinate to "B".

In terms of complex sentences such as converbial constructions, iconicity appears to be a contributing semantic factor that impacts the order of clauses. In other words, the order of elements in complex sentences is affected by the meaning relationships that the complex sentences have. For example, when a temporal clause expresses a previous event, it tends to be placed before the main clause more often than when a temporal clause indicates a subsequent event. Related examples are given in (120) and (121) below.

120) Uyan-ınca benim-le oynar mı-sın? (W-GA16B1A-0732-808)
wake up-CON me. with play-Q-2SG
'Could you play with me when you wake up?'

121) Benim-le oynar mı-sın uyan-ınca?
me. with play-Q-2SG wake up-CON
'Could you play with me when you wake up?'

In example (120), the arrangement of converb clause and the main clause matches chronological progression of events. On the contrary, example (121) deviates from this natural sequence. Iconicity of sequence theory predicts that example (120) is more acceptable than example (121) because the order of clauses resembles that of actions involved.

There are studies reporting that the ordering of clauses in complex sentences often exhibits iconicity. Greenberg (1963) states that in conditional statements, the conditional clause precedes the conclusion as the normal order in all languages. He further adds that in expressions of volition

and purpose, a subordinate verbal form always follows the main verb as the normal order except in those languages in which the nominal object always precedes the verb. He associates these two universals about positioning to iconic motivation. Lehmann (1974) states "the precedence of the conditional clause, with regard to the conclusion, is the only admitted, or primary, neutral, non-marked order in the conditional sentences of all languages" (p. 78). He proposes that subordinate clauses in conditional constructions refer to an event that happens before the one expressed in the main clause in terms of time. Clark (1971) puts forth the argument that *after-clauses* tend to come before the main clause more frequently compared to *before-clauses* in English. This is attributed to the fact that after-clauses refer to an event that takes place prior to the one described in the main clause, while before-clauses refer to an event that occurs afterwards. Utilizing a collection of linguistic data derived from both spoken and written English corpus, Diessel (2008) states that there exists a distinct association between the order of clauses and iconicity. Temporal clauses expressing a preceding event tend to appear before the main clause more frequently compared to temporal clauses indicating a subsequent event. Although all these investigations indicate the significance of iconic sequence in shaping the linear structure of complex sentences, it is crucial to highlight that the distributional characteristics of particular types of adverbial clauses do not align with the principle of iconicity. Diessel (2001) analyses the causal clauses in a typological study and states that the placement of causal clauses contradicts the iconic sequencing principle. While causes and reasons are logically antecedent to the effect described in the main clause, causal clauses often tend to be positioned at the end of the sentence. Furthermore, although the placement of conditional clauses adheres to the principle of iconic sequencing, there is another possible reason for their distribution. When the conditional clause comes after the main clause, it is possible for the listener to initially misconstrue the preceding main clause as a statement of fact. Given that revising a previous statement adds cognitive processing demands, there is a strong motivation to position conditional clauses ahead of the main clause (Diessel, 2008). As it is clearly seen, iconicity of sequence cannot be the sole determinant in explaining the sentential positions of the converb clauses. Thus, *processing theory of constituent order*, which is based on a syntactic processing perspective, will be dealt in the next subsection.

3.2. PROCESSING THEORY OF CONSTITUENT ORDER

Givon (1988) states that the primary factors influencing permissible word order variations according to the grammar are related to "information structure", which includes pragmatic-semantic concepts like predictability, significance, agency, definiteness, and so on. Hawkins (1992) states "it is generally agreed that syntactic weight or length is also relevant in performance,

but the extent of this relevance is usually seen as being limited to a handful of structures that are particularly difficult for processing, such as center embeddings and the positioning of finite clause complements" (p. 196). He further states that in languages with flexible word order, the primary factor influencing variations in word order is the grammatical complexity of a sentence, with considerations of information playing a secondary role.

Diessel (2005) states "Hawkins' principal idea is that words and phrases are arranged in such a way that linear ordering is subservient to constituent-structure recognition" (p. 456). The primary parsing principle proposed by Hawkins is referred to as "Early Immediate Constituents" (EIC). Following this principle, the human parser favours word and phrase orders that have a short "constituent recognition area". Hawkins (1992) defines this principle as follows:

> "The constituent recognition domain of a phrasal mother node M is the ordered set of words in a parse string that must be parsed in order to recognize all ICs (immediate constituents) of M, proceeding from the word that constructs the first IC on the left, to the word that constructs the last IC on the right, and including all intervening words" (Hawkins 1992, p. 198).

Complex sentences are structures composed of two clausal immediate constituents (ICs), namely the main clause and the subordinate clause. They are governed by a mother node "S", created by the subordinating conjunction or subordinating suffix depending on the language, signalling that the currently processed structure comprises two clauses: an adverbial clause and a main clause. Figure 1 below shows the structure of immediate constituents of the temporal converb clause constructions in Turkish.

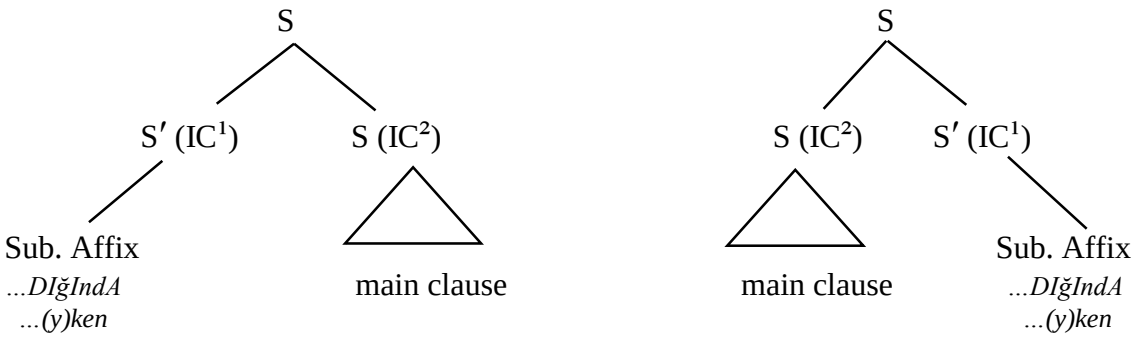

Figure 1*: The structure of immediate constituents of the temporal converb clause constructions in Turkish*

As seen in Figure 1, Hawkins (1992) states that syntactic parsing is guided by principle that prefers those orders of words and phrasal constituents that allow for a rapid access to all immediate constituents (ICs) of a mother node (M), once the first IC has been recognized as a daughter of M. This principle predicts that complex sentences with initial adverbial clauses are

easier to parse (and thus preferred) than complex sentences in which the adverbial clause comes after the main clause in right branching languages in which adverbial clause is marked by a final subordinator. In right branching languages, complex sentences with final adverbial clauses require keeping the entire main clause (IC^2) in the short term memory until the subordinate clause (IC^1) is accessed, while complex sentences with initial adverbial clauses simply add the main clause (IC^2) to the structure that has been created by parsing the subordinate clause (IC^1).

The second reason for the processing difficulty is that when the adverbial clause comes after the main clause, it is not immediately evident that the sentence is composed of two clauses. In this scenario, the parser cannot create the mother node "S" that governs the entire sentence until it encounters the subordinating suffix, which organizes the complex sentence after processing the main clause. In other words, when the adverbial clause comes after the main clause, the parser identifies the mother node "S" when it can immediately access both ICs: main and adverbial clauses can be attached to "S" as soon as this node is constructed. Hence, the recognition domain is significantly longer when the adverbial clause comes after the main clause.

Related examples are given in (122) and (123) from Japanese, which is a right branching language, to show the syntactic parsing strategy.

122) [Bukka ga agatta *node*], minna ga komatte iru
price rose CON all suffering AUX
'Because prices have gone up, all are suffering.'

123) Minna ga komatte iru [bukka ga agatta *node*]
all suffering AUX price rose CON
'Because prices have gone up, all are suffering.'

(Kuno, 1978, p. 22)

In example (122), the converb clause comes before the main clause. According to processing theory of constituent order by Hawkins (1992), the parser adds the main clause to the structure that has already been created by parsing the converb clause. However, in example (123), the parser needs to keep the entire main clause in the short term memory until the subordinate clause is accessed, which creates a longer recognition domain and in turn is hard to process, and thus it is not preferred. So then the reason why right branching languages like Turkish and Japanese tend to place all adverbial clauses before the main clause is related to the grammatical complexity of a sentence.

There are studies reporting that syntactic weight, length and complexity play role on the positioning of complex sentences. Diessel (2005) analyses the ordering distribution of main and adverbial clauses in English by using corpus data from spoken and written English. The results show that final occurrence of adverbial clauses is motivated by processing forces. Complex sentences with final adverbial clauses are easier to parse and thus preferred than complex sentences in which the adverbial clause precedes the main clause in English. Dryer (1980) analyses the positional tendencies of sentential subjects and sentential objects, subordinate clauses which function as subject or object of their sentence in English. He finds that processing difficulties may be the factor that affects the positional tendencies of sentential noun phrases. Diessel (1996) studies the processing factors of pre and postposed adverbial clauses in English and German. The results show that preposing of conditional and concessive clauses is motivated by semantic processing factors. Postposing of conditional and concessive clauses is motivated by particular discourse factors. The results further show that the distributional behaviour of temporal and causal clauses in final position is motivated by a certain parsing principle. These studies refer to corpus data in order to make judgement about the role of syntactic weight, length and complexity on sentential positions of complex sentences. They did not apply any experimental design to observe the real time processing difficulties of the human parser. The current study benefits from reading time data in order to observe the processing difficulties in complex sentences.

3.3. CORPUS

This section gives information about the definition of corpus and using corpus in language studies in a comprehensive way.

3.3.1. Definition of Corpus

O'Keeffe, McCarthy and Carter (2007) define corpus as "a collection of texts, written or spoken, which is stored on a computer" (p. 1). Biber, Conrad and Reppen (1998) point out that corpus is a principled compilation of texts that can be used for both qualitative and quantitative analysis. The terms "principled", "collection" and "qualitative and quantitative analysis" are important concepts in the definition of corpus. First of all, the collection should be in a principled way. Any old collection of texts does not make a corpus (Crowdy, 1993). A corpus must accurately represent something, and its value is frequently assessed based on its level of representativeness. O'Keeffe et al. (2007) state that to build a corpus representing classroom discourse, for example, great care

must be taken at the design stage of a corpus so as to ensure that it is representative. The design matrix should ideally capture all the essential variables of age, gender, location, type of school, level, teacher, class size, location, nationalities and so on. Second the "collection" of texts are usually stored on a computer. Due to corpora being stored on a computer, it becomes feasible to accumulate and analyse vast quantities of text using specialized software. Language corpora can consist of either written or spoken texts, or a combination of both. In the case of a written language corpus, texts can be digitized and input into a computer through methods such as scanning, typing, downloading from the internet, or utilizing pre-existing electronic files. On the other hand, assembling corpora of spoken language requires significantly more time and effort (McEnery et al., 2006). For example, a spoken corpus may be coded for different speaker turns, interruptions, speaker overlaps, truncated utterances, extra-linguistic information such as 'giggling', 'door closes in background', 'dog barking; thus, recording and transcribing the data need a lot of time and work. It leads to written corpora's being much more plentiful and usually much larger than spoken ones. Third, corpus is available for qualitative and quantitative analysis. We can look at a language feature in a corpus in different ways. For example, by using a newspaper corpus, we could analyse the frequency of occurrences for words like "*fire*" and "*blaze*". This will give us quantitative results, that is, numbers of occurrences, which we can then compare with frequencies in other corpora, such as casual conversation or general written English. This observation could potentially lead us to infer that the term "*blaze*" is more commonly used in newspaper articles compared to everyday English conversations or writing, especially in the context of discussing destructive fire outbreaks. This conclusion is arrived at through quantitative means.

Choosing the right corpus that best suits to the needs of the research is very essential (McCarthy, 1998; Biber et al.,1998; Meyer, 2002 and Adolphs, 2006). For example, some may wish to use a corpus for research purposes to study how a lexical item or pattern is used. Others may wish to compare the use of an item in different language varieties, for example "*will*" and "*shall*" in American versus British English (Carter and McCarthy, 2006). In such situations, the selected corpus should ideally offer the most accurate representation of the language or language variation under study. Moreover, while comparing different language varieties, it is essential that the corpora themselves should be comparable.

McEnery and Wilson (2001) agree with McEnery et al., (2006) on the characteristics of corpus. They state that any collection of more than one text can be called a corpus, however, the term, when used in the context of modern linguistics, tends most frequently to have more specific connotations than this simple definition provides for. These important characteristics are (i) sampling and representativeness, (ii) finite size, (iii) machine-readable form and (iv) a standard

reference. First of all, sampling and representativeness are very important characteristics of a corpus because we are interested in a whole variety of a language for data collection. The total text population is huge, and with a living language such as Turkish, the number of utterances is constantly increasing and theoretically infinite. To analyse every utterance in such a language would be an impossible task. It is therefore necessary to build a sample of the language variety in which we are interested.

Chomsky (1984, 1988) criticizes corpus based studies in understanding human linguistic potential and nature of human language because corpora would always be skewed. He states that certain utterances might be omitted from the corpus due to their rarity, while some significantly more common utterances could be excluded purely by chance. Additionally, chance factors could result in the inclusion of certain rare utterances in the corpus. Chomsky's ideas regarding the potential bias in corpora are valuable; however, advancements in modern computer technology now enable the collection of significantly larger corpora compared to Chomsky's era. In linguistic studies, we need to choose a sample, which is maximally representative of the variety under examination with samples of a broad range of different genres.

Along with sampling, finiteness is another important characteristic of corpora. Corpus tends to imply a body of text of a finite size. For example, Lancaster-Oslo/Bergen corpus and the Brown corpus have one million running words of text while British National Corpus (BNC) has one hundred million running words, which makes these corpora a reliable source of quantitative data about a language (McEnery & Wilson, 2001).

Another important characteristic of corpus is that it is machine readable. Corpus which is a machine readable has many advantages. The most important advantage is that it may be searched and manipulated easily using a concordance software.

Lastly, a corpus constitutes a standard reference for the language variety which it represents, which assumes that the corpus is readily accessible to other researchers. Brown corpus of written American English, London-Lund corpus for spoken British English and Turkish National Corpus (TNC) for written and spoken Turkish are a few corpora among many standard reference corpora. The benefit of having a widely accessible corpus is that it serves as a benchmark against which subsequent studies can be evaluated.

The use of corpora in linguistic studies has gained importance recently (Lüdeling & Kytö, 2008). The significance of corpora in language studies is closely linked to the broader importance of empirical data in general. O'Keeffe et al. (2007) state that empirical data allows linguists to make objective statements grounded in the actual reality of language, rather than subjective statements

influenced by an individual's internalized cognitive perception of the language. With the empirical data at hand, qualitative and quantitative analyses contribute to corpus studies a lot. Qualitative analysis can provide great richness and precision while quantitative analysis can provide statistically reliable and generalizable results (McEnery & Wilson, 2001).

Lüdeling and Kytö (2008) talk about the role and function of corpora in language studies and mention three major purposes to use corpora: The first one is empirical support. Many researchers employ corpus as a valuable resource known as an "example bank". Essentially, they want to get empirical evidence to substantiate the hypotheses, principles, or rules they are currently investigating. The methodology of corpus linguistics offers a search tool that typically allows for effective retrieval of relevant examples within a specific corpus, ensuring a high recall rate. Secondly, corpus can give frequency information. Corpora offer frequency data concerning words, phrases, or constructions, which can be utilized in quantitative studies. Quantitative studies are used across various domains of theoretical linguistics and computational linguistics. They facilitate the exploration of similarities and differences among diverse speaker groups or text types. Additionally, they give essential frequency information for psycholinguistic research and other related studies. Lastly, a corpus can offer additional information, also known as meta-data, regarding factors like the age or gender of the speaker / writer, text genre, temporal and spatial details about the text's origin, and more. These extra-linguistic data enable comparisons between various text types or distinct speaker groups.

After giving the definition and characteristic features of corpus and its importance in language studies, it is better to talk about the types of corpora shortly. Baydal (2016) states "the purpose, the degree of the representativeness, the structure and the formation of the corpus determine the type of corpus" (p. 12). Corpus types are classified into six categories according to their functions. These are (i) specialized corpus, (ii) dialect corpus or regional corpus, (iii), learner corpus, (iv) comparable corpus, (v) parallel corpus and (vi) general (reference) corpus. A *specialized corpus* is created with a specific purpose (Kennedy,1998). Specialized corpora can include examples such as journal articles, essays written by students, newspaper news, or history books. *Dialect* or *regional corpus* is a particular type of spoken corpus designed for the purpose of exploring regional language variations. With a dialect corpus, speakers can be categorized based on their dialects, and various pronunciations can be discerned and differentiated (Baker et al., 2006). *Learner corpus* comprises texts produced by learners, whether spoken or written. Its purpose is to compare the students' texts, such as essays written by them, either amongst themselves or against a substantial reference corpus (Callies, 2013). A *comparable corpus* is used to assess the similarities and differences between two or more corpora, either in different languages or within

the same language but with distinct dialects. A *parallel corpus* is employed to conduct comparisons between texts from two distinct languages. The last type of corpus, namely *general (reference) corpus* is the main target of this study. A general corpus is composed of data gathered from a wide variety of different sources. A general corpus can comprise written or spoken data, or a combination of both, spanning one or multiple time periods and encompassing one or multiple countries. Most widely known general (reference) corpora are British National Corpus (BNC), Brown Corpus and Cambridge International Corpus (CIC).

In comparison to other languages with extensively documented histories and grammars, Turkish is not as thoroughly studied. While some catalogues of constructions and structures have been compiled, the number of comprehensive grammars or general descriptions for Turkish remains limited. Current linguistic research in Turkish primarily focuses on specific areas like discourse analysis, pragmatics, and syntax, with fewer works dedicated to semantics, lexicology, or other domains due to the need for more extensive datasets. Therefore, having a well-balanced and representative corpus of Turkish is crucial, given the relatively small amount of accumulated and documented linguistic resources available for the language.

Aksan and Aksan (2018) state that currently, in Turkish, there exist at least three distinct types of corpora. These are; (i) large-sized general linguistic corpora, created and accessible to users through suitable corpus tools, (ii) small-sized specialized corpora designed to investigate specific research inquiries, with access restricted to the creators only and (iii) NLP corpora developed without linguistic considerations but primarily intended as testing resources for algorithms designed for various applications.

The first large-sized general linguistic corpora which is designed and compiled to represent modern Turkish is the Middle East Technical University (METU) Turkish Corpus. Özge and Say (2004) state that this corpus marks the initial endeavour to create a balanced, written Turkish corpus, with the hope that it will be beneficial for both descriptive and theoretical investigations. METU Turkish corpus includes two sub-corpora, namely METU-Sabancı Turkish Treebank and The METU-Turkish Discourse Bank (METU-TDB). METU-Sabancı Turkish Treebank's having 7260 sentences and 65,000 words and The METU-Turkish Discourse Bank's approximately 400,000-words lead to their being adequate source in meeting the demands of linguistic research. As it is stated before, the significance of balance and representativeness of corpora has grown considerably in considering a reference corpus as a dependable data source for analysing language usage patterns across diverse genres, contexts, and among users of varying ages and genders, among other factors. Halliday et al. (2004) agree with this idea by stating that for any comprehensive reference corpus, a minimum size of 50 million words is expected.

METU Turkish corpus' inadequacy led to the construction of large-scale general reference corpus of Turkish. Turkish National Corpus (TNC) by Mersin University is a well-balanced, representative, and large-scale (50 million words) free resource of a general-purpose corpus of contemporary Turkish (Aksan & Aksan, 2018, p. 303). The major design principles were derived from the British National Corpus (BNC) experiences, with slight adjustments. The fundamental concept was to construct a linguistic corpus mirroring the language in a well-balanced fashion, following the BNC model. McEnery et al. (2006) state that BNC is widely acknowledged as a balanced corpus, and numerous other large-sized reference corpora currently accessible, such as the American National Corpus, the Korean National Corpus, and the Polish National Corpus, also adopt the BNC model to attain balance and representativeness. It was aimed to reduce the corpus size of the TNC to half of the BNC's size while maintaining proportional distribution of the corpus content. The distribution of the number of words in the corpus is preserved proportionally for each *medium*, *time span*, and *text domain.*

The imaginative domain primarily consists of fictional works like novels, short stories, poems, and drama, while the informative domain includes texts related to sciences, arts, commerce-finance, belief-thought, world affairs, and leisure. Imaginative texts make up 19% of the TNC, while informative texts make up 81%. (Aksan et al., 2012; Aksan & Aksan, 2018). Table 2 below shows the written components of the TNC.

Table 2: *The written components of the TNC (Adapted from Aksan &Aksan, 2018)*

Domain	*Percentage*	*Medium*	*Percentage*
Fiction	19%	Books	58%
Social sciences	16%	Periodicals	32%
Art	7%	Misc. published	5%
Commerce-Finance	8%	Misc. unpublished	3%
Op-ed pieces	4%	Spoken texts	2%
World affairs	20%		
Applied sciences	8%		
Natural sciences	4%		
Leisure writing	14%		

As can be seen at Table 2, in the text domain; fiction, social sciences and world affairs are high in percentage while in the medium; books and periodicals are mostly referred. The spoken texts in the medium means materials that are written to be spoken, such as political speech, news broadcasts, etc. This distribution follows the distribution in the BNC.

The spoken section of the TNC consists of orthographic transcriptions derived from both formal and informal communicative contexts. It encompasses spontaneous, everyday conversations

covering various subjects by individuals of diverse ages and genders, along with samples from meetings, lectures, and speeches. This spoken section, which includes one million words, accounts for 2% of the entire TNC. Aksan and Aksan (2018) state that the ultimate goal is to achieve a corpus size of ten million words for the spoken section. The distribution of domains planned for Spoken Turkish Corpus is given below at Table 3.

Table 3: *Distribution of domains planned for the Spoken Turkish Corpus (Adapted from Aksan &Aksan, 2018)*

Domain	*Percentage*
Conversations among family and/or relatives	25%
Workplace conversations	20%
Education	15%
Broadcasts	15%
Conversations among friends and/or acquaintances	12%
Service encounter	5%
Natural sciences	4%
Other	3%

Table 3 shows that conversations among family and / or relatives and workplace conversations are mostly used domains in the spoken section of the TNC. In domains of spoken corpus, parameters of the BNC were also taken into consideration.

3.3.2. Using Corpus in Language Studies

After defining corpus and giving information about Turkish National Corpus, it is better to mention about the language studies that use corpora. McEnery and Hardie (2012) state that the growing utilization of corpora in linguistic studies brought forth new ideas and approaches that contributed to the revelation of numerous aspects of language structure and language usage.

There are several subdisciplines of linguistics that use corpora to have empirical data such as speech research, lexical studies, grammar, semantics, sociolinguistics, dialectology, psycholinguistics and so on. (McEnery &Wilson, 2001). Concerning speech research, using corpus is very important because it provides a broad sample of speech which extends over a wide selection of variables namely speaker age, gender and class and across a variety of genres such as conversation, news, poetry, liturgy and so on. Referring to corpus is also important in speech research because it provides a sample of naturalistic speech rather than speech which has been elicited under artificial conditions. Wilson's (1989) study on prepositional phrases and intonation group boundaries uses a subsample of Lancaster Spoken English Corpus to find the relationship

between syntactic cohesiveness of a phrase and the likelihood of a prosodic boundary. Altenberg (1990) uses London-Lund Corpus on his study on intonation group boundaries. Other studies that use corpora on speech research are Knowles' (1991) study on perception of intonation and Wichman's (1994) study on differences in the transcriptions of tones.

Regarding lexical studies, corpora have so many contributions for the studies. Corpora mean that lexicographer can sit at a computer and call up all the examples of the usage of a word or phrase from millions of words of text in a few seconds. They provide more up-to-date information about the language. Atkins and Levin's (1995) study of verbs in the semantic class of "*shake*" uses corpora to look at the occurrences of the verbs. Opdahl (1991) uses Lob and Brown Corpora to study the use of adverbs which may or may not have a *"-ly*" suffix. Other study that use corpora on lexical investigation is Bauer and Nation's (1993) study on morphological analyses. He uses Corpus of New Zealand English.

Grammatical or syntactic studies have been the most frequent types of research which have used corpora (McEnery & Wilson, 2001). What makes corpora important for syntactic research is their potential for the representative quantification of the grammar of a whole language variety and their role as an empirical data for the testing of hypotheses. Schmied (1993) studies relative clauses in English and refers LOB and Kolhapur Corpora to get quantitative information about many aspects of relative clauses. Oostdijk and de Haan (1994) use British National Corpus and International Corpus of English to analyse the frequency of the various English clause types.

Regarding the semantic studies, there are two important roles of the corpus. The first one is that it can be used to provide objective criteria for assigning meanings to linguistic items (Mindt, 1991). The second important role of corpora in semantics is in establishing more firmly the notions of "*fuzzy categories*" and "*gradience*" (McEnery & Wilson, 2001). It suggests that probabilistically motivated choices of ways of putting things play a far greater role than a model of language based upon hard and fast categories would suggest. Mindt's (1991) study on futurity of verb constructions denoting future time uses the Corpus of English Conversation to find out how far the sense of futurity appears to be dependent on co-occurring adverbial items and how far it appears to be independently present in the verb construction.

In psycholinguistic studies, in order to test hypotheses about how language is processed in the mind, it is necessary to measure correlates of mental processes such as the length of time it takes to position a syntactic boundary in reading or how eye movements change during reading. Corpora play significant role in psycholinguistic studies. First of all, corpus is a source of data from which materials for laboratory experiments may be developed (McEnery & Wilson, 2001).

Properly sampled corpora are able to provide researchers with more concrete and reliable information about frequency. A related study was carried out by Garnham et al. (1981) who used the London-Lund spoken corpus to look at the occurrence of speech errors in natural conversational English.

Concerning sociolinguistic studies, a corpus can provide a representative sample of naturalistic data regarding age, gender, class, region and so on which can be quantified. Kjellmer's (1986) study on examining masculine bias in American and British English uses the Brown and LOB corpora to look at the occurrences of the lexical items "*man/men*" and "*woman/women*". Holmes (1994) uses corpus in his study of gender related lexical issues. He analyses the frequency of "*Ms*" as compared with "*Miss/Mrs*"; the use of "*sexist*" suffixes and the use of generic "*man*".

As well as subdisciplines of linguistics mentioned above, using corpora has also become popular in other subdisciplines such as discourse analysis, pragmatics, stylistics, text linguistics, language teaching, historical linguistics, dialectology and variation studies and cultural studies. Sampling and quantification, ease of access, enriched and naturalistic data make corpora so important in linguistic studies.

3.4. LANGUAGE PROCESSING

Poirier and Shapiro (2012) state that as speakers (or signers), our task is to carefully choose words that align with our intended message, skilfully combining them to effectively convey our thoughts. As comprehenders, we encounter complex sequences of sounds, signs, or letters and must skilfully comprehend their intended meaning and reconstruct the message they carry. However, on a daily basis, we communicate through speaking or writing and encounter sentences that have never been expressed before. Furthermore, the act of producing or understanding language is fast and seemingly easy, yet the language system itself is exceedingly complex. These issues are core subjects of psycholinguistics. Trask (2007) defines psycholinguistics as "the study of the connections between language and mind" (p. 47). Language acquisition, the links between language use and memory, the linguistic examination of reading, possible links between perception and cognition and language processing have so far been the most prominent areas of psycholinguistics. These topics have been explored with varying degrees of success. Among them, language processing is one of the popular topics in recent years (Blumenthal, 1987; Garnham et al., 2006; Önem, 2022). Trask (2007) states "whenever we produce an utterance, or whenever we hear and understand one, there is a great deal of elaborate activity going on in our brains. This activity is language processing" (p. 47). Psycholinguistics have developed a variety

of methods to understand the different stages involved in language processing. By experimenting with subjects in a lab, researchers can discover how the variation of conditions impacts the accomplishment of language-related tasks. However, the findings are not always simple to explain. Despite the challenges, linguists have made some progress in identifying the different steps involved in speech planning, the mental processes that enable us to produce utterances. Comprehension is even much harder; several perceptual strategies have been suggested, and these are somewhat effective at explaining the understanding of simple and complex utterances.

Önem (2022) states that different models have been proposed about how languages are processed. Poirier and Shapiro (2012) groups these models into three major categories. These are (a) form based models, (b) constraint based models and (c) resource based models. Form-based accounts (FBA) treat the word like a dictionary entry: when the form is found (written or auditory), all information related to this form is accessed. Out of all this information, a word's syntactic category (noun, verb, adverb, etc.) is the element that seems most crucial for parsing the input for FBA accounts. The comprehension system thus has to identify what category the words belong to, so as to know how to merge them. Unlike FBAs, constraint-based accounts (CBAs) do not acknowledge the existence of separate syntactic rules. Instead, syntactic constraints on how words may combine are specified in a word's lexical entry. FBAs tend to view words as "blocks" that exist and are stored as units. In contrast, CBAs assume that words are not stored as entities but arise from the unique pattern of activation of features. In their view, syntactic restrictions are thus one of the many properties composing a word (MacDonald et al., 1994). Even though these two methods differ on their view of the language system, they both aim to explain how linguistic information helps the computation of an interpretation. A third, more diverse group of accounts is less focused on the linguistic description of the comprehension process and more interested in understanding its computational implementation. The main assumption of such accounts is that understanding a sentence requires usage of cognitive resources and that processing difficulty arises from higher consumption of these resources (Poirier & Shapiro, 2012). Resource- based accounts (RBAs) thus tend to contrast two sentences differing in comprehension difficulty (slower reaction times and higher error rates are taken as indicators of a harder sentence) and link extra processing costs to specific features of sentences. To sum up, there is a multitude of sentence comprehension models, with as many views on the structure of a word or the interplay of the many processes involved. Existing models are continuously improved and new frameworks are regularly suggested. Certainly, processing is fast and incremental, and uses many processes and/or types of information to converge onto an interpretation for what is heard or seen.

There are many factors affecting language processing. In their study on individual differences in language processing, Farmer et al. (2019) explore some potential sources of variability in language processing and categorize factors that affect language processing into three broad groups. These are a) verbal working memory, b) cognitive control and c) perceptual and perceptuo-motor related factors. Verbal working memory capacity is the main factor that affects how well people understand language tasks (Caplan & Waters, 1999; Farmer et al., 2019). Just and Carpenter (1992) propose that there is a consistent exchange between working memory and processing resources, so that higher memory demands make processing more challenging, and vice versa. The relationship between language processing and verbal working memory capacity can be seen by the difference in reading times between syntactically complex sentences and simpler ones. A related example is given in (124).

124) The reporter that attacked the senator admitted the error. (subject relative)
The reporter that the senator attacked admitted the error. (object relative)
(Just & Carpenter, 1992, p. 355)

King and Just (1991) discovered that people with low verbal working memory ability took longer to read the difficult regions of sentences as in example (124) that had object-embedded relative clauses, and also made more mistakes on questions about their meaning, compared to people with high verbal working memory ability. As well as verbal working memory, cognitive control is another factor that affect language processing. Cognitive control can be defined as attentional control. Gernsbacher (1997) states that the reason why less-skilled readers had lower language comprehension than more-skilled readers was because their cognitive control was weaker. Novick et al. (2005) suggested that cognitive control may vary among people (and across ages) and may affect how they make syntactic choices, especially when they have to correct their initial interpretations. Perceptual and perceptuo-motor related factors are last factors that affect language processing. Farmer et al. (2019) state that differences in how people perceive things can explain differences in how well they process language in real time. Leech et al. (2007) state that language processing depends a lot on how well one can perceive and process sensory information. When people have to deal with more than one sensory challenge at the same time, their language skills become similar to those who have problems with language development or recovery (Farmer et al., 2019).

Önem (2022) deals with the factors affecting language processing from different perspective. He categorizes factors that affect language processing into five distinct groups. These are (a) age, (b) gender, (c) educational background, (d) changes during the experiment and (e) motivation. Regarding age factor, Era et al. (2011) investigate psychomotor speed in a random sample of 7979

subjects aged 30 years and over and find that as people get older (from 30s to 80s), they take longer to process the sentences make decisions. Age affects their speed more in the multiple-choice test than in the simple test. The processing is also affected by gender. In the same study, Era et al. (2011) find that men are found to process sentences faster than women. Dykiert et al. (2012) study sex differences in reaction time mean and intra-individual variability across the life span and find that men are often found to have faster and less variable reaction times than women. Not all the studies have found a relationship between gender and language processing. In their study on factors influencing the latency of simple reaction time, Woods et al. (2015) found no sex differences in simple reaction time latencies. Regarding to educational background, Krieg et al. (2001) study simple reaction time, symbol - digit substitution and serial digit learning of adults between 20 – 59 years old and find that more educated and richer people did better on tasks when compared to less educated and poor people. The processing may also be affected by changes in the course of the experiment. Baayen and Milin (2010) state that the level of arousal or fatigue, the amount of previous practice, and trial-by-trial sequential effects affect language processing. Lastly, motivation might affect processing. Möckel et al. (2015) study the effects of time on task in response selection and state that when people take part in a cognitive activity for too long, it might result in learning and adaptation effects; they might lose interest or feel tired mentally, which is a condition that makes people think slower and make more mistakes. Önem (2022) agrees with this idea by stating that besides how long people take part in a task and how tired people are, motivation might also affect how they process and perform in language studies.

After giving definition of language processing and its characteristics, it is better to talk about the methods on language processing. Gompel (2013) states that "the sentence has been the focus of much language research" (p. 1). This research resulted in the development of transformational-generative grammars since the 1950s (e.g., Chomsky, 1957, 1965), which are formal grammars with syntactic rules that try to capture all sentences that are grammatical and exclude all sentences that are not. Early experimental research in psycholinguistics examined whether language users followed these rules, especially whether sentences that needed more transformational rules were more difficult to process. However, it became clear in the early seventies that the transformational rules proposed by theoretical linguists did not explain processing difficulty during sentence processing (Gompel, 2013). Because these rules required the whole sentence to be applied, they did not match the experimental evidence for incrementality, that is, for the most part, language users understand sentences word-by-word rather than waiting for the interpretation until the end. (Just & Carpenter, 1980). The discovery that sentence processing is very incremental led to the recognition that research has to use on-line methods, that is, methods that measure processing as language users process the sentence rather than off-line methods, which measure experimental

participants' responses after the sentence is finished (Gompel, 2013). An example of an off-line method is grammaticality judgement, in which participants have to quickly decide whether a sentence is grammatical; longer decision times and more "no" responses indicate that participants had difficulty processing the sentence.

On-line methods are much in number when compared to off-line methods. Gompel (2013) states that the measurement of event related brain potentials (ERPs) triggered by linguistic stimuli during language comprehension is a type of on-line methods. ERPs are variations in the brain's electric signals, which are measured with sensors attached to the heads of the subjects. Research with ERPs has demonstrated that sentences that violate grammar rules cause a positive electrical reaction around 600 ms after the word that is ungrammatical in contrast to sentences that are grammatical. This is known as the P600 effect. The same type of P600 also arises when a sentence with structural ambiguity is resolved in favour of the less favoured interpretation. Therefore, these ERP reactions can be seen as indicators of trouble during the comprehension of sentences with two possible meanings. Cross-Modal Interference is another on-line method in language processing. In this method, while listening to a sentence, a sequence of letters is momentarily displayed on a screen at a specific spot of interest. The duration of making a choice if the string is a valid word or not is compared between two sentences that form a minimal pair. Slower responses indicate harder processing (Poirier & Shapiro, 2012). Cross-Model Priming is another on-line method in language processing which is similar to Cross-Modal Interference but differ from it in terms of application. Marinis (2018) states that Cross-Modal Priming assesses how much lexical and syntactic information is used during sentence comprehension. It involves both hearing and seeing, making it a dual task. This is the reason it is referred to as cross-modal. During each attempt, participants commence by listening to a sentence. Prior to the sentence conclusion, a word or image is displayed on the computer screen. This displayed content is either connected to a word from the preceding sentence or entirely unrelated to it. Upon viewing the word / picture, their task involves swiftly pressing a button to perform either a rapid lexical judgment or a picture categorization. Response times to a word / picture connected to a previously heard word are expected to be quicker than those to an unrelated word / picture, as the former benefits from the presence of a related (or identical) word that appeared before it, leading to facilitation. Eye-tracking is another on-line method which is frequently used in language processing experiments. Eye tracking involves the recording of participants' eye fixation as they read sentences. The duration and location of people's eye gazes on the words are recorded and various eye movement metrics are calculated for segments of the sentence that are important by combining fixations in different ways. A major benefit of this technique is that it enables the study of sentence comprehension in a naturalistic manner, without any extra task like pressing a button (Gompel,

2013). An additional benefit is that the various measurements taken through eye tracking could capture processes taking place at distinct time intervals. For instance, the initial pass measurement captures processing that happens relatively early, whereas the total time measure encompasses fixations that occur during the process of re-reading as well. As well as eye-tracking, self-paced reading is another on-line method which is frequently used in language processing experiments. It will be explained in detail in section 3.4.1 as self-paced reading is the focus of this study. Before explaining self-paced reading in detail, it is better to mention studies on language processing.

The recent introduction of numerous aforementioned methods, along with upcoming ones, is expected to contribute to a continuously expanding surge in research on the psychological foundations of language. Ullman (2013) points out that "the biological bases of language is increasingly integrated with the investigation of the processing and representation of language" (p. 273). There are a lot of research on the processing of language using a wide range of tools and methods for gathering data. For example, in their study on the perception of Japanese vowel length by Australian English listeners, Whang et al. (2019) use a forced-choice task, where participants were required to classify the vowel in the previously mentioned isolated consonant-vowel-consonant stimuli. The study shows that Australian English listeners utilize both spectral and durational cues when categorizing Japanese long / short vowels. This contrasts with earlier studies involving American English listeners, which demonstrated a tendency to less frequently employ durational cues. Felser and Roberts (2007) examine the immediate processing of wh-dependencies among proficient Greek-speaking English learners through a cross modal picture priming task. Participants are tasked with reacting to various types of picture targets placed either in positions with structurally defined gaps or in control positions before the gap while listening to sentences containing indirect-object relative clauses. They find that the learners exhibit distinct processing patterns for the experimental sentences compared to both adult native English speakers and monolingual English-speaking children. In another study, Sonnenstuhl et al. (1999) investigate how native speakers of German process regular and irregular past participles along with noun plurals. In this research, the cross-modal priming approach is utilized, where an auditory cue is followed by a visually displayed target. The researchers identify variations in priming effects between regularly and irregularly inflected forms. In their study on sentences involving temporarily ambiguous structures, Witzel et al. (2009) use eye tracking method to reveal biases based on structure-based parsing principles. Three types of syntactically ambiguous structures are examined; (a) ambiguity in the attachment of relative clauses; (b) ambiguity in the attachment of adverbs; and (c) ambiguity between noun phrase and sentence coordination. The results show that the individuals who speak both Chinese and English exhibit distinct attachment biases on all three structures. Kounios and Holcomb (1994) use the measurement of event related

brain potentials in their study on investigating the idea that abstract words predominantly engage neural assemblies in the left hemisphere, while concrete words utilize bilateral representation. The results show that concrete items elicit greater negativity between 300-500 and 500-800 milliseconds compared to abstract concepts. Within both time intervals, event-related potentials (ERPs) for concrete and abstract words exhibit distinctions over the sites in the right hemisphere, while no distinctions are observed at sites in the left hemisphere.

As well as studies conducted in other languages, there are studies conducted in Turkish using on-line language processing methods although they are limited in number. For example, Çokal (2012) uses eye-tracking experiments to investigate the on-line comprehension of "*this*", "*that*" and "*it*" in English, and to contrast the processing strategies between Turkish non-native speakers and native English speakers. The study shows that there are differences between native and non-native speakers of English on the processing of deictic items. Turan (2018) also uses eye-tracking experiments on his study on the processing of attachment preferences to relative clauses (RC) in Turkish. The study aims to identify potential impacts of different relative clause types (subject and object) on the processing of various attachment types (low, high, and high with ambiguity). The findings show distinct disparities between the two attachment categories. Dikmen (2020) uses event-related potentials (ERPs) on her study on investigation of the processing of metaphor language in Alzheimer's Disease and Behavioural Frontotemporal Dementia patients. The ERP findings indicate a broad disruption in language processing among individuals with Alzheimer's Disease. This disorder is marked by increased negativity in both the early and late N400 components, along with reduced positivity in the P600 component. Uygun and Clashen (2020) investigate the morphological processing in heritage speakers on the Turkish aorist by using masked priming study. The outcomes from the priming measurements indicate that both the heritage speakers and monolingual speakers of Turkish exhibit similar performance in terms of morphological conditions. They display notable priming effects for both regular and irregular aorist forms. In her study on morphological processing of inflected and derived words in L1 Turkish and L2 English, Şafak (2015) uses masked priming experiments. The results suggest that both in their native language Turkish (L1) and second language English (L2), native Turkish speakers employ a strategy of breaking down inflected and derived words into stems and suffixes during visual word recognition. Moreover, these morphological processes remain unaffected by the semantic relationship between inflected / derived words and their respective stems. In the next section, self-paced reading task, which is frequently used in language processing experiments, is dealt with in detail and related studies both in other languages and in Turkish are mentioned.

3.4.1. Self-Paced Reading

Gibson (2000) states “a major issue in understanding how language is implemented in the brain involves understanding the use of language in language comprehension and production” (p. 95). Recent studies have indicated that forming a meaning for a sentence entails moment-by-moment integrating diverse sources of information, restricted by the computational resources at hand (Trueswell, 1996; Altmann & Steedman, 1988; Ni, Crain, & Shankweiler, 1996). For this moment-by-moment integrating, self-paced reading offers insights into the real-time process of syntactic computation (Felser, 2021). While formal linguistics does not typically perceive the generation of syntactic structures as processes that unfold over time, employing experimental techniques to trace the time course of sentence processing can offer valuable insights into the characteristics of syntactic formations and representations. First, information derived from immediate reading or listening can offer more indirect indications of grammatical awareness when contrasted with off-line tasks. Second, on-line methods can assist in uncovering the origins of linguistic unacceptability. Third, assessing the complexity of processing at individual words or phrases enables us to pinpoint the exact moment in reading or listening when a grammatical anomaly is recognized.

During the process of actively producing and comprehending language, grammatical structures are formed step by step from left to right. This contrasts with formal linguistic theories where structures are constructed from right to left in a strictly bottom-up manner, leading to a seeming contradiction (Felser, 2021). Within the framework of generative-transformational linguistics, processes like successive-cyclic movement are believed to occur in a sequence of local steps, starting from the right and moving towards the left and bottom to top (Chomsky, 1973). Phillips and Lewis (2013) state that contrary to the view of generative-transformational linguistics, examining grammatical phenomena and constraints through the lens of processing from left to right can provide fresh and unique understandings of their characteristics.

Psycholinguists developed the self-paced reading (SPR) technique during the 1970s. Jegerski (2014) states that the design of self-paced reading is simple enough that one might easily assume today that it came before the emergence of modern eye-tracking in reading studies. Felser (2021) defines self-paced reading as “an experimental psycholinguistic technique that involves measuring word-by-word (or phrase-by-phrase) reading times, with participants being allowed to move from one sentence segment to the next at their own pace” (p. 618). Just et al. (1982) state that the basis for the self-paced reading method is referred to as the “eye-mind assumption” which suggests that the time taken for reading corresponds to the time taken for processing. Increased

reading durations within a specific segment of a sentence are believed to indicate challenges in processing within or near that part of the sentence. Felser (2021) explains what is looked and measured in self-paced reading as follows:

> "In SPR tasks, stimulus sentences are displayed on a computer monitor either cumulatively, with each subsequent word added to the previous ones until the entire sentence is visible, or non-cumulatively. Here the previous word disappears every time the participant brings up a new one via a button press, so that only one word or phrase is visible at any time. Sentence segments may either be displayed at the centre of the screen or linearly. The most commonly used variant of the SPR technique involves a linear word-by-word display, where the number of words in a sentence is indicated visually (e.g. by using dashes separated by spaces) but only one word is visible at a time" (Felser, 2021, p. 619).

Typically, participants are assigned an additional task, such as answering a comprehension question at the end of a sentence. This task primarily serves to guarantee that the stimulus items receive appropriate attention. In every version of the SPR task, the computer records the intervals between individual button presses, forming a reading-time profile for each kind of stimulus sentence or experimental situation, broken down by sentence segments. Self-paced reading represents an affordable and user-friendly method that utilizes real-time syntactic processing. This technique offers indirect indications of understanding grammatical nuances, which can either enhance or substitute for information derived from metalinguistic evaluations. Kush et al. (2017) state that self-paced reading experiments are flexible and can be done with standard computers in different environments, including outside the lab. Self-paced reading data collection is also possible through the World Wide Web.

Felser et al. (2003) state that the primary limitation of self-paced reading stems from the requirement for the researcher to predefine how the stimulus sentences are segmented for presentation. This compels participants to potentially read in an unnatural manner. The approach of presenting stimuli in a non-cumulative way prevents participants from revisiting earlier segments, potentially placing an unusually significant load on their working memory. The utilization of the SPR technique also necessitates participants to possess proficient reading skills. As a result, this approach might not be suitable for certain groups, such as young children, individuals speaking languages without a writing system, or bilinguals who lack literacy in the specific language under study (Booth et al., 2000).

Felser (2021) states that self-paced reading technique has been employed to explore a diverse array of grammatical phenomena. Exploring these grammatical phenomena range from recognizing the moment when an irregularity is identified to revealing the processes responsible for generating grammatical illusions and tracking the developmental path of a displaced element. In all these studies based on self-paced reading, analysing reaction times is crucial in order to get

safe results. Thus, it is better to talk about analysing reaction times in self-paced reading studies. Baayen and Milin (2010) define reaction time as "a simple and probably the most widely used measure of behavioural response in time units (usually in milliseconds), from presentation of a given task to its completion" (p. 13). The technique of self-paced reading, which collects reaction times, has significantly contributed to offering researchers in psycholinguistics and related disciplines with information that constrains models of human cognitive processes. Starting from the 1950s, there has been a consistent increase in the quantity of experiments utilizing reaction time as the response variable. These experiments commonly source stimuli from auditory or visual domains, and occasionally from other sensory domains as well. Jiang (2012) states that analysing reaction times is very advantageous because reaction times can be employed to investigate a broad range of language processing subjects. Every cognitive process requires a certain amount of time. Consequently, given a suitable task, it is theoretically possible to examine any cognitive process through the lens of reaction time. The second advantage of analysing reaction time lies in its ability to offer a finer-grained measure for investigating cognitive processes or mental representations of linguistic knowledge compared to accuracy data. In other words, reaction time offers a more sensitive means to uncover the cognitive processes occurring in individuals' minds during language processing. The third advantage of reaction times is that by being on-line, reaction time research enables the investigation of the actual process of language processing. When utilizing an off-line task like untimed grammaticality judgment to investigate the process of language processing, what is actually being studied is the result or outcome of language processing. On the contrary, analysing reaction times on on-line tasks helps researchers examine language processing as it happens, and show the mental processes such as how fast different kinds of information are activated or what strategies are used to process a specific linguistic structure.

After explaining self-paced reading task and analysing reaction times under self-paced reading experiments, it is better to mention the studies using self-paced reading as a method in psycholinguistic studies both in other languages and in Turkish. Jegerski (2014) states that the majority of self-paced reading paradigms investigate challenges in processing that emerge while reading sentences containing elements that might fall into categories such as (a) ambiguity, (b) anomaly and (c) distance dependency. Ambiguities occur when the grammar allows for two or more separate syntactic understandings of a word or phrase within the sentence. Noticeable processing strategies often emerge when the (native) parser leans towards prioritizing one interpretation over the others. For example, Trueswell and Kim (1998) examine the syntactic preferences of briefly displayed prime words on readers' ability to resolve temporary syntactic ambiguities. They use self-paced reading task in which participants read sentences with sentence

complements that carried ambiguity. The results show that priming a verb to the matrix that typically pairs with a direct object lead to heightened processing challenges in the disambiguating part of the sentence complement. Juffs (1998) uses self-paced reading task in their study on how adult English as a second language learners handle sentences including verbs that temporarily create ambiguity between being a main verb and a reduced relative clause. The results show that learners utilize both verb subcategorization details and cues following the ambiguity to disambiguate between main verb and reduced relative clause interpretations. As well as ambiguities, studying anomalies is the second category in self-paced reading paradigms. Anomalies involve distinct grammatical violations (such as error identification or grammaticality paradigms) along with irregular or non-standard arrangements of word order, semantics, discourse, and other syntactic and beyond-syntactic elements (Jegerski, 2014). There are a lot of psycholinguistic studies related to anomalies using self-paced reading tasks in literature. For example, Foote (2011) studies both early and late bilinguals of English and Spanish whether they exhibit interconnected understanding of agreement in the Spanish language or not by assessing their responsiveness to agreement errors during reading comprehension. The results show that both individuals do exhibit a consolidated grasp of subject-verb number agreement and noun-adjective gender agreement in the Spanish language. In another study, Roberts and Liszka (2013) present the findings from a self-paced reading study aimed at exploring whether advanced learners of English as a second language (L2) in French and German are capable of detecting tense / aspect inconsistencies between a preceded temporal adverbial and the subsequent inflected verb during their on-line comprehension. The results show that the two groups of learners exhibit different processing patterns for the experimental items. The third category in self-paced reading paradigms is the distance dependency. Dependency paradigms investigate the comprehension of a grammatical connection between two elements in the input that are often not positioned close to each other in the linear sequence of words. This situation poses a specific difficulty in the process of comprehension. Wh- movement can be given as an example to this phenomenon. Williams et al. (2001) study processing of English wh- questions by native speakers of English and advanced Chinese, German, and Korean learners of English as a second language by using self-paced reading task and off-line task. The results of the self-paced reading task show that both individuals who are native speakers and those who are not native speakers exhibit similar behaviours. All the participant groups propose a gap in the initial position that aligns with the rules of grammar. Juffs (2005) studies the influence of first language on the processing of wh- movement in English as a second language by using self- paced reading technique. Findings indicate that not all the differences among the non-native speaker groups can be accounted for solely by considering whether wh-movement and the structure of the verb phrase exist in their native language or not.

As well as studies using self-paced reading as a method in psycholinguistic studies in other languages, there are studies related to Turkish that use self-paced reading as a psycholinguistic method although the literature is limited. For example, Aydın and Cedden (2010) analyse Turkish sentences for reading times to determine potential distinctions in how canonical SOV sentences, scrambled SVO sentences involving constituent movement to positions after the verb, and SVO wh-clauses with base-generated post-verbal constituents are processed. The findings from this research indicate that because of the longer reading times observed for SVO sentences, there are higher processing demands associated with SVO sentences in comparison to the standard SOV sentences. Gračanin-Yüksek et al. (2017) investigate the processing of Turkish anaphors within individual sentences as well as in more extensive discourse contexts by using self-paced reading tasks. The results show that contextual information impacts the potential interpretations linked to an anaphor, yet the impact of context relies on the extent to which the anaphor is limited by its syntactic structure. Pirdal (2021) studies the effects of word order and linear distance on processing in Turkish. She finds that noun phrases that are not scrambled are processed more rapidly in comparison to noun phrases that have been scrambled. Önem (2022) investigates how scrambling impacts the processing and perception of congruency in Turkish sentences. The results show that the positioning of scrambled elements, arguments with a focus on scrambling, the alignment of questions and answers, and the placement of focused arguments all lead to varying levels of differences in sentence processing and the perception of congruency. Tekin (2022) investigates how metonymic noun phrases in Turkish are processed through the utilization of two self-paced reading experiments. These experiments involve object relative clause structures (where the metonymic noun phrase comes before the object and verb) and subject relative clause structures (where the object and verb come before the metonymic noun phrase). The average response times of speakers' quantitative data indicate that, in terms of processing, there is a relatively close resemblance between the literal and metonymic meanings. Even though the utilization of self-paced tasks for studying processing in Turkish is not very widespread, these tasks can be highly valuable as a psycholinguistic research method to comprehend the nature of processing.

CHAPTER 4- METHODOLOGY

In the first part of this chapter, corpus-based study is presented with converb clauses that are analysed in the study, data collection tool, data collection procedure and data analysis subsections. In the second part, experimental study is presented including pilot study, participants and settings, material, data collection tool, data collection procedure and data analysis subsections.

4.1. CORPUS BASED STUDY

This section presents a comprehensive explanation of the converb clauses that are chosen as the sample in the corpus based study. Then data collection tool, data collection procedure and data analysis are presented in detail.

4.1.1. Converb Clauses

Temporal converb clauses analysed in this study are part of the following three categories; (a) converbs expressing events that occur before the event mentioned in the main clause; (b) converbs expressing events which occur at the same temporal point as expressed by the embedded and main clauses and (c) converbs expressing posteriority in which the event expressed in the embedded clause occurs after the event expressed in the main clause.

Converbs expressing events that occur before the event mentioned in the main clause are made up the endings of *-(y)IncA (when), -DIğIndA (when), -DIğI zaman (when), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since)* and *-DIktAn sonra (after)*. Related examples of this category are given below in (125) through (130).

125) Bilgisayar-ı aç-ınca bir ses duy-du-m.
computer-ACC turn on-CON a noise hear-PST-1SG
'I heard a noise when I turned on computer.'

126) Baba-m ev-e gel-diğinde yemeğ-e otur-du-k.
father-POSS home-DAT come-CON meal-DAT sit-PST-1PL
'When my father came, we started eating.'

127) Zil çal-dığı zaman dışarı çık-abil-ir-siniz.
bell ring-CON when outside go-AUX-PRS-2PL
'You can go out when the bell rings.'

128) Askere git-tiğinden beri zayıfla-dı.
military go-CON since lose. weight-PST-3SG
'Since he went to military, he has lost weight.'

129) Yemeği ye-r ye-mez hemen uyu-du.
meal eat-CON eat-NEG immediately sleep-PST-3SG
'As soon as he/she ate the meal, he/she slept.'

130) Para-yı öde-dikten sonra ürün-ler kargola-n-dı.
money pay-CON after product-PL ship-PASS-PST-3PL
'After the money was sent; the products were shipped.'

Converbs expressing events which occur at the same temporal point as expressed by the embedded and main clauses include the following endings: *-DiğIndA (when), -DIğI zaman (when), -ken (while)* and *–DıkçA (whenever)*. Examples of this category are given below in (131) through (134).

131) Vazo kır-ıl-dığında çocuk yer-de otur-uyur-du.
vase break-PASS-CON child floor-LOC sit-PROG-PST-3SG
'When the vase was broken, the child was sitting on the floor.'

132) Kaza ol-duğu zaman film izli-yor-du-m.
accident happen-CON when film watch-PROG-PST-1SG
'When the accident happened, I was watching TV.'

133) Memleket-e git-tikçe arkadaş-lar-ım-ı ziyaret ed-er-im.
hometown go-CON friends-PL-POSS-ACC visit-PRS-1SG
'Whenever I go to my hometown, I visit my friends.'

134) Bebek uyur-ken sessiz ol-malı-sınız.
baby sleep-CON quiet be-AUX-2PL
'While the baby is sleeping you must be silent.'

Converbs expressing posteriority are consisted of the endings of *–DiğIndA (when), -DIğI zaman (when)* and *-mAdAn önce (before)*. Related examples of this category are given below in (135) through (137).

135) Fatma ev-e gel-diğinde yemek çoktan bit-miş-ti.
Fatma home-DAT come-CON meal already finish-PFV-PST
'When Fatma came home, the meal had already finished.'

136) Telefon aç-tığım zaman onlar çoktan ayrıl-mış-tı.
phone call-CON when they already leave-PFV-PST

‘When I called them, they had already left.’

137) Uyu-madan önce diş-ler-in-i fırçala-malı-sın.
sleep-CON before tooth-PL-GEN-ACC brush-AUX-2SG
‘Before sleeping, you must brush your teeth.’

The converbs clauses analysed in this study can be summarized as in the Table 4, which shows the temporal meaning relations in temporal converb constructions.

Table 4: *Temporal meaning relations in temporal converb constructions in Turkish*

	Priority	Simultaneity	Posteriority
-(y)IncA (*when*)	+	-	-
-DIğIndA (*when*)	+	+	+
-DIğI zaman (*when*)	+	+	+
-ken (*while*)	-	+	-
-(A/I) r…-mAz (*as soon as*)	+	-	-
-DIğIndAn beri (*since*)	+	-	-
-mAdAn önce (*before*)	-	-	+
-DIktAn sonra (*after*)	+	-	-
-DIkçA (*whenever*)	-	+	-

Table 4 shows that priority meaning relationship is expressed through six converbial endings; namely, *-(y)IncA (when)*, *-DIğIndA (when)*, *-DIğI zaman (when)*, *-(A/I) r…-mAz (as soon as)*, *-DIğIndAn beri (since)* and *-DIktAn sonra (after)*. Simultaneity meaning relationship is expressed through four converbial endings. These are *-DiğIndA (when)*, *-DIğI zaman (when), -ken (while)* and *–DıkçA (whenever)*. Posteriority meaning relationship is expressed through three converbial endings; namely, *–DiğIndA (when)*, *-DIğI zaman (when)* and *-mAdAn önce (before)*.

4.1.2. Turkish National Corpus

The data of the study were collected from the Turkish National Corpus (TNC) (Aksan et al., 2012), which contains 50 million words. It comprises diverse samples of textual data from various genres spanning a 24-year period (1990-2013). The written component encompasses texts created in different domains and covering various subjects. Additionally, 2% of the TNC's database consists of transcriptions from spoken data, comprising spontaneous, everyday conversations, and speeches collected in specific communicative contexts.

Aksan et al. (2012) state that during the creation of the TNC, the structure of the British National Corpus was generally taken as an example and modifications were made when necessary for Turkish language. Various open-access tools were used in all stages of the creation of the TNC, and it was aimed to make the corpus open and accessible to researchers and non-commercial use. Turkish National Corpus (TNC) Version 3.0.63 provides researchers to reach data both in spoken and written registers. There are four types of queries that researchers can choose according to the purpose of the study. These queries are (a) standard query, (b) lemma query, (c) morphological affix query and (d) co-occurrence query. Figure 2 below shows the four types of queries that TNC has in its interface.

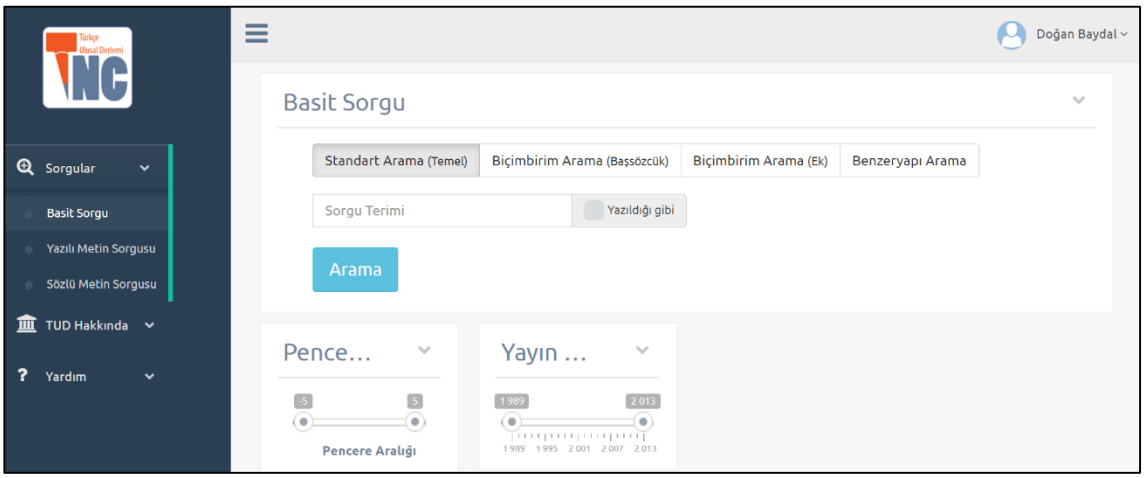

Figure 2: *The screenshot of the Turkish National Corpus (TNC) query interface*

As can be seen in Figure 2; for the purpose of this study, morphological affix query was used. In order to search for a morphological affix in the interface, the programme provides tag-set for affixes. Table 5 below shows the tag-sets provided by the programme for temporal converbial suffixes.

Table 5: *Tag-set for temporal converbial suffixes in Turkish National Corpus (TNC)*

Tag	Morpheme	Function	As in
aveli	*AlI*	adverbial	gideli
avrek	*ArAk*	adverbial	yazarak
avnce	*IncA*	adverbial	yazınca
avip	*Ip*	adverbial	gelmeyip
avmdn	*mAdAn*	adverbial	gelmeden önce
avca	*cA, cAnA, cAk*	adverbial	gelince, koşunca
avdkc	*DIkçA*	adverbial	yazdıkça
avsa	*sA, A*	adverbial	gitse, gideydi
avsye	*AsIyA*	adverbial	gidesiye
avrkt	*ArAktAn*	adverbial	yazaraktan
avmms	*mAmAsIyA*	adverbial	açmamasıya

avken	*ken, kene*	adverbial	giderken, giderkene
avdgn	*dık, dıgında, dıgı zaman, dıgından beri*	adverbial	gittikten sonra, açtığında, geldiği zaman, aldığından beri
avır	*ır, ar, ir*	adverbial	gel-ir

As shown in Table 5, when the tag-set for the related converbial ending is searched in the query, the interface gives three results about the tag: (a) the number of texts that the searched parts of speech / affix appears in, (b) observed frequency of the searched parts of speech / affix and (c) normalized frequency of the parts of speech / affix. Figure 3 below shows sample results for a searched converbial ending, namely *-(y)IncA (when)*.

Figure 3: *The screenshot of the searched suffix "-(y)IncA (when)"*

Figure 3 above shows that for the searched suffix "*-(y)IncA (when)*"; the number of texts that the suffix appears in is 2981, the observed frequency of the related suffix is 41976 and the normalised frequency is 828.29.

4.1.3. Data Collection Procedure

To decide which temporal converbial endings will be analysed in the study, all the temporal converbial suffixes in Turkish, namely the suffixes that were presented at Table 1, were searched one by one in the program to see the normalized frequency values of them. Table 6 below shows the normalised frequencies of the all converbial endings presented at Table 6.

Table 6: *Normalized frequency values of temporal converbial endings in Turkish in Turkish National Corpus (TNC)*

Converbial Ending	Observed Frequency	Normalised Frequency
-(y)IncA (when)	41976	828,9
-ken (while)	40117	811
-DIğIndA (when)	34609	699,6

-mAdAn önce (before)	32221	651,4
-DIğI zaman (when)	31344	633,6
-DIktAn sonra (after)	30993	626,5
-DIkçA (whenever)	27543	556,8
-DIğIndAn beri (since)	23670	478,5
-(A/I) r…-mAz (as soon as)	20019	404,7
-DIğI gibi (as soon as)	1336	27
-(y)AlI (beri)	1098	22,1
-(y)IncAyA kadar (until)	865	17,4
-DIğI sürece(throughout the time)	533	10,7
-(y)IncAyA dek (until)	391	7,9
-DIğI müddetçe (throughout the time)	223	4,5

It is clearly observed from Table 6 that the temporal converbial endings *-(y) IncA (when)*, *-ken (while)*, *-DIğIndA (when)*, *-mAdAn önce (before)*, *-DIğI zaman (when)*, *-DIktAn sonra (after)*, *-DIkçA (whenever)*, *-DIğIndAn beri (since)* and *-(A/I) r…-mAz (as soon as)* are above the normalized frequency of 404,7. The temporal converbial endings; *-DIğI gibi (as soon as)*, *-(y)AlI (beri)*, *-(y)IncAyA kadar (until)*, *-DIğI sürece(throughout the time)*, *-(y)IncAyA dek (until)* and *-DIğI müddetçe (throughout the time)* are below the normalized frequency of 27. Biber et al. (1998) state that normalized values are important in a way to adjust raw frequency counts from texts of different lengths so that they can be compared accurately. McEnery et al. (2006) state that interpretation of frequency data should be made carefully and frequently, raw frequencies obtained from corpus require standardization to a common baseline. Thus, normalised values of the searched converbial ending were taken into consideration in deciding which temporal converbial endings will be analysed in the study. McEnery et al. (2006) further state that we consider a sample to be representative if the findings within the sample also apply to the broader population. Yates (1965) states that the goal of sampling theory is to obtain a sample that, within the constraints of its size, replicates the features of the population, particularly those that are of immediate interest, as accurately as can be achieved. Thus, the converbial endings that have normalized frequency values more than 400 are included in the study for the analysis. These converbial endings are; *-(y) IncA (when)*, *-ken (while)*, *-DIğIndA (when)*, *-mAdAn önce (before)*, *-DIğI zaman (when)*, *-DIktAn sonra (after)*, *-DIkçA (whenever)*, *-DIğIndAn beri (since)* and *-(A/I) r…-mAz (as soon as)*. Temporal meaning relations and related examples for those temporal converbial endings were presented in part 4.1.1.

After these nine temporal converbial endings were searched in the programme, full lists of the all converbial endings with related examples are reached. In each example, there is information about (a) type of text, (b) identity tag and (c) contextual key word analysis. The text type gives information about the type of the text in which the example appears, whether it is written or

spoken. Thus, each example has an identity tag that begins with either “W” or “S”. “W” means that the example belongs to written register and “S” means the example belongs to spoken register. The identity tag also gives information about the date and topic of the text and age, gender, educational background and social status of the people in the texts. Contextual key word analysis gives the five words on the left and right of the searched word. Figure 4 below shows some of the instances of the converbial construction, *-(y)IncA (when)*.

Figure 4: *The screenshot of the searched suffix “-(y)IncA (when)” with specific examples*

Figure 4 shows that when the suffix *“-(y)IncA (when)”* is searched, all the related examples are given in the programme.

For manual analysis, all the samples of the converbial endings were exported to Excel file in order to eliminate the examples that aren’t related to the aim of this study. Figure 5 below shows some of the instances of the converbial construction *-(y)IncA (when)* in excel file.

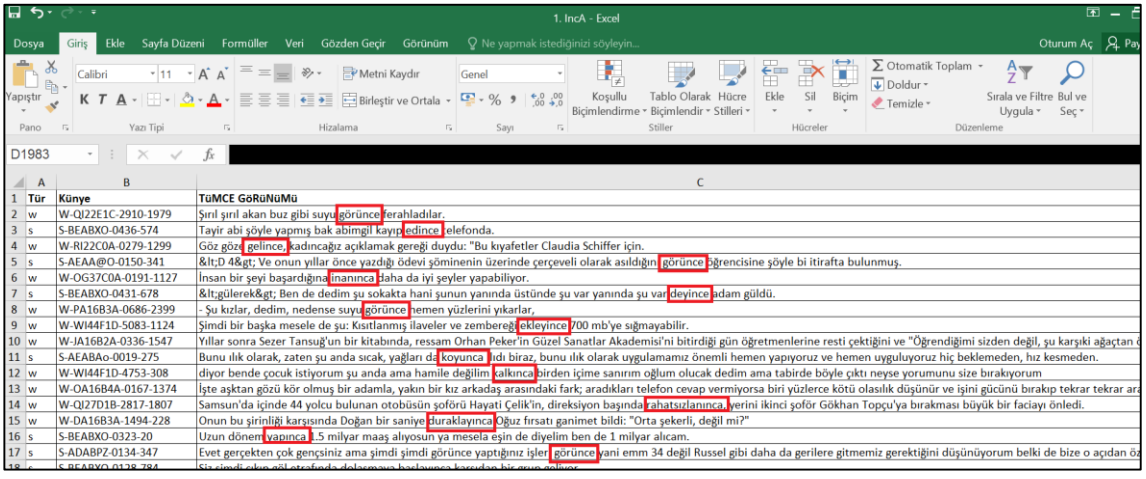

Figure 5: *The screenshot of the searched suffix "-(y)IncA (when)" with specific examples in Excel file.*

As it is seen in Figure 5, the examples in the Excel file were analysed because it should be noted that the nine converb constructions mentioned can also carry meanings that are not related to time. They might indicate alternative relationships in meaning, such as manner, condition, contradiction, interruption of the event expressed in the converb clause, and similar connections. Nevertheless, this study does not cover these non-temporal meaning relationships. Following the initial search, any adverbial clauses that are not pertinent to the objectives of the present study were disregarded. As well as converb clauses with non-temporal meaning relationships, converb clauses that do not appear alongside a connected main clause were eliminated. Additionally, converb clauses that are linked to the main clause at the level of the speech act were excluded. A related example is given in (138).

138)	Ee!	tabii	onlar	öyle	diy-ince. (S-BEABXO-0456-621)
	Well!	of course	they	so	say-CON
	'Well! Of course, when they say so.'				

After all these manual analyses, 1000 *-(y) IncA (when)* clauses, 1000 *–DiğIndA (when)* clauses, 1000 *-DIğI zaman (when)* clauses, 1000 *–ken (while)* clauses, 1000 *-(A/I) r…-mAz (as soon as)* clauses, 1000 *-DIğIndAn beri (since)* clauses, 1000 *-mAdAn önce (before)* clauses, 1000 *-DIktAn sonra (after)* clauses and 1000 *–DikçA (whenever)* clauses were chosen as a sample which is as representative as possible of the population. Simple random sampling, one of the fundamental sampling technique, was used to choose example sentences. In this approach, each example sentence in the sampling frame receives a unique number, and the sample is selected using a random number table (McEnery et al., 2006). As the spoken register is important for the aim of this study, roughly 47% of the data are derived from spoken conversations, while the remaining 53% originate from various written genres. Table 7 below shows the raw frequencies of the data analysed in this study.

Table 7: *Raw frequencies of the data analysed in the study*

Converbial Type	Spoken	Written	Total
-(y)IncA (when)	490	510	1000
-DIğIndA (when)	420	580	1000
-DIğI zaman (when)	515	485	1000
-ken (while)	520	480	1000
-(A/I)r…-mAz (as soon as)	480	520	1000
-DIğIndAn beri (since)	420	580	1000
-mAdAn (önce) (before)	470	530	1000
-DIktAn sonra (after)	460	540	1000
–DıkçA (whenever)	430	570	1000
Total	4205	4795	9000

Table 7 shows that there are 9000 samples of converbial constructions in total that are analysed in this study. 4205 of the samples are selected from spoken corpus while 4795 of them are selected from written corpus. For *-(y) IncA* (*when*) temporal converb clauses; there are 490 spoken and 510 written samples, for *-Dığında* (*when*) temporal converb clauses; there are 420 spoken and 580 written samples, for *-DIğI zaman* (*when*) temporal converb clauses; there are 515 spoken and 485 written samples, for *-ken (while)* temporal converb clauses; there are 520 spoken and 480 written samples; for *-(A/I)r…-mAz (as soon as)* temporal converb clauses; there are 480 spoken and 520 written samples. *-DIğIndAn beri (since)* temporal converb clauses have 420 spoken and 580 written samples, *-mAdAn (önce) (before)* temporal converb clauses have 470 spoken and 530 written samples, *-DIktAn sonra (after)* temporal converb clauses have 460 spoken and 540 written samples and lastly, *-DIkçA* (*whenever*) clauses have 430 spoken and 570 written samples.

4.1.4. Data Analysis

Each converb construction was coded to assess two aspects: (a) the placement of the converb clause concerning the main clause (whether it appears initially or finally in the sentence); and (b) the conceptual order of the main and converb clauses (whether the converbial clause gives anteriority, simultaneity or posteriority meaning). The coding process was carried out independently by two researchers. Eagan et al. (2020) state that coding the data eases the process of translating observed phenomena into meaningful interpretations. These encoded data can subsequently be tallied, contrasted, modelled, or subjected to various analyses to offer substantiating or contradicting evidence for a particular assertion or a rationale for a specific

course of action. They further state that in the social sciences, it is frequently necessary to involve a human element in the process. Consequently, issues related to reliability, including Inter-Rater Reliability (IRR), are a vital aspect of conducting valid research in the field of learning analytics. Eagan et al. (2020) define two types of approaches for coding process. One of both is for two processes (usually two humans) to code all of the data and the other one is that the raters code only a subset of the data, often referred to as a test set. The first approach was used in this study in that two coders coded all the instances. Tinsley and Weiss (1975) state that there are three stages of intercoding process. In the first stage, the code is defined. The second stage is that two raters independently code the test set. And in the last stage, the alignment of their coding is assessed using the selected IRR measurement.

In the analysis, first the code was defined for the placement of the converb clause concerning the main clause. For the converb clauses that appear initially, the code was (1); and for the converb clauses that appear finally in the sentence, the code was (2). The code for the conceptual order of the main and converb clauses was defined as (1), (2) and (3). Code 1 was given for converb clauses which have anteriority meaning, code (2) was given for converb clauses which have simultaneity meaning and code (3) was given for converb clauses which have posteriority meaning. After the raters independently coded the two test sets, the agreement of their coding was measured in both percentage agreement and Cohen's Kappa, Scott's Pi and Krippendorff's Alpha. Table 8 below shows the results of the interrater reliability in this study.

Table 8: *The results of the interrater reliability*

	Percent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha (nominal)	N Agreements	N Disagreements	N Cases	N Decisions
Converb clauses that appear initially or finally	100%	0.999	0.999	0.999	8996	4	9000	18000
Converb clauses that have anteriority, simultaneity or posteriority meaning	99.2%	0.987	0.987	0.987	8931	69	9000	18000

As seen in Table 8, McHugh (2012) states that Cohen's Kappa result should be understood in the following manner: values ≤ 0 indicate no agreement, 0.01–0.20 signify minimal to slight agreement, 0.21–0.40 represent fair agreement, 0.41–0.60 indicate moderate agreement, 0.61–0.80 suggest substantial agreement, and 0.81–1.00 reflect almost perfect agreement. By looking at the results of the interrater reliability at Table 6, it is seen that for the first coding, the Cohen's Kappa is 0.999 and for the second coding, the Cohen's Kappa is 0.987, which means that there is almost perfect agreement between the raters.

In order to analyse the results of the corpus data, the study utilized chi-squared test for statistical analysis. Oakes (1998) states that there are several significance tests available for the corpus based analyses. Some of them are the chi-squared test, t-test, Wilcoxon's rank sum test and so on. McEnery and Wilson (2001) state that the chi-squared test is probably the most commonly used significance test in corpus studies and has the advantages that (a) it is more sensitive than, for example, t-test; (b) it does not assume that the data are "normally distributed" - this is often not true of corpus data and (c) and in 2 x 2 tables, it is very easy to calculate even without a computer statistics package. Oakes (1998) recommends the use of Yates's correction with 2 x 2 tables if the frequency is very small, however, because the samples with more than normalised frequency value of 400 are analysed in this study, Yates's correction was not applied. Very simply, the chi-squared test compares the difference between the actual frequencies which have been observed in the corpus (the observed frequencies) and those which one would expect if no factor other than chance have been operating to affect the frequencies (the expected frequencies). The grater the difference between the observed frequencies and the expected frequencies, the more likely it is that the observed frequencies are being influenced by something other than chance. Probability values of less than 0.05 (written as $p < 0.05$) are assumed to be significant, whereas those greater than 0.05 are not.

4.2. EXPERIMENTAL STUDY

This section first gives information about the pilot study. Then main study is presented in detail with participants and setting, material, design of the self-paced reading task, data collection tool, data collection procedure and data analysis subsections.

4.2.1. Pilot Study

A pilot study was carried out to assess the comprehensibility of the experimental items and the actual effectiveness of the data collection process. Prystauka et al. (2023) state that gathering data from individuals who have limited access to research facilities, who come from geographically dispersed populations, or who have lower socio-economic status can pose challenges due to the logistical demands of in-lab testing. Undoubtedly, robust online-based methods would expand the potential participant pools for nearly any study, making it easier to access participants for language processing research, including languages and communities that are currently underrepresented. This applies to researchers operating in contexts where the required equipment for expensive lab-based research is not feasible. They further stat that being equally significant and applicable is the matter of statistical sensitivity. Researchers have the option to redistribute resources typically used for in-lab testing to enrol a larger number of participants, thus enhancing statistical power. Regardless of financial constraints, it is possible to include a much larger number of participants, and do so more quickly, when they are recruited and tested online as compared to in a laboratory setting. Thus, web-based data collection tool was employed in this study. While choosing the participants for the pilot study, Brysbaert (2019) states that pilot testing is valuable for demonstrating the practicality of a method and for experimenting with the process, however, it does not offer dependable insights when effect size is not suitable. He states that the effect size for the pilot study should be in line with the main study. Thus, he suggests at least N=30 in order for the test to be significant. Hence, the pilot study involved the participation of 30 Turkish native speakers (comprising 19 females and 11 males) who were enrolled in Ondokuz Mayıs University. Their ages ranged between 18 and 26 (M = 21.33, SD = 1.41), and according to their account, all of them had either correct or corrected vision with no previous history of any neurological disorder. Between February 2022 and April 2022, two experiments were conducted. On these experiments, the counterbalanced experimental sentences in which the converb clause precedes the main clause and sentences in which the converb clause comes after the main clause were administered.

During each session, the participants received initial training via virtual meetings as part of the pilot study, focusing on how to use both the hardware and software components. Subsequently, they were provided with experimental and filler sentences as well as comprehension questions at the end of the sentences. All participants received the experimental items one by one. Each word in a sentence becomes visible one by one by pressing the spacebar, which reveals the next word while hiding the recently read one. The participants were instructed to read the sentences at a natural pace. After each experimental sentence, the participants were asked to read the

comprehension question and write an answer for this question. The time spent on reading each area of interest and the answers for the comprehension questions were recorded.

The pilot study unveiled two significant findings. The first finding pertained to the comprehensibility of the experimental sentences; all the experimental sentences were reported to be unambiguous with no alternative interpretations, and each one was deemed clear and comprehensible. Additionally, by presenting the experimental items in a random sequence, this reduced the potential impact of familiarity and retention effects. Another significant observation pertained to the data collection process. It was evident that providing prior training to the participants facilitated their acclimation to the procedure, resulting in no reported issues with hardware and software usage. Furthermore, the software effectively served its purpose in presenting stimuli and recording responses. Each experimental item was displayed in a random order, without any delays or repetitions, and they were easily legible on the screen with clear and straightforward prompts. Hence, the pilot study can be regarded as having validated the reliability, and appropriateness of the methodology employed in investigating the phenomenon under examination in the current study.

4.2.2. Main Study

The main study gives comprehensive explanation of the participants and setting, material, design of the self-paced reading task, data collection tool, data collection procedure and data analysis of the experimental study.

4.2.2.1. Participants and Setting

As it was stated in pilot study, robust internet-based techniques would expand the available pool of potential participants for almost any study. Nielsen et al. (2017) state that gaining a comprehensive grasp of the development of the human mind, both in terms of individual growth and evolutionary history, relies on sampling a diverse range of individuals. However, recent focus has highlighted the issue of limited diversity in psychological testing, specifically the predominant reliance on populations that do not adequately represent global human culture, such as those from WEIRD (Western, educated, industrial, rich, and democratic) backgrounds (Legare & Harris, 2016). In order to avoid this sampling bias, participants with heterogeneous backgrounds were selected for the study.

A total of sixty-five volunteers between the ages of 18-45 participated in the first experiment. However, three of these participants did not complete the first experiment. In addition, nine participants with reading time values below the range of 100 ms and with an accuracy rate of less than 90% for the reading comprehension questions in the first experiment were excluded from the study. For the second experiment, three participants with reading time values below the range of 100 ms and with an accuracy rate of less than 90% for the reading comprehension questions were not included in the study. For this reason, the data of these fifteen participants were not included in the study. Table 9 below shows the data about the voluntary participants.

Table 9: *Data about the voluntary participants of the study*

	1st Experiment	2nd Experiment
The number of participants that attended the experiment (N)	65	53
The number of participants that did not complete the experiment (N)	3	-
The number of participants with reading time values below the range of 100 ms and with an accuracy rate of less than 90% for the reading comprehension questions in the experiment (N)	9	3
The number of participants whose data were analysed in the study (N)	**50**	**50**

As it is seen at Table 9, fifty (76.9%) voluntary participants (thirty-one females, nineteen males; *M*=36,87, *SD*= 6.32) were included in both experiments after the data were screened. The criteria for inclusion or exclusion in this study are stated below:

- The native language of the participants should be Turkish,
- The participants should not have vision problems,
- The participants should not have any neurological or psychological disorders,
- The participants should not have literacy difficulties.

All of the participants were provided with information about the study's objectives and the procedure prior to its commencement. Written consent was obtained from each participant prior to the study, and their age, gender, educational background and study responses were recorded anonymously. Brysbaert (2019) states that for t-test repeated-measures; one group of 52 participants are needed for a two-tailed test of $p < 05$. Thus, a group of 50 participants would provide sufficient sensitivity for detecting variations in reading time. After enrolling volunteers for the study, a power analysis for sensitivity was conducted using G*Power 3.1.9.7 (Faul et al., 2009). Figure 6 below shows the power analysis report for the participants in the study.

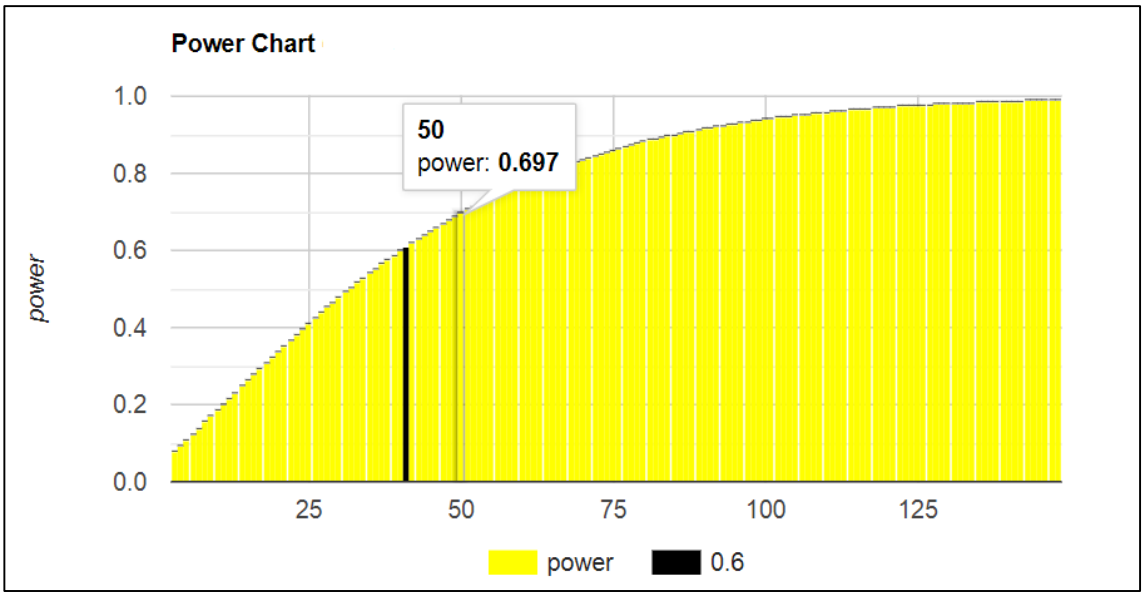

Figure 6: *The results of the power analysis for the participants of the study*

Figure 6 shows that the effect size is d=.6 and $p < 0.05$; thus, the study with 50 participants would be able to detect the differences in reading time with sufficient sensitivity with a medium effect size of d =.697.

As for the setting of the data collection process, the primary focus was on ensuring the well-being of the participants, as it was believed that creating a comfortable and relaxed environment for them would lead to improved and more dependable outcomes. Unlike the controlled setting that take place lab-based experimental work, the data collection process occurred in a range of locations, encompassing the participants' homes and workplaces, along with other convenient settings like parks, coffee shops, and outdoor facilities, due to the online nature of the procedure. The researcher joined the participants throughout the entire data collection process through virtual meetings on the Zoom platform. Between April 2023 and July 2023, two experiments were conducted.

4.2.2.2. Material

Since they underwent extensive editing and review, and were confirmed to be reliable, clear, and comprehensible during the pilot study, the identical sets of experimental items that were utilized in the pilot study were also employed in the actual data collection phase. The experimental sentences used in the study consisted of complex sentences with subordinate and main clause and they were selected primarily from Aksan et al. (2012). After the complex sentences with temporal

converb constructions were selected from the Turkish National Corpus (TNC) Aksan et al. (2012), the standardization and simplification processes of the experimental sentences were applied. Jegerski (2014) states that within regions of interest, whether they are words or phrases, it is crucial to maintain grammatical consistency among experimental elements. For instance, if area of interest 1 serves as the subject noun phrase in experimental sentence 1, it should likewise function as a subject noun phrase in experimental sentence 2, 3 and in all other stimulus items. Additionally, each region of interest should have a roughly similar length across various stimulus items. Thus, the data were applied a standardization process as follows;

139) (S-AEABI-0330-696)

Yıl	sonun-da	müdür	tatil-e	çıkar çıkmaz	biz	yeni	taşın-dığı-mız
year	end-LOC	manager	holiday-DAT	go-CON	we	just	move-PST-1PL
ofis-i	kapat-tı-k.						
office -ACC	close-PST-1PL						

'We closed the office that we had just moved as soon as the manager went on holiday at the end of the year.'

Example (139) which was selected from TNC includes object relative clause, namely "*yeni taşındığımız ofis (the office that we had just moved)*. Bulut (2012) states that object relative clauses are already harder to process when compared to subject relative clauses. Thus, the object relative clause in this sentence creates extra processing difficulty. So it was excluded from the sentence. Likewise, all the parts of speech in the experimental sentences that create extra processing difficulty were excluded as long as the comprehensibility of the sentences are not affected.

Jegerski (2014) states that the number of area of interest per condition is usually eight to twelve. It means that the total number of sentences generated for an experiment can vary from sixteen (two conditions x eight areas of interest per condition) to forty-eight (four conditions x twelve areas of interest per condition). Given that these target areas of interest constitute around 35% of the entire experiment, and even individuals with a very high level of language proficiency are typically not asked to read more than 150 to 200 sentences in a single research session, individual self-paced experiments seldom incorporate more than forty-six target stimuli. Thus, area of interests in this study was determined as seven per condition. The number of total experimental sentences except filler sentences was determined as thirty-six per experiment. This simplicity offers the advantages of preventing excessive complexity in statistical analyses, which can make them difficult to interpret, and it also helps in maintaining a manageable number of required participants.

Pliatsikas and Marinis (2013) state that after the experimental sentences have been generated, they are divided into the areas of interest. Participants will read these sections one at a time, and each section will correspond to an individual data point in the form of a reading time measured in milliseconds (ms). Jegerski (2014) states that the researcher decides whether to employ segmentation of area of interest on a word-by-word basis or a phrase-by-phrase basis, as exemplified in (140) and (141) below.

140) *Word-by-word segmentation*

Müdür /	tatile /	çıkınca /	biz /	ofisi /	kapattık.
manager	holiday-DAT	go-CON	we	office -ACC	close-PST-1PL

'When the manager went holiday, we closed the office.'

141) *Phrase-by-phrase segmentation*

Müdür /	tatile	çıkınca /	biz /	ofisi	kapattık.
manager	holiday-DAT	go-CON	we	office-ACC	close-PST-1PL

'When the manager went holiday, we closed the office.'

Gilboy and Sopena (1996) state that word by word segmentation results in more precise data since it collects a greater number of data points per area of interest. Jiang (2012) states that the word-by-word presentation is necessary when one is particularly interested in the processing of a very specific location or a particular word in a sentence. Since the aim of this study is to analyse converbial constructions with special interest, the word by word segmentation with seven areas of interest were determined for this study, which is shown in the Table 10 below.

Table 10: *Word segmentation setting of the experimental study*

AI1	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
Müdür	tatil-e	çık-ınca	biz	ofis-i	kapat-tı-k	●
manager	holiday-DAT	go-CON	we	office -ACC	close-PST-1PL	

As seen in Table 10, there are seven areas of interest for word by word segmentation. In order to create grammatical consistency among the experimental sentences, in each experimental sentence, nominative marked animate and common nouns were employed as subjects and only inanimate and accusative or dative case marked nouns were employed as objects in the subordinate clauses. For the main clauses, nominative marked animate or inanimate and common nouns or pronouns were employed as subjects and only inanimate and accusative case marked nouns were employed as objects. All the verbs of the main clauses were transitive and were

marked with the past tense marker *-Dı* with some exceptions, moreover, all the verbs in the main clauses were affirmative with some exceptions.

The area of interest 7 (●) in Table 10 is for the *spill-over effect* and the *sentence wrap-up effect*. Keating and Jegerski (2015) state that the target or the critical region in the experimental sentence is as important as the area of interest following the critical region of interest. This is essential because the processing of a critical region within a sentence frequently extends or "spills over" onto the words that come right after the critical region. As well as spill-over effect, wrap-up effect is crucial in sentence processing experiments. Jiang (2012) states that participants usually require more time to press a button at the end of a sentence. Therefore, the reaction time (RT) for the final word or segment in a sentence is often not a reliable representation of the actual reading time. As a result, the analysis of data should exclude the last word or segment. Since the sentential positions of subordinate and main clause are analysed in this study, spill-over and wrap-up effects may have misleading results, thus an extra area of interest was added to the experimental items. Especially, when the subordinate clause follows the main clause, the region of area of interest appears at the end of the experimental sentence, which may pose unreliable reaction time. Table 11 below shows word segmentation setting for the sentence in which subordinate clause follows the main clause.

Table 11: *Word segmentation setting for the sentence in which subordinate clause follows the main clause*

AI1	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
Biz	ofis-i	kapat-tı-k	müdür	tatil-e	çık-ınca	●
we	office -ACC	close-PST-1PL	manager	holiday-DAT	go-CON	

It is seen at Table 11 that when the critical region is at the end of the sentence, it is very probable that it will be affected by spill-over and wrap-up effects. Thus, one more word was added to the end of each experimental sentence in accordance with the comprehensibility of the sentence. Jiang (2012) states that last word or segment should not be included in the analysis of data.

After applying standardization, simplification, grammatical consistency and spill-over and wrap-up effect processes, the experimental sentences were formed as follows. Table 12 below shows the first experimental sentence set according to nine temporal converbial constructions.

Table 12: *First experimental sentence set according to nine temporal converbial constructions*

AI1	AI2	AI3	AI4	AI5	AI6	AI7
Müdür manager	**tatile** holiday-DAT	**çıkınca** go-CON	**biz** we	**ofisi** office - ACC	**kapattık** close-PST-1PL	**zaten** already
		çıktığında go-CON				
		çıktığı zaman go-CON				
		çıkarken go-CON				
		çıkar çıkmaz go-CON				
		çıktığından beri go-CON			**kapalı tuttuk** keep closed-PST-1PL	
		çıkmadan önce go-CON			**kapattık** close-PST-1PL	
		çıktıktan sonra go-CON				
		çıktıkça go-CON				

As seen in Table 12, in the first experiment sentence set, nominative marked animate and common noun was employed as the subject and inanimate and dative case marked noun was employed as the object for the subordinate clause. For the main clause, pronoun was employed as the subject and inanimate and accusative case marked noun was employed as the object. Table 12 shows that minor changes were applied for the standardization of the areas of interest because of the meaning relationships that the converbial constructions have. The temporal converb *-DIğIndAn beri* (*since*) does not correspond to meaning relation of the verb in the main clause because *-DIğIndAn beri (since)* presents a starting point meaning relationship for the predicate in the main clause and requires continuity in the predicate of the main clause for this sentence. Thus, "*kapalı tuttuk"* (*keep closed-PST-1PL*) was used instead of "*kapattık*" (*close-PST-1PL*). For the area of interest seven; "*zaten"* (*already*) was used as a free adjunct. It does not change the meaning of the sentence in both sentential positions, namely in positions where the subordinate clause precedes the main clause and where it comes after the main clause. Table 13 below shows the second experimental sentence set according to nine temporal converbial constructions.

Table 13*: Second experimental sentence set according to nine temporal converbial constructions*

AI1	AI2	AI3	AI4	AI5	AI6	AI7
Öğrenciler student-PL	**okula** school-DAT	**gidince** go-CON	**ben** I	**eskileri**	**hatırladım**	**yine** again

		gittiğinde go-CON		old time-PL-ACC	remember-PST-1SG	
		gittiği zaman go-CON				
		giderken go-CON				
		gider gitmez go-CON				
		gittiğinden beri go-CON				
		gitmeden önce go-CON				
		gittikten sonra go-CON				
		gittikçe go-CON				

Table 13 shows that the areas of interest do not require any minor changes. Nominative marked animate and common noun was employed as the subject and dative case marked noun was employed as the object for the subordinate clause. For the main clause, pronoun was employed as the subject and accusative case marked noun was employed as the object. The verb of the main clause is same for all temporal converb clause constructions. For the area of interest seven; "*yine"* (*again*) was used as a free adjunct. It does not change the meaning of the sentence in both sentential positions. Table 14 below shows the third experimental sentence set according to nine temporal converbial constructions.

Table 14: *Third experimental sentence set according to nine temporal converbial constructions*

AI1	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
Öğretmen teacher	**dersi** subject-ACC	**anlatınca** explain-CON	**çocuklar** child-PL	**konuyu** topic-ACC	**anladı** comprehend-PST-3PL	**zaten** already
		anlattığında explain-CON				
		anlattığı zaman explain-CON				
		anlatırken explain-CON				
		anlatır anlatmaz explain-CON				
		anlattığından beri explain-CON				
		anlatmadan önce explain-CON			**anlamamıştı** comprehend—NEG-PERF-3PL	
		anlattıktan sonra explain-CON			**anladı** comprehend-PST-3PL	

		anlattıkça explain-CON				

Table 14 shows that in the third experiment sentence set, nominative marked animate and common noun was employed as the subject and accusative case marked noun was employed as the object for the subordinate clause. For the main clause, nominative marked animate common noun was employed as the subject and accusative case marked noun was employed as the object. It is clear from Table 14 that minor changes were applied for the standardization of the areas of interest because of the meaning relationships that the converbial constructions have. The temporal converb *-mAdAn önce* (*before*) does not correspond to meaning relation of the verb in the main clause because it denotes posteriority of the converb clause event related to the main clause event. Thus, the meaning relationship of the verb in the main clause, namely "*anladı*" (*comprehend-PST-3PL*), cannot be realized before the verb in the subordinate clause, namely "*anlatmadan önce*" (*explain-CON*). For this condition, the verb in the main clause was changed to "*anlamamıştı*" (*comprehend—NEG-PERF-3PL*) in order to have more comprehensible experimental sentence. For the area of interest seven; "*zaten*" (*already*) was used as a free adjunct. It does not change the meaning of the sentence in both sentential positions, namely in positions where the subordinate clause precedes the main clause and where it comes after the main clause. Table 15 below shows the fourth experimental sentence set according to nine temporal converbial constructions.

Table 15: *Fourth experimental sentence set according to nine temporal converbial constructions*

AI1	AI2	AI3	AI4	AI5	AI6	AI7
Tamirci mechanic	**arabayı** car-ACC	**çalıştırınca** start-CON	**duman** fog	**etrafı** environment-ACC	**sardı** surround-PST-3SG	**yine** again
		çalıştırdığında start-CON				
		çalıştırdığı zaman start-CON				
		çalıştırırken start-CON				
		çalıştırır çalıştırmaz start-CON				
		çalıştırdığından beri start-CON				
		çalıştırmadan önce start-CON			**sarmamıştı** surround-NEG-PFV-3SG	**zaten** already
		çalıştırdıktan sonra			**sardı**	**yine** again

		start-CON			surround-PST-3SG	
		çalıştır<u>dıkça</u> start-CON				

Table 15 shows that in the fourth experiment sentence set, nominative marked animate and common noun was employed as the subject and accusative case marked noun was employed as the object for the subordinate clause. For the main clause, nominative marked inanimate common noun was employed as the subject and accusative case marked noun was employed as the object. It is clear in Table 15 that minor changes were applied for the standardization of the areas of interest because of the meaning relationships that the converbial constructions have. The temporal converb *-mAdAn önce* (*before*) does not correspond to meaning relation of the verb in the main clause because it denotes posteriority of the converb clause event related to the main clause event. Thus, the meaning relationship of the verb in the main clause, namely "*sardı*" (*surround-PST-3SG*), cannot be realized before the verb in the subordinate clause, namely, "*çalıştırmadan önce*" (*start-CON*). For this condition, the verb in the main clause was changed to "*sarmamıştı*" (*surround-NEG-PERF-3PL*) in order to have more comprehensible experimental sentence. For the area of interest seven; "*yine*" (*again*) was used as a free adjunct except for the condition with the converb clause *-mAdAn önce* (*before*). Since the event in the main clause have not been realized, "*zaten*" (*already*) have been used instead of "*yine*" (*again*) only for this condition.

Keating and Jegerski (2015) state that if the experimental manipulation includes a bias related to lexical, semantic, pragmatic, or plausibility aspects, it might be beneficial to perform a *sentence norming study* to confirm that the experimental items function as intended. In a norming study, individuals sourced from the identical population as the experimental group, yet not involved in the main experiment, are tasked with assessing or evaluating sentences using a psychometric scale, typically a Likert-type scale with three, five, or seven levels. Havik et al. (2009) state that based on the objective of the norming study, the sentences may either be exactly the same as those planned for utilization in the main study or include keywords or sentence frames meant to construct the experimental items for the primary study. For the norming test of the experimental stimuli of this study, the same experimental sentences (thirty-six sentences generated from four sets) were included. Twenty-five native speakers of Turkish, who were not involved in the main study, engaged in an offline task to assess plausibility. They were given the experimental sentences and tasked with evaluating the plausibility of the constructions using a scale ranging from 1 (very plausible) to 7 (very implausible). The outcomes substantiated the consistent performance of the experimental sentences in terms of plausibility scores (*plausible mean*=1.4, *SD*=0.4, $p < .001$).

Apart from the experimental stimuli generated by manipulating the linguistic variables, other stimuli in self-paced reading experiment have no relevance to the research questions. These stimuli are called filler items. Jiang (2017) states that to avoid directing the participants' focus towards the underlying structure, it is typically required to incorporate a group of sentences that do not involve the target structure. Jegerski (2014) states that the literature does not unanimously agree on the optimal ratio of target to total non-target (filler) stimuli for a psycholinguistic experiment. However, some studies suggest that a minimal proportion of these non-target stimuli could impact reading behaviour during a self-paced reading task. Additionally, evidence indicates that having 50% non-target sentences is the minimum acceptable quantity (Juffs 2004, Havik et al., 2009). Thus, thirty-six filler sentences were incorporated per experiment. Felser (2021) states that every target stimulus, distractor, and filler is designed to be similar in terms of length and other surface features, ensuring that participants cannot readily distinguish the target sentences. Keating and Jegerski (2015) state that each filler would exclusively appear in a single condition and remain identical across all experiment lists since there is no experimental manipulation involving fillers. He also states that fillers should exhibit surface-level similarities to the target items, especially concerning sentence length. The filler sentences below were given as examples to an experimental item by Keating and Jegerski (2015).

142) Before the student guessed the answer appeared on the next page. (*Experimental Item*)
Yesterday, there was a book on the table in the hallway. (*Filler item*)
The bank usually closes early on Wednesday afternoons. (*Filler item*)
The clerk changes the sign outside the store every day. (*Filler item*)
(Keating & Jegerski, 2015, p. 16)

It is clearly seen from the examples that filler items are similar to experiential item at surface level. In terms of subject, object and verb of the items, they are not similar.

In this study, converbial constructions with non-temporal meaning were used as filler stimuli in order to avoid directing the participants' focus towards temporal constructions. Filler sentences were generated from conditional, concession, purpose, reason, preference and substitution converb clause constructions. Since the experimental stimuli are based on four different sets and nine experimental sentences were generated from one set, different types of case marked, animate and inanimate, common and proper nouns were employed as subjects and objects for both main and subordinate clauses for the filler sentences. Moreover, the verbs of the main clauses in the filler sentences were both transitive and intransitive and were marked with different tense markers. The aim of employing different types of subject, object and verb was to divert participants' attention from the experimental stimuli as much as possible. For the area of interest

seven, free adjunct was not employed because spill-over and sentence wrap-up effects are not aimed for the filler items. Examples below show some of the filler items that were formed for this study with respect to different converbial types.

143) Purpose clause

Çocuğ-a	dondurma	al-mak için	araba-yı	kenar-a	yanaştır-dı-m.
child-DAT	ice-cream	buy-CON	car-ACC	road-side-DAT	pull-PST-1SG

'I pulled the car over to the side in order to buy ice cream to the child.'

144) Concession clause

Durum-umuz-u	bil-diği halde	Hasan	bize	yardım et-me-di.
situation-POSS-ACC	know-CON	Hasan	us	help-NEG-PST-3SG

'Although he knows our situation, Hasan did not help us.'

145) Conditional clause

Ahmet'e	borç	para	ver-di-m	geri öde-mek şartıyla.
Ahmet-DAT	a loan of	money	spot-PST-1SG	repay-CON

'I spotted Ahmet a loan of money provided that he would repay.'

146) Reason clause

Dışarısı	soğuk	ol-duğu için	öğrenci-ler	sıkı	giy-in-di.
Outside	cold	be-CON	student-PL	warmly	dress-PASS-3PL

'Since it was cold outside, the students dressed warmly.'

147) Substitution clause

Ahmet	dersi-ne	çalışacağına	bütün	gün-ü	uyuy-arak	geçir-di.
Ahmet	lesson-DAT	study-CON	whole	day-ACC	sleep-ADV	spend-PST-3SG

'Ahmet spent the whole day sleeping instead of studying his lessons.'

As it is clearly seen from the examples above, the filler sentences were employed from purpose, concession, conditional, reason and substitution clauses which have different meaning relationships when compared to temporal converb clauses. After completing the finalization of experimental and filler stimuli, the self-paced reading task was designed.

4.2.2.3. Design of the Self-Paced Reading Task

In line with the research questions, the self-paced reading task was designed to incorporate experimental items with two conditions. In the first condition, converb clauses come before the main clause and in the second condition converb clauses come after the main clause. Table 16 and Table 17 below show two conditions for the experimental sentences with the *-(y)IncA* converb clause construction according to four sets.

Table 16: *The first condition of the -(y)IncA converb clause experimental stimuli*

	AI1	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
1	Müdür	tatile	çıkınca	biz	ofisi	kapattık	zaten
	manager	*holiday-DAT*	*go-CON*	*we*	*office -ACC*	*close-PST-1PL*	*already*
2	Öğrenciler	okula	gidince	ben	eskileri	hatırladım	yine
	student-PL	*school-DAT*	*go-CON*	*I*	*old time-PL-ACC*	*remember-PST-1SG*	*again*
3	Öğretmen	dersi	anlatınca	çocuklar	konuyu	anladı	zaten
	teacher	*subject-ACC*	*explain-CON*	*child-PL*	*topic-ACC*	*comprehend-PST-3PL*	*already*
4	Tamirci	arabayı	çalıştırınca	duman	etrafı	sardı	yine
	mechanic	*car-ACC*	*start-CON*	*fog*	*environment-ACC*	*surround-PST-3SG*	*again*

Table 16 shows that in the first condition of the experimental stimuli with *-(y)IncA* converbial ending, converb clauses precede the main clause. The critical region is in the area of interest three. Table 17 below shows the second condition of the experimental stimuli with *-(y)IncA* converbial ending.

Table 17: *The second condition of the -(y)IncA converb clause experimental stimuli*

	AI1	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
1	Biz	ofisi	kapattık	müdür	tatile	çıkınca	zaten
	we	*office -ACC*	*close-PST-1PL*	*manager*	*holiday-DAT*	*go-CON*	*already*
2	Ben	eskileri	hatırladım	öğrenciler	okula	gidince	yine
	I	*old time-PL-ACC*	*remember-PST-1SG*	*student-PL*	*school-DAT*	*go-CON*	*again*

3	Çocuklar	konuyu	anladı	öğretmen	dersi	anlatınca	zaten *already*
	child-PL	*topic-ACC*	*comprehend-PST-3PL*	*teacher*	*subject-ACC*	*explain-CON*	
4	Duman	etrafı	sardı	tamirci	arabayı	çalıştırınca	yine *again*
	fog	*environment-ACC*	*surround-PST-3SG*	*mechanic*	*car-ACC*	*start-CON*	

Table 17 shows that converb clauses come after the main clause and the critical region is in the area of interest six. It is important to state that although the linear structure of the converbial construction was changed in the second condition, the area of interest seven was not changed in both of the conditions because it serves as a spill-over and wrap-up effect area for both conditions. Table 16 and 17 show that for one converbial construction, there are two conditions and four different examples. It means that for one converbial construction, there are eight experimental stimuli for two self-paced reading tasks. Table 18 below shows the total number of experimental stimuli for nine converbial constructions.

Table 18: *Total number of experimental stimuli for nine converbial constructions*

Converbial Type	Initial Position	Final Position	Total
-(y)IncA (*when*)	4 sentences	4 sentences	8 sentences
-DIğIndA (*when*)	4 sentences	4 sentences	8 sentences
-DIğI zaman (*when*)	4 sentences	4 sentences	8 sentences
-ken (*while*)	4 sentences	4 sentences	8 sentences
-(A/I)r…-mAz (*as soon as*)	4 sentences	4 sentences	8 sentences
-DIğIndAn beri (*since*)	4 sentences	4 sentences	8 sentences
-mAdAn (önce) (*before*)	4 sentences	4 sentences	8 sentences
-DIktAn sonra (*after*)	4 sentences	4 sentences	8 sentences
–DıkçA (*whenever*)	4 sentences	4 sentences	8 sentences
Total	36 sentences	36 sentences	72 sentences

Table 18 shows that each converbial construction has 8 experimental stimuli. For initial position of the converb clauses, there are 36 experimental stimuli and for final position of the converb clauses, there are 36 experimental stimuli. Totally there are 72 experimental items for two self-paced reading tasks. All the experimental items used in the study can be found in Appendix 1.

As well as experimental stimuli, two conditions were created for filler items in order to avoid directing the participants' focus towards temporal constructions. Table 19 below shows two conditions for purpose clause filler items.

Table 19: *Two conditions for purpose clause filler items*

Condition	**AI1**	**AI2**	**AI3**	**AI4**	**AI5**	**AI6**	**AI7**
1	Çocuğa	dondurma	almak	için	arabayı	kenara	yanaştırdım
	child-DAT	*ice-cream*	*buy-CON*	*CON*	*car-ACC*	*road-side-DAT*	*pull-PST-1SG*
2	Arabayı	kenara	yanaştırdım	çocuğa	dondurma	almak	için
	car-ACC	*road-side-DAT*	*pull-PST-1SG*	*child-DAT*	*ice-cream*	*buy-CON*	*CON*

Table 19 shows that in the first condition, subordinate clause comes before the main clause while in the second condition, it comes after the main clause. Creating two conditions for filler sentences is in line with the suggestion of Keating and Jegerski (2015) who state that fillers should exhibit surface-level similarities to the target items. Table 20 below shows the total number of filler items for different subordinate clauses.

Table 20: *Total number of filler items for different subordinate constructions*

Subordination Type	Initial Position	Final Position	Total
Purpose	6 sentences	6 sentences	12 sentences
Concession	6 sentences	6 sentences	12 sentences
Conditional	9 sentences	9 sentences	18 sentences
Reason	10 sentences	10 sentences	20 sentences
Substitution	5 sentences	5 sentences	10 sentences
Total	36 sentences	36 sentences	72 sentences

Table 20 shows that there are thirty-six subordinate filler items in the initial position and there are thirty-six subordinate filler items in the final position. Totally there are seventy-two filler items for two self-paced reading tasks. All the experimental items used in the study can be found in Appendix 2.

Keating and Jegerski (2015) state that after finalizing the experimental stimuli and filler sentences, the second most crucial aspect in structuring a sentence processing study is the formulation of the post-stimulus distractor task. While the main measure in sentence processing studies is acquired during the reading of each stimulus, commonly in real-time or online, the post-stimulus distractor task serves as a secondary, offline measurement associated with each item. At its core, the aim of this post-stimulus task is to provide participants with a distinct objective for

reading the stimuli, ensuring their sustained attention throughout the experimental session. Two frequently encountered forms of post-stimulus distractor queries include acceptability judgments and comprehension questions based on meaning. In this study, meaning-based comprehension questions were used to ensure participants focus on comprehension and to aid in the identification of sentences for exclusion in data analysis. Felser (2021) states that another factor to contemplate regarding the distractor task is whether the distractor probes emerge after all the stimuli in an experiment or only after a specific percentage of stimuli selected randomly. Keating and Jegerski (2015) state that incorporating distractor questions or decisions consistently in all trials of an experiment can offer significant advantages. These include enhanced distraction from the primary experimental measure and research objectives, heightened face validity, and greater and sustained focus on stimuli throughout the experiment. Finally, and of utmost significance, data on accuracy and reaction time from the post-stimulus task items can provide additional insights into sentence processing behaviour, contingent upon the availability of sufficient data. In line with the mentioned advantages, meaning-based comprehension questions were used for all experimental stimuli and filler items. The participants were expected to write the related answers for the comprehension questions. The aim of using comprehension questions for filler items is to divert participants' attention from the experimental stimuli as much as possible. Table 21 below shows how the comprehensions questions are used with experimental stimuli and filler sentences.

Table 21: *Formation of comprehension questions with experimental stimuli and filler sentences*

Experimental Stimulus	Müdür tatile çıkınca biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already 'When the manager went holiday, we closed the office'
Comprehension Question	Tatil-e çık-an kim? holiday-DAT go-ADJ who 'Who goes holiday?'
Filler Sentence	Dışarısı soğuk ol-duğu için öğrenci-ler sıkı giy-in-di. outside cold be-CON student-PL warmly dress-PASS-3PL 'Since it was cold outside, the students dressed warmly.'
Comprehension Question	Sıkı giyin-en kim? warmly dress-ADJ who 'Who dressed warmly?'

Table 21 shows that comprehension questions ask about an information in the experimental and filler stimuli. There are seventy-two comprehension questions for the experimental stimuli and

seventy-two comprehension questions for the filler sentences. All comprehension questions used in the study can be found in both Appendix 1 and Appendix 2.

After finalizing all the stimuli, the presentation lists were generated. Jegerski (2014) states that in an optimal scenario, a single self-paced reading task would be used with participants reading all stimulus items in every condition. However, in reality, employing a single task could result in various undesirable presentation effects such as priming and ordering effects. Additionally, it may raise the probability of participants becoming consciously aware of the linguistic target of the experiment. Jiang (2012) states that to avoid these complications, each participant reads each stimulus item only once in one of its conditions, ensuring an equal number of target stimuli are read in each condition. To cover all conditions for each stimulus, *multiple counterbalanced presentation lists* (Jegerski, 2014, p. 32) are generated. This way, one group of participants reads a stimulus item in the first condition, another in the second condition, and so forth. In this context, counterbalancing refers to the practice of each participant contributing an equal number of data points to each level of a variable. This is done to account for potential individual differences in reading speed or other characteristics among participants. There are two stimulus conditions for this study; namely; converb clauses that precede the main clause and converb clauses that come after the main clause. Converb clauses that precede the main clause were coded as (a) and converb clauses that come after the main clause were coded as (b). There are 36 experimental items in the study for one condition; thus, they were numbered to 1 to 36. Table 22 below shows the coding process of the experimental items for four different sets.

Table 22: *Coding process of the experimental stimuli*

1. set	1a 1b	2a 2b	3a 3b	4a 4b	5a 5b	6a 6b	7a 7b	8a 8b	9a 9b
2. set	10b 10a	11b 11a	12b 12a	13b 13a	14b 14a	15b 15a	16b 16a	17b 17a	18b 18a
3. set	19a 19b	20a 20b	21a 21b	22a 22b	23a 23b	24a 24b	25a 25b	26a 26b	27a 27b
4. set	28b 28a	29b 29a	30b 30a	31b 31a	32b 32a	33b 33a	34b 34a	35b 35a	36b 36a

After the coding process of the experimental stimuli was finalised as it was seen in Table 22, counterbalancing of the stimuli was applied and there were two experimental presentation lists as shown in Table 23 below.

Table 23: *Illustration of counterbalancing 36 stimuli in two experiments with two conditions across two experimental presentation lists*

	Item 1	*Item 2*	*Item 3*	*Item 4*	*Item 5*	*Item 6*	*Item 7*	*Item 8*	*Item 9*
Experiment I	**1a**	**10b**	**19a**	**28b**	**2a**	**11b**	**20a**	**29b**	**3a**
Experiment II	**1b**	**10a**	**19b**	**28a**	**2b**	**11a**	**20b**	**29a**	**3b**
	Item 10	*Item 11*	*Item 12*	*Item 13*	*Item 14*	*Item 15*	*Item 16*	*Item 17*	*Item 18*
Experiment I	**12b**	**21a**	**30b**	**4a**	**13b**	**22a**	**31b**	**5a**	**14b**
Experiment II	**12a**	**21b**	**30a**	**4b**	**13a**	**22b**	**31a**	**5b**	**14a**
	Item 19	*Item 20*	*Item 21*	*Item 22*	*Item 23*	*Item 24*	*Item 25*	*Item 26*	*Item 27*
Experiment I	**23a**	**32b**	**6a**	**15b**	**24a**	**33b**	**7a**	**16b**	**25a**
Experiment II	**23b**	**32a**	**6b**	**15a**	**24b**	**33a**	**7b**	**16a**	**25b**
	Item 28	*Item 29*	*Item 30*	*Item 31*	*Item 32*	*Item 33*	*Item 34*	*Item 35*	*Item 36*
Experiment I	**34b**	**8a**	**17b**	**26a**	**35b**	**9a**	**18b**	**27a**	**36b**
Experiment II	**34a**	**8b**	**17a**	**26b**	**35a**	**9b**	**18a**	**27b**	**36a**

Table 23 shows that when the one participant sees the first condition of the experimental sentence, the other participant in the second experiment sees the second condition of the same experimental sentence. The reason for seeing the experimental items on the order of *1a; 10b; 19a; 28b* and so on is that the experimental items between 1 to 9 belong the same set. Thus, ordering the experimental sentences as *1a*; *2b*, *3a* and so on would create task familiarity and fatigue effects. The aim here was to avoid these effects as much as possible.

The same procedure was generated for the filler items. Subordinate clauses that precede the main clause were coded as "a" and subordinate clauses that come after the main clause were coded as "b". There are 36 filler items in the study for one condition; thus, they were numbered to 1 to 36 and there were two filler presentation lists. After each filler sentence was added after experimental sentences, the presentation lists for both experiments were finalised. Table 24 below shows an example presentation list for both experiments.

Table 24: *An example presentation list for both self-paced reading tasks*

	Item 1	*Item 2*	*Item 3*	*Item 4*	*Item 5*	*Item 6*	*Item 7*	*Item 8*	*Item 9*	…
Experiment I	**1a**	Filler 1a	**10b**	Filler 7b	**19a**	Filler 13a	**28b**	Filler 22b	**2a**	…
Experiment II	**1b**	Filler 1b	**10a**	Filler 7a	**19b**	Filler 13b	**28a**	Filler 22a	**2b**	…

Table 24 shows that while the participant of the first experiment starts the self-paced reading task with "*1a*" experimental stimulus at item 1, he/she encounters an experimental stimulus from the same set at item 9. Keating and Jegerski (2015) call this method "*sequencing trail*". They state that the arrangement of each item in the overall presentation list should be evenly distributed, ensuring that no single stimulus item or condition from the same set appears in nearly the same position. Considering the filler sentences between the experimental stimuli and comprehension questions after each item, the design of the self-paced reading tasks in this study was aimed to avoid repetition effects for the same set as much as possible.

Certainly, the stimuli are not displayed in numerical order, and the same order is not used for all participants. When organizing stimuli within each presentation list, "*pseudo-randomization method*" (Jegerski, 2014) was preferred. To avoid clustering of target stimuli, pseudo-randomization was employed to ensure that consecutive sentences with similar characteristics did not appear in succession. Lists of numbers were created in a pseudo-randomized manner using the online tool Research Randomizer (Urbaniak & Plous, 2013).

4.2.2.4. Data Collection Tool

While there are alternative psycholinguistic research tools designed for self-paced reading tasks, several studies employing PCIbex (Zehr & Schwarz, 2018) indicate numerous advantages associated with the software (Sedarous & Namboodiripad, 2020; Namboodiripad et al., 2019; Peer et al., 2017). Zehr & Schwarz (2018) state that the PCIbex Farm, accessible at https://farm.pcibex.net/, serves two primary purposes: offering a straightforward coding interface for implementing experimental designs and facilitating the sharing of resulting experiments through web browsers for both data collection and Open Science resource sharing. Sedarous & Namboodiripad (2020) state that PCIbex employs its proprietary mini-language, which does not necessitate any prior JavaScript or programming skills, to define the structure of individual trials and the overall experiment. The design interface also simplifies the integration of resources, such

as visual and auditory stimulus files, and features a trial preview window for convenient testing during development.

The PCIbex mini-language is designed to be highly accessible, providing full control over the sequence of events within a given trial. The core components consist of elements such as text, images, audio, video, timers, etc., which can undergo various actions (presentation/playback, etc.) with precise control over timing and screen placement. In addition to fundamental functions like displaying text in different formats and soliciting text / key-press or mouse-click input, it has the capability to include a diverse array of features. This accommodates both straightforward and intricate experimental task paradigms, encompassing a broad spectrum of dynamic and interactive elements (such as visual stimuli, dynamically evolving trial structures, response feedback, scripted / timed events, and audio/video playback). It also has the ability to log timing and inputs comprehensively. It effortlessly incorporates pre-existing functionalities for standard psycho-linguistic tasks inherited from the original IBEX, which includes tasks like self-paced reading and rating studies (Zehr & Schwarz, 2018). For all these reasons, PCIbex was used in the study to find out if different positions of subordinate and main clauses in temporal converb clause constructions cause any significant differences in processing by administering the self-paced reading task. Figure 7 below shows the screenshot of the homepage of the PCIbex.

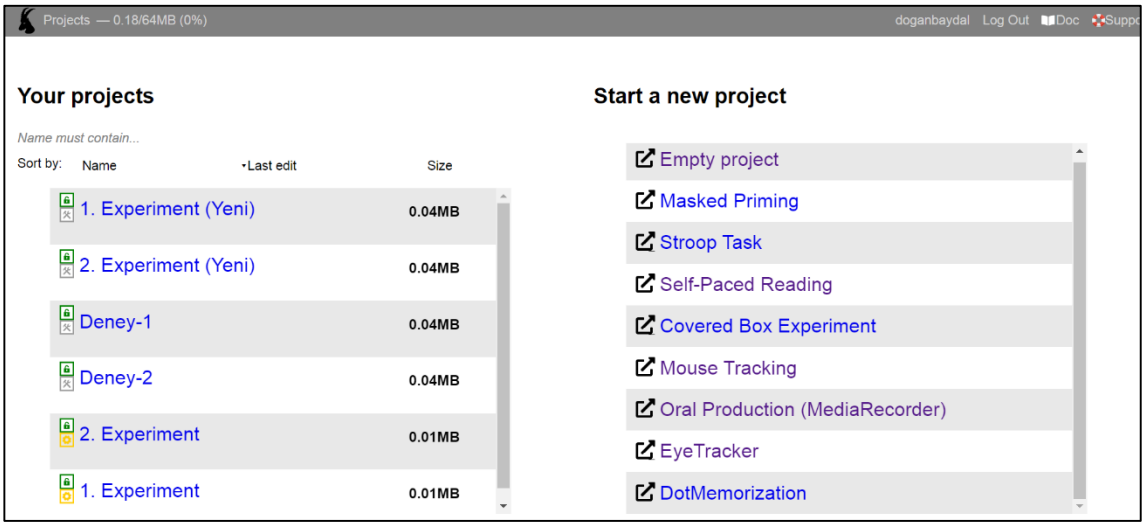

Figure 7: *The screenshot of the homepage of PCIbex*

As it is seen from Figure 7, self-paced reading is one of the experiments that can be conducted through the research tool. After signed up with an e-mail, the home-page with the new projects appears on the screen. After clicking empty project under start a new project, the new project with PCIbex dashboard interface will appear on the main page. In line with the aims of the psycholinguistic experiment, the new project is created.

4.2.2.5. Data Collection Procedure

This study was structured as a self-paced reading task, allowing participants to advance at their own processing pace. The data collection process was devised based on recommendations found in the relevant literature. Jegerski (2014) states that the term "self-paced reading" encompasses various formats. First, the presentation can be *cumulative*, signifying that once a stimulus segment is disclosed, it remains visible to the participant as the subsequent segment is revealed, and this process continues until the entire sentence is ultimately displayed as a whole, which is illustrated in Figure (8). Second, the presentation can be noncumulative, signifying that only a single segment is visible at any given moment, and each time a new segment is disclosed, the preceding one is obscured again. It is illustrated in Figure (8) below.

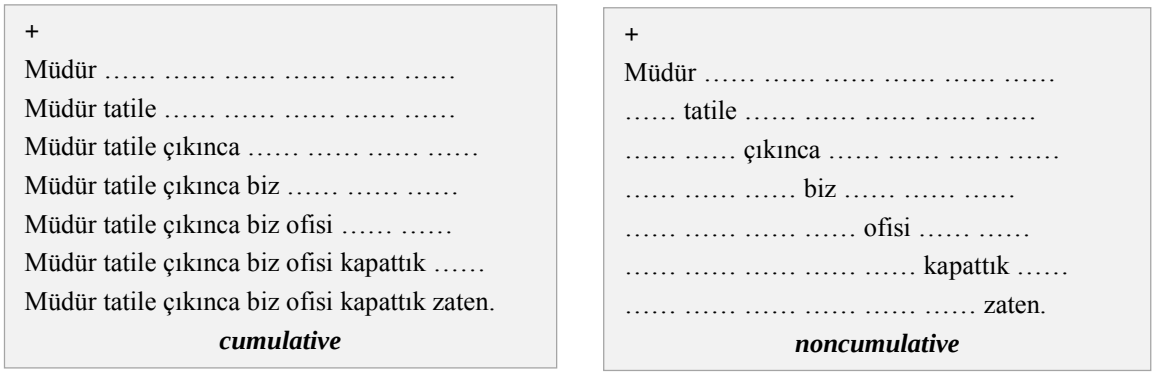

Figure 8*: Illustration of self-paced reading cumulative and noncumulative formats with word-by-word segmentation*

As seen in Figure 8, Jiang (2012) states that the cumulative display poses challenges as most participants tend to adopt a reading strategy where they unveil multiple segments of a stimulus before reading them collectively. Hence, the experimental stimuli were displayed in a noncumulative fashion, centrally positioned on the monitor. Additionally, a comprehension question was posed at the conclusion of each experimental and filler item, following the recommendations of Jiang (2012) and Jegerski (2014).

After deciding for the display type of the experimental stimuli, training session was conducted because Racine (2014) states that the data collection procedure needs to involve a training session, enabling participants to gain sufficient practice with the software and hardware without affecting the results. At the beginning of the training session, participants were instructed to position themselves at a distance of approximately 50-60 cm from the computer, ensuring easy access to

both the keyboard and monitor. They were also tasked with reading a brief information text on the monitor, providing details about the data collection procedure in Turkish, and entering their ages, genders and educational backgrounds. The researcher also elucidated the process and addressed any questions they may have had.

During the training session, as in the data collection process, a series of routines was utilized. These routines included presenting two conditions related to subordinate clause construction and comprehension question different from the experimental stimuli. Moreover, the sentences in the training session were not chosen from temporal converbial constructions in order not to direct the participants' focus towards temporal constructions. An illustration depicting a sample of the self-paced reading test procedure's routine loop in the training section is presented in Figure 9 below.

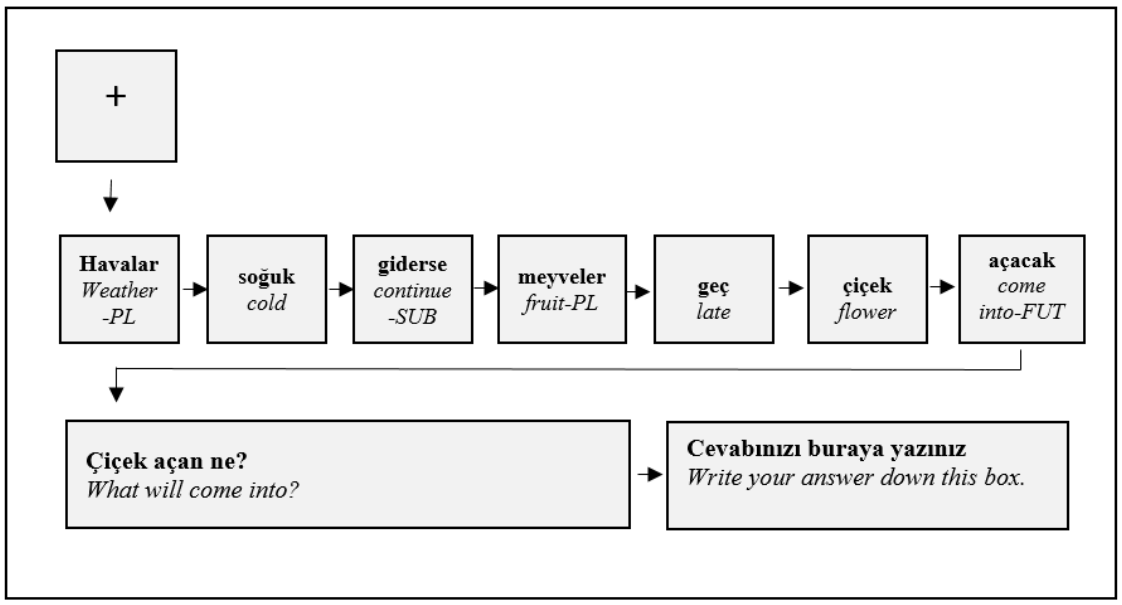

Figure 9: *Flow diagram illustrating a sequence of routines in the training section*

As illustrated in Figure 9, participants were displayed a "+" symbol as a fixation indicator. Subsequently, they pressed the space key at their own pace, leading to the one by one appearance of segments of the training experimental stimuli on the monitor. After the experimental stimuli, a comprehension question appeared on the screen. The participants typed the answer for the comprehension question and clicked the next stimulus button. Subsequently, the entire sequence restarted with a new randomly chosen training stimulus, continuing until all items within the training session were finalized. The training session included four distinct items, mirroring those encountered in the actual data collection process. Following the end of the training session, there was a short break, during which the researcher checked if the participants encountered any difficulties or not.

The initiation of the main data collection took place when participants informed the researcher of their readiness following the training session. The identical procedure employed during the training session was applied during the data collection phase. Figure 10 below shows an illustration depicting a sample of the self-paced reading test procedure's routine loop in the main section.

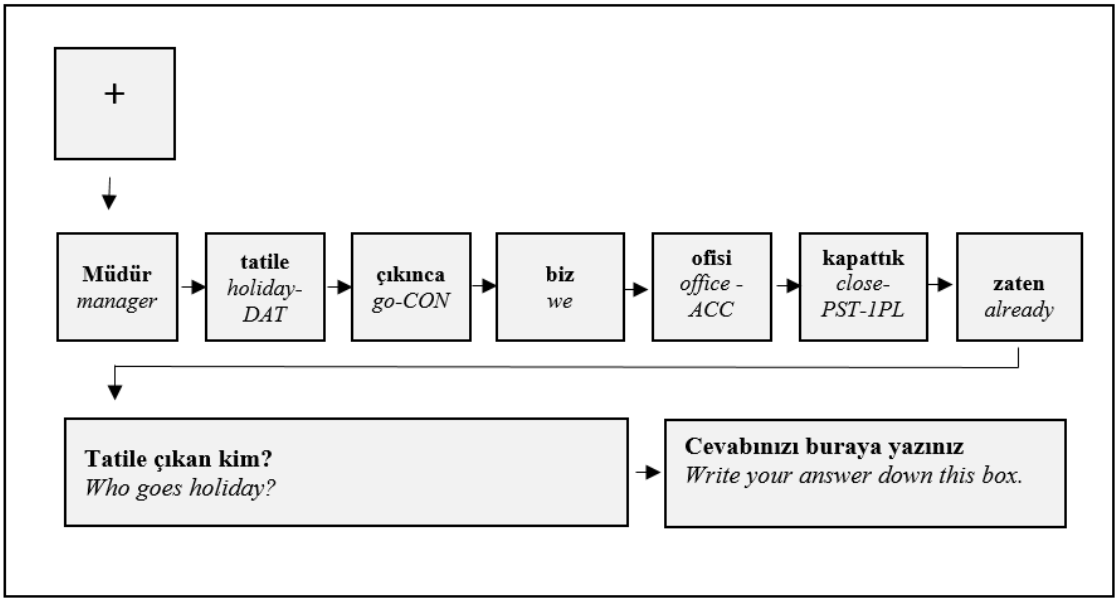

Figure 10: *Flow diagram illustrating a sequence of routines in the main section*

Figure 10 shows that main data collection begins with the first experimental stimulus. As it was stated before, to prevent participant fatigue, habituation, and the recall of the structure, each experimental stimulus was presented in a randomized order. The experimental loop continued until the completion of the final stimulus. As previously stated, a total of 144 experimental and filler items were given across two distinct experiments. In accordance with the recommendations of Fard and Lavender (2019), each participant's data collection session lasted around 20 minutes. However, as the test was self-paced for reading, there were no specific upper or lower time constraints.

4.2.2.6. Data Analysis

The raw data obtained through the self-paced reading method encompass reaction times measured in milliseconds, along with qualitative responses for every occurrence in the experiment that permitted participant input. For instance, every section of the experimental sentences produces a numeric reading time and a categorical record of the button pressed to proceed to the next display

(specifically, the space bar on the keyboard in this study). Consequently, a singular sentential stimulus is linked to eight associated data points. A comprehension question is likewise associated with a corresponding response to the question. The reaction time and comprehension question response data are gathered and saved as a single output file for each participant through the experimental software. Consequently, there is no manual scoring or coding with self-paced reading task.

Output files for data organize information by trial (stimulus), where each data point is represented as a row in a list or table. All trials are sequentially listed based on the order of their presentation during the experiment. In a raw data file, target items are mixed together with fillers, and numerical reaction times are intertwined with distractor comprehension responses. Table 25 below shows excerpt of an unsorted self-paced reading data output file.

Table 25: *Excerpt of an unsorted self-paced reading data output file for the training section*

Experiment	*Subject*	*Trial*	*Event*	*Response*	*RT*
Training 1	1	Training1-1	-havalar- *weather-PL*	Space Key	714
Training 1	1	Training1-2	-soğuk- *cold*	Space Key	803
Training 1	1	Training1-3	-giderse- *continue-SUB*	Space Key	903
Training 1	1	Training1-4	-meyveler- *fruit-PL*	Space Key	799
Training 1	1	Training1-5	-geç- *late*	Space Key	655
Training 1	1	Training1-6	-çiçek- *flower*	Space Key	704
Training 1	1	Training1-7	-açacak- *come into-FUT*	Space Key	912
Training 1	1	Training 1-8	Comp. Ques.	-meyveler-	-

Note: This section of the data file solely reflects one stimulus from the training section at the commencement of the experiments. For a single subject, the output file contains data for 36 experimental items, 36 filler items, and 72 comprehension questions.

As it is clearly seen in Table 25, due to the varied randomization of stimuli and different conditions applied to each stimulus within every presentation list, the initial appearance of the data files differs across each presentation list. The raw data output files are typically in the "*.txt*" format and can be readily opened in Excel or a comparable spreadsheet program. The sorting, linking, and macro features in these programs greatly simplify the process of preparing the data for analysis.

The statistical software package SPSS was selected for conducting tests and statistical procedures due to its added features and ability to handle large datasets. The initial stages of data preparation

for analysis usually involved consolidating all data files into a comprehensive master file. This master file identifies individual participants by number, specifies values for any grouping variables, and segregates the experimental items from the practice, distractor, and filler items. The master data file underwent modifications to facilitate various types of analyses, leading to the creation of three distinct spreadsheets: one for each experimental stimulus region containing reading times, one for each filler stimulus region containing reading times and one for comprehension questions containing response data. The first data set contained 25.200 rows for experimental stimuli (two experiments and 100 participants), the second data set contained 25.200 rows for the filler stimuli (two experiments and 100 participants) and the third data set contained 7200 rows for comprehension responses (two experiments and 100 participants).

Jegerski (2014) states that whether employing parametric statistics or mixed-effects models, it is a prevailing practice in native language studies to exclude and disregard reading time data associated with incorrect comprehension question responses as well as filler items. This is based on the assumption that inaccuracy suggests the participant may not have been attentive during the reading of the experimental sentence. In other words, in the investigation of native language processing, errors are typically rare, and the mechanism through which readers reach incorrect responses to comprehension questions is usually not a focal point of interest. Thus, the data from incorrect comprehension responses with an accuracy rate of less than 90% and distractor filler trials were discarded.

The next step in preparing the data for parametric tests involves refining the reaction time data on a *per-subject* and *per-item* basis. Additionally, aggregate means are calculated, both by subject and by item, for the numerical reaction time data. In this study, the item layout was preferred since the aim of this study is to compare the items; namely preposed and postposed converbial constructions. For this procedure, the data from the subjects' layout was transformed, with each row now representing an item plus area of interest and each column representing a subject. This transformation is shown with example data in Table 26.

Table 26: *Example reading time data from self-paced reading organized by item*

Item-AI	*Sub 1/a*	*Sub 1/b*	*Sub 2/a*	*Sub 2/b*	*Sub 3/a*	*Sub 3/b*	*Sub 4/a*	*Sub 4/b*	…
1-1	773	765	854	993	954	1093	873	869	…
1-2	841	789	978	934	1078	1074	941	899	…
1-3	889	803	994	948	1095	1038	989	903	…
1-4	756	991	834	1001	939	1101	856	1011	…
1-5	714	891	834	1053	934	1158	814	984	…

1-6	870	1299	911	1332	1019	1492	970	1395	…
1-7	1233	1444	1442	1560	1540	1690	1383	1572	…

Note: This is an example partial data set from only four participants and one item with seven areas of interest. For *t*-tests, a mean score for each area of interest for each stimulus condition would be calculated on the complete data set.

The item arrangement in Table 26 serves as a useful visualization for understanding how both data trimming and the calculation of aggregate means yield distinct results when carried out on an item-layout basis compared to a subject-layout approach.

After refining the reaction time data on per-item basis, data trimming process was applied. Jiang (2012) states that data trimming involves trimming reaction time data to minimize the impact of data points that seem to have been affected by external factors unrelated to language processing. These factors may include minor distractions and disruptions during the self-paced reading experiment, which can obscure genuine reading time effects by introducing unnecessary variability and diminishing experimental power. Jegerski (2014) states that trimming entails identifying and eliminating or replacing extreme data points, commonly referred to as *outliers*. Outliers are assumed to represent measurement error rather than genuine processing behaviour, and removing them is crucial for optimizing the accuracy and statistical power of parametric tests, such as *t*-tests, conducted on aggregate means. Given that this study conducted *t*-tests and Mann-Whitney U tests to determine differences between two groups, data trimming was necessary. Jackson (2010) recommends that reading time values in the extremely low range of 100 to 200 ms are likely to be erroneous and lack informative value, and thus, it is reasonable to exclude them. Luce (1986) also states that genuine response times below 100 ms are typically implausible, especially with self-paced reading tasks. Reading times below 100 ms in self-paced reading tasks likely indicate accidental button presses. Conversely, extremely high values may indicate genuine processing challenges, so retaining them in the data makes sense. In line of the recommendations of Jackson (2010) and Luce (1986), reading time values below the range of 100 ms were excluded from the data while high values were kept intact. Data trimming process was conducted by statistical software program SPSS.

After the data had undergone trimming, it became possible to compute aggregate means and perform *t*-tests and Mann–Whitney U tests on these means. The conformity of numerical variables to normal distribution was checked by "*Shapiro-Wilk Test*" (Shapiro & Wilk, 1965). Descriptive statistics of the numerical variables were given as mean $\pm$ standard deviation ($\bar{X} \pm SD$) for normally distributed data and median (min-max) for non-normally distributed data. "*Independent Samples T Test*" was used to compare two stimuli conditions with normal distribution, and "*Mann-Whitney U Test*" was used to compare two stimuli conditions without normal distribution. In all calculations and interpretations in the study, the statistical significance level was considered

as "*p<0.05, p<0.01, p<0.001*" and hypotheses were established bi-directionally. Statistical analysis of the data was performed in SPSS v26 (IBM Inc., Chicago, IL, USA) package program.

The comprehensive outcomes of the statistical analyses, whether they are parametric or non-parametric tests, are presented when presenting or publishing the results of a self-paced reading experiment or a series of experiments. In this study, group means in the form of descriptive statistics were presented through a table of reading times as seen in Table 27 and depicted using line graphs with error bars as seen in Figure 11 and Figure 12.

Table 27: *Reading times analysis for the experimental stimulus "Tamirci arabayı çalıştırınca, duman etrafı sardı yine" (When the mechanic started the car, the fog surrounded the environment again)*

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	962,22±63,10	943 (863-1083)	2027,88±25,53	2024 (1988-2079)	**U=0**	**<0,001*** **
arabayı *car-ACC*	598,70±40,01	593,5 (549-677)	2001,62±3,61	2002 (1987-2007)	**U=0**	**<0,001*** **
çalıştırınca *start-CON*	1262,96±157,63	1242,5 (1003-1596)	2848,78±81,29	2847 (2653-2975)	**U=0**	**<0,001*** **
duman *fog*	1319,90±158,04	1309,5 (1019-1588)	902,54±57,26	911 (802-1006)	**t=17,556**	**<0,001*** **
etrafı *environment-ACC*	1266,16±138,55	1253 (1010-1532)	1152,28±78,18	1148 (1020-1280)	**U=617**	**<0,001*** **
sardı *surround-PST-3SG*	1259,54±83,53	1265,5 (1111-1392)	1147,76±70,62	1146,5 (1012-1282)	**U=401**	**<0,001*** **
yine *again*	1973,48±22,22	1972,5 (1938-2018)	2929,72±50,21	2919,5 (2845-3028)	**t=-123,144**	**<0,001*** **

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 27 shows the mean, standard deviation and median scores for both conditions as well as *t* and *u* scores and *p* values. It shows the clear comparisons between two conditions of the experimental stimulus. It should be noted that while the segment "tamirci (*mechanic*)" is in the first area of interest in the pre-posed converb clause condition, the same segment is in the fourth

area of interest in the post-posed converb clause condition. The other segments are also in different areas of interest related to two conditions, which was explained in detail in part 4.2.2.3.

As well as the table of reading times, Jiang (2012) recommends presentation of the self-paced reading data through a line chart. Figure 11 and 12 below show the visual presentation of the sample stimulus at Table 27.

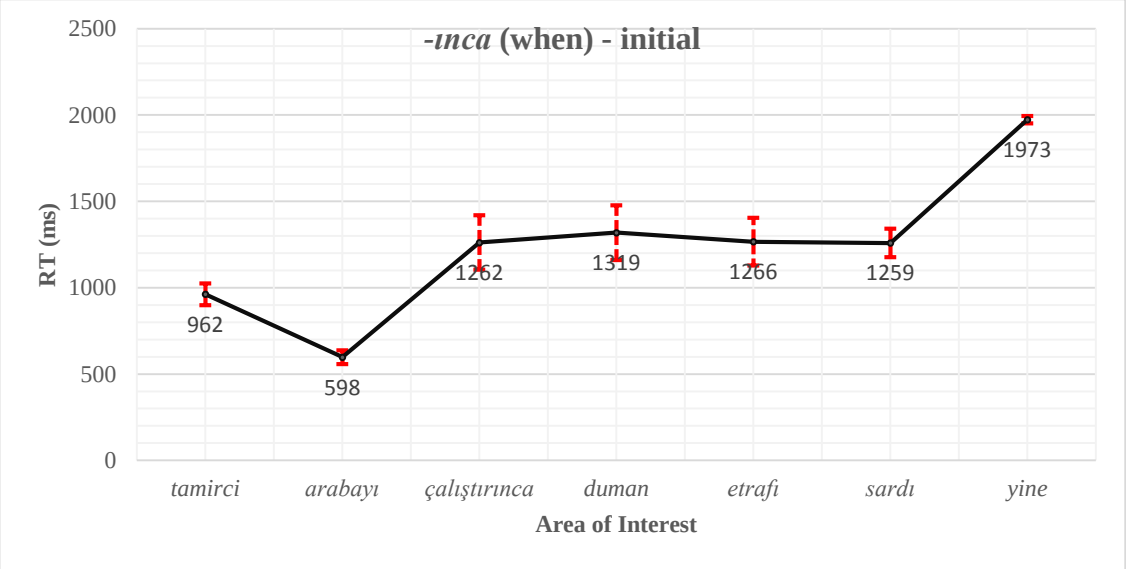

Figure 11: *Visual presentation of the reading times analysis for the experimental stimulus "Tamirci arabayı çalıştırınca, duman etrafı sardı yine" (When the mechanic started the car, the fog surrounded the environment again)*

Figure 11 shows the visual presentation of the reading times analysis of the sample stimulus in Table 27. It presents means ($\bar{x}$) of the reading times and standard deviations (*sd*) for each area of interest in the first condition of the experimental sentence, namely converbial clause that precedes the main clause for *-IncA (when)* converbial ending. The standard deviation is shown with the red lines on each area of interest. The second condition of the same experimental stimulus is shown in Figure 12 below.

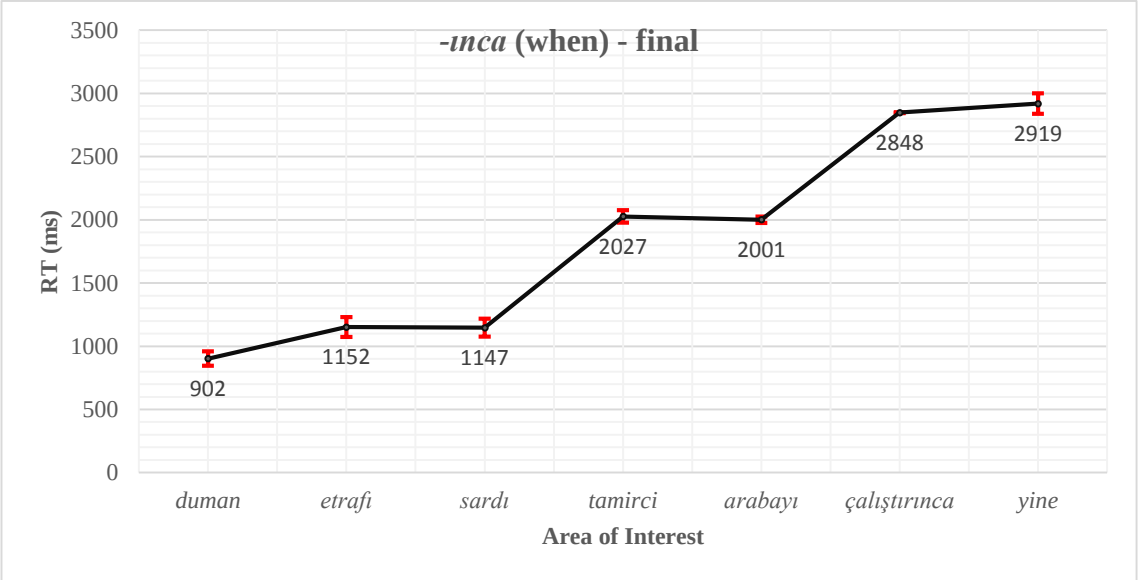

Figure 12: *Visual presentation of the reading times analysis for the experimental stimulus "Duman etrafı sardı tamirci arabayı çalıştırınca, yine" (The fog surrounded the environment when the mechanic started the car again)*

Figure 12 presents means ($\bar{x}$) of the reading times and standard deviations (*sd*) for each area of interest in the second condition of the experimental sentence, namely converbial clause that comes after the main clause for *-IncA* converbial ending. The both line charts above clearly shows the differences between the means ($\bar{x}$) and the standard deviations (*sd*) of the reading times as suggested by Jiang (2012).

After the data analysis of the both corpus and experimental studies, the findings of the both studies and discussion are given in the next section.

CHAPTER 5- FINDINGS AND DISCUSSION

This chapter includes the discussion of the findings. The subsequent subsections are structured in accordance with the research questions of the study. First the findings of the corpus study on the positioning of temporal converb clauses in Turkish are given. Then the findings of the experimental study on processing of temporal converb clauses in Turkish are presented and discussed.

5.1. DISCUSSION OF THE FINDINGS ON CORPUS BASED STUDY

This section includes a discussion of corpus data. Initially, the results of the statistical analyses for both written and spoken corpus data in general are presented, then individual statistical analyses for each converbial ending, namely *-(y)IncA (when)*, *-DIğIndA (when)*, *-DIğI zaman* (when), *-ken (while)*, *-(A/I) r…-mAz (as soon as)*, *-DIğIndAn beri (since)*, *-mAdAn (önce) (before)*, *-DIktAn sonra (after)*, and *-DıkçA (whenever)*, are given.

5.1.1. Findings Concerning Corpus Data

The findings of the corpus study are analysed separately for the spoken and the written data. For both types of data, detailed analyses were presented regarding the linear structure, namely initial and final positions of the converb clauses and regarding the conceptual order, namely, priority, simultaneity and posteriority meaning relationships that the converb clauses have.

The findings of the *spoken* data from the corpus show that out of 4205 spoken data for the temporal converbial constructions in Turkish National Corpus (TNC); there are 3760 converb clauses that appear at the beginning of sentences and 445 converb clauses that appear at the end in total. This means that 89,42% of the temporal clauses come before the main clause, while only 10,58% come after it for the spoken data. Figure 13 below shows the distribution of initial and final converb clauses that express priority, simultaneity and posteriority.

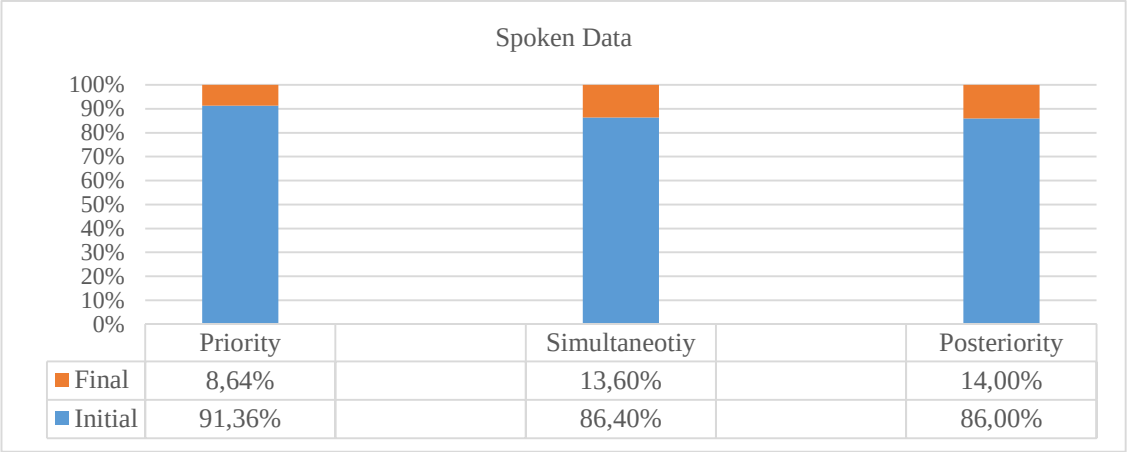

Figure 13: *Conceptual order and linear structure for the spoken data*

Figure 13 shows the correlation between linear structure and conceptual order in the spoken data. It illustrates that out of the *prior* converb clauses, 91,36% (N=2379) come before the main clause and 8,64% (N=225) come after it. Similarly, 86,40% (N=902) of the *simultaneous* converb clauses are positioned before the main clause and 13,60% (N=142) are positioned after the main clause. 86% (N=479) of the temporal clauses that express *posteriority* are placed before their corresponding main clause and 14% (N=78) are placed after their corresponding main clause. Table 28 below shows the 2×3 X^2 analysis, which was performed to examine the relation between conceptual order and linear structure for the spoken data.

Table 28: *Results of the chi-square test on spoken corpus findings*

	Priority	Simultaneity	Posteriority	Row Totals
Initial	2379	902	479	3760
Final	225	142	78	445
Column Totals	2604	1044	557	4205

*The chi-square statistic is *27.3227*. Df=2. The p-value is < *0.00001*. Significance level is set at p < *.05*

Table 28 shows the results of the chi-square test, degrees of freedom (df) value and p value for the spoken data. The relation between these variables is significant, X^2 (2, N=4205) = 27.3227, p <0.00001. In spoken data, temporal converb clauses in general are more likely to come before the main clause and temporal clauses that express a prior event are more likely to appear before the main clause compared to temporal clauses indicating a simultaneous and posterior event.

For the written data, out of 4795 samples, there are 4243 converb clauses that appear at the beginning of the sentences and 552 converb clauses that appear at the end. Approximately 88,49% of the temporal clauses come before the main clause, while only 11,51% come after it. Figure 14 below shows the distribution of initial and final converb clauses that express priority, simultaneity and posteriority for the written data.

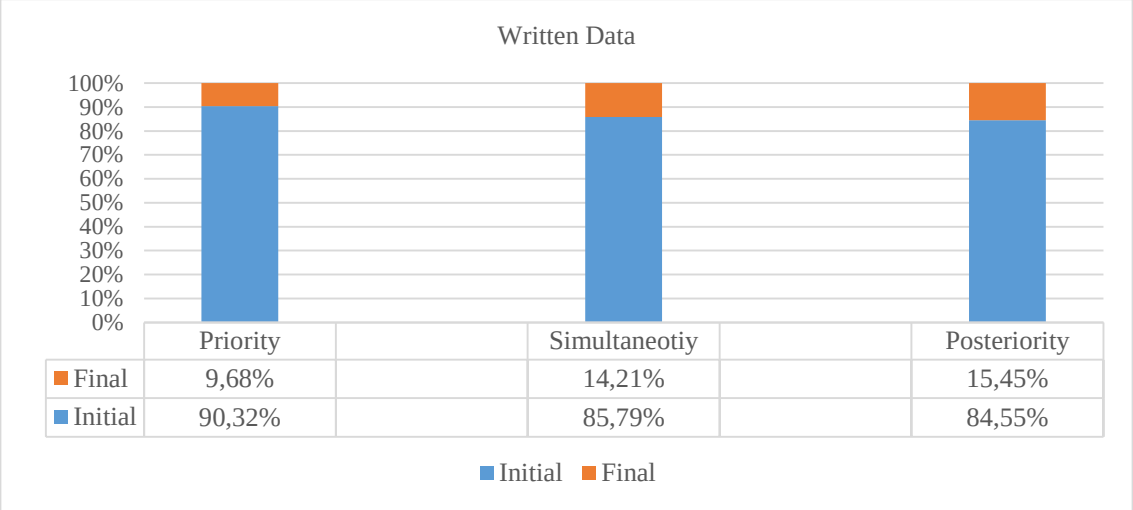

Figure 14: *Conceptual order and linear structure for the written data*

Figure 14 shows the correlation between linear structure and conceptual order in the written data. It illustrates that out of the *prior* converb clauses, 90,32% (N=2734) come before the main clause and 9,68% (N=293) come after the main clause. Similarly, 85,79% (N=978) of the *simultaneous* converb clauses are positioned before the main clause and 14,21% (N=162) are positioned after the main clause. 84,55% (N=531) of the temporal clauses that express *posteriority* are placed before their corresponding main clause while 15,45% (N=97) are placed after their corresponding main clause. Table 29 below shows the 2×3 X^2 analysis, which was performed to examine the relation between conceptual order and linear structure for the written data.

Table 29: *Results of the chi-square test on written corpus findings*

	Priority	Simultaneity	Posteriority	Row Totals
Initial	2734	978	531	4243
Final	293	162	97	552
Column Totals	3027	1140	628	4795

*The chi-square statistic is *27.6676*. Df=2. The p-value is < *0.00001*. Significance level is set at p < .05

Table 29 shows the results of the chi-square test, degrees of freedom (df) value and p value for the written data. The relation between these variables is significant, X^2 (2, N=4795) = 27.6676, p <0.00001. In written data, temporal converb clauses in general are more likely to come before the main clause and temporal clauses that express a prior event are more likely to appear before the main clause compared to temporal clauses indicating a simultaneous and posterior event.

Given that the placement of temporal adverbial clauses varies depending on the converb suffix used, the specific positional patterns of nine temporal clauses were also investigated. The sample sizes in the explanations show the total numbers for the linear structure and / or conceptual order. Table 30 below shows the distribution of initial and final converb clauses that express priority for *-(y)IncA* (when) temporal converb clauses.

Table 30*: -(y)IncA (when) temporal converb clauses - conceptual order and linear structure*

-(y)IncA (*when*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	418	0	0	418	429	0	0	429	847
Final	72	0	0	72	81	0	0	81	153
Total	490	0	0	490	510	0	0	510	1000

Table 30 reveals that *-(y)IncA* (when) temporal converb clauses typically come before the main clause. Specifically, 418 of the clauses are positioned before the main clause, while 72 of them appear after it for the spoken data. For the written data, 429 of the clauses are positioned before the main clause, while 81 of them appear after it. In general, 84,7% of -(*y)IncA* (when) temporal converb clauses come before the main clause while 15,3% come after it. Since there are not simultaneous and posterior meaning relationships for *-(y)IncA* (when) clauses, the chi-square statistic was not calculated.

Table 31 below shows the distribution of initial and final converb clauses that express priority, simultaneity and posteriority for *-DIğIndA* (when) temporal converb clauses.

Table 31*: -DIğIndA (when) temporal converb clauses - conceptual order and linear structure*

-DIğIndA (*when*)	Spoken (Conceptual Order)	Written (Conceptual Order)	

Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	309	23	39	371	432	29	45	506	877
Final	23	10	16	49	41	12	21	74	123
Total	332	33	55	420	473	41	66	580	1000

Based on the information provided in Table 31, it is evident that *-DIğIndA* (when) temporal converb clauses predominantly appear before the main clause. Most of the *-DIğIndA* (when) temporal converb clauses express priority. Table 30 shows that there are 332 prior clauses, 33 simultaneous clauses, and 55 posterior clauses for the spoken data. Out of them, 371 of the clauses are positioned before the main clause, while 81 of them appear after it. The relation between these variables is significant, X^2 (2, N=420) = 34.5596, p <0.00001. In the written data, there are 473 prior clauses, 41 simultaneous clauses, and 66 posterior clauses. Out of them, 506 of the temporal clauses come before the main clause, while only 74 come after it. The relation between these variables is significant, X^2 (2, N=580) = 38.6904, p <0.00001.

Table 32 below shows the distribution of initial and final converb clauses that express priority, simultaneity and posteriority for *-DIğI zaman* (when) temporal converb clauses.

Table 32: *-DIğI zaman (when) temporal converb clauses – conceptual order and linear structure*

-DIğI zaman (*when*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	401	43	21	465	373	33	22	428	893
Final	21	18	11	50	31	16	10	57	107
Total	422	61	32	515	404	49	32	485	1000

Table 32 reveals that *-DIğI zaman* (when) temporal converb clauses typically come before the main clause. Most of the *-DIğI zaman* (when) temporal converb clauses express priority. Table 32 shows that there are 422 prior clauses, 61 simultaneous clauses, and 32 posterior clauses for the spoken data. Out of them, 465 of the clauses are positioned before the main clause, while 50 of them appear after it. The relation between these variables is significant, X^2 (2, N=515) = 60.2703, p <0.00001. In the written data, there are 404 prior clauses, 49 simultaneous clauses,

and 32 posterior clauses. Out of them, 428 of the temporal clauses come before the main clause, while only 57 come after it. The relation between these variables is significant, X^2 (2, N=485) = 38.8497, p <0.00001.

Table 33 below shows the distribution of initial and final converb clauses that express simultaneity for *-ken* (while) temporal converb clauses.

Table 33: *-ken (while) temporal converb clauses – conceptual order and linear structure*

-ken (*while*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	0	449	0	449	0	414	0	414	863
Final	0	71	0	71	0	66	0	66	137
Total	0	520	0	520	0	480	0	480	1000

Table 33 indicates that *-ken* (while) temporal converb clauses which indicate simultaneity typically come before the main clause. Specifically, 449 of the clauses are positioned before the main clause, while 71 of them appear after it for the spoken data. For the written data, 414 of the clauses are positioned before the main clause, while 66 of them appear after it. In general, 86,3% of *-ken* (while) temporal converb clauses come before the main clause while 13,7% come after it. Since there are not prior and posterior meaning relationships for *-ken* (when) clauses, the chi-square statistic was not calculated.

Table 34 below shows the distribution of initial and final converb clauses that express priority for *-(A/I) r…-mAz* (as soon as) temporal converb clauses.

Table 34: *-(A/I) r…-mAz (as soon as) temporal converb clauses – conceptual order and linear structure*

-(y)IncA (*as soon as*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	433	0	0	433	468	0	0	468	901
Final	47	0	0	47	52	0	0	52	99

Total	480	0	0	480	520	0	0	520	1000

Table 34 shows that *-(A/I) r…-mAz* (as soon as) temporal converb clauses expressing earlier events generally precede the main clause. 433 of the clauses are found to appear before the main clause, while 47 of them are found to appear after it for the spoken data. 468 of the clauses are positioned before the main clause, while 52 of them appear after it for the written data. In general, 90,1% of *-(A/I) r…-mAz* (as soon as) temporal converb clauses come before the main clause while 9,9% come after it. Since there are not simultaneous and posterior meaning relationships for *-(A/I) r…-mAz* (as soon as) clauses, the chi-square statistic was not calculated.

Table 35 below shows the distribution of initial and final converb clauses that express priority for *-DIğIndAn beri* (since) temporal converb clauses.

Table 35: *-DIğIndAn beri (since) temporal converb clauses - conceptual order and linear structure*

-DIğIndAn beri (*since*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	386	0	0	386	531	0	0	531	917
Final	34	0	0	34	49	0	0	49	83
Total	420	0	0	420	580	0	0	580	1000

Table 35 reveals that *-DIğIndAn beri* (since) temporal converb clauses expressing prior events mostly precede the main clause. Specifically, 386 of the clauses are positioned before the main clause, while 34 of them appear after it for the spoken data. For the written data, 531 of the clauses are positioned before the main clause, while 49 of them appear after it. In general, 91,7% *-DIğIndAn beri* (since) temporal converb clauses come before the main clause while 8,3% come after it. Since there are not simultaneous and posterior meaning relationships for *-DIğIndAn beri* (since) clauses, the chi-square statistic was not calculated.

Table 36 below shows the distribution of initial and final converb clauses that express posteriority for *-mAdAn önce* (before) temporal converb clauses.

Table 36: *-mAdAn önce (before) temporal converb clauses - conceptual order and linear structure*

-mAdAn önce (*before*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	0	0	419	419	0	0	464	464	883
Final	0	0	51	51	0	0	66	66	117
Total	0	0	470	470	0	0	530	530	1000

Table 36 indicates that *-mAdAn önce* (before) temporal converb clauses expressing posteriority generally precede the main clause. In particular, 419 of the clauses are situated before the main clause, while 51 clauses occur after it for the spoken data. 464 of the clauses are situated before the main clause, while 66 clauses occur after it for the written data. In general, 88,3% of *-mAdAn önce* (before) temporal converb clauses come before the main clause while 11,7% come after it. Since there are not prior and simultaneous meaning relationships for *-mAdAn önce* (before) clauses, the chi-square statistic was not calculated.

Table 37 below shows the distribution of initial and final converb clauses that express priority for *-DIktAn sonra* (after) temporal converb clauses.

Table 37: *-DIktAn sonra (after) temporal converb clauses – conceptual order and linear structure*

-DIktAn sonra (*after*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	432	0	0	432	501	0	0	501	933
Final	28	0	0	28	39	0	0	39	67
Total	460	0	0	460	540	0	0	540	1000

As can be seen in Table 37, *-DIktAn sonra* (after) temporal converb clauses expressing events occurring before the events expressed by the main verb typically come before the main clause. For the spoken data, 432 of the clauses are positioned before the main clause, while 28 of them appear after it. For the written data, 501 of the clauses are positioned before the main clause, while

39 of them appear after it. In general, 93,3% of *-mAdAn önce* (before) temporal converb clauses come before the main clause while 6,7% come after it. Since there are not simultaneous and posterior meaning relationships for *-mAdAn önce* (before) clauses, the chi-square statistic was not calculated.

Table 38 below shows the distribution of initial and final converb clauses that express simultaneity for *-DıkçA* (whenever) temporal converb clauses.

Table 38: *-DIkçA (whenever) temporal converb clauses - conceptual order and linear structure*

-DıkçA (*whenever*)	Spoken (Conceptual Order)				Written (Conceptual Order)				
Linear Structure	Prior	Simultaneous	Posterior	TOTAL	Prior	Simultaneous	Posterior	TOTAL	LINE TOTAL
Initial	0	387	0	387	0	502	0	502	889
Final	0	43	0	43	0	68	0	68	111
Total	0	430	0	430	0	570	0	570	1000

Table 38 shows that *-DIkçA* (whenever) temporal converb clauses which express simultaneous events typically come before the main clause. In particular, 387 of the clauses are situated before the main clause, while 43 clauses occur after it for the spoken data. 502 of the clauses are situated before the main clause, while 68 clauses occur after it for the written data. In general, 88,9% of *-DıkçA* (whenever) temporal converb clauses come before the main clause while 11,1% come after it. Since there are not prior and posterior meaning relationships for *-DıkçA* (whenever) clauses, the chi-square statistic was not calculated.

After presenting the findings of the corpus data both in general and for specific converbial endings, the next subsection provides discussion of these findings.

5.1.2. Discussion of the Corpus Data Findings

The discussion related to corpus findings is composed of two parts. First, the general discussion on the spoken and written corpus data is initiated and then discussion on the specific positional patterns of nine temporal clauses is be held.

The corpus analyses for the converbial constructions in general reveal interesting results. For the spoken data in general, an obvious connection can be observed between the conceptual order and linear structure for the prior and simultaneous converb clause constructions. The arrangement of the two clauses matches the inherent chronological progression of events as suggested by Wittgenstein (1922), Ungerer and Schmid (2006), Simone (1995), Thompson (1987), Greenberg (1963), Lehmann (1974), Croft (2003), Clark (1971) and Diessel (2001, 2008). For the converb clause constructions which denote posteriority in the spoken data, the distinct connection between the conceptual order and linear structure cannot be observed. Although the events in the converb clauses which denote posteriority happen after the events in the main clause, most of converb clauses are positioned before the main clauses in the linear structure. This sentential position for the converb clauses which denote posteriority is not in line with the asymmetry underlying structural coding as suggested by Croft (2003). Moreover, it is clearly seen from the findings of the spoken data that while the percentage of subordinate clauses which denote priority is 91,36% in the initial position, the percentage of subordinate clauses which denote posteriority is 86% in the initial position. These findings show that iconic motivation does not have a role on the sentential positions of the temporal converbial constructions on the spoken data. The tendency in the spoken data for the sentential positions of the temporal converbial constructions is also observed in the written data. An obvious connection can be observed between the conceptual order and linear structure for the prior and simultaneous converb clause constructions in the written data. In other words, there is relationship between the arrangement of linguistic elements and the structure of events encountered in reality as suggested by Ungerer and Schmid (2006) for the converb clause constructions which denote priority and simultaneity. For the converb clause constructions which denote posteriority in the written data, the distinct connection between the conceptual order and linear structure is not observed. Although the events in the converb clauses which denote posteriority happen after the events in the main clause, most of converb clauses are positioned before the main clauses in the linear structure. Moreover, the findings of the written data show that while the percentage of subordinate clauses which denote priority is 90,32% in the initial position, the percentage of subordinate clauses which denote posteriority is 84,55% in the initial position. Based on these findings, it is safe to claim that the sequence of subordinate clauses in relation to the main clause is not affected by iconic motivation in the written data. Figure 14 and 15 below show the relationship between the clause order and iconicity in temporal converbial constructions in a more comprehensive way based on the findings for both of the data.

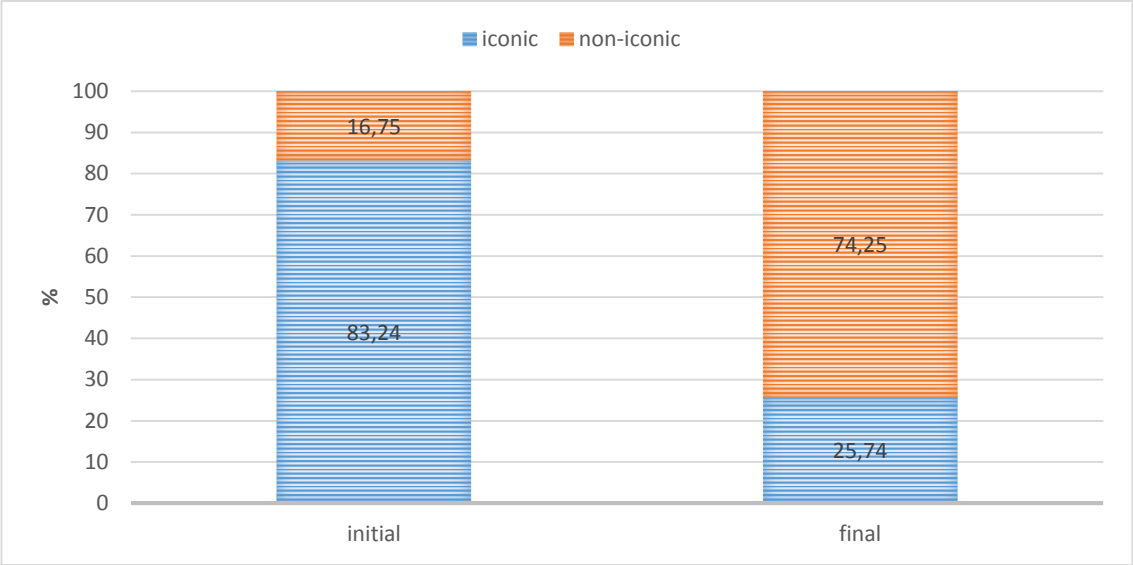

Figure 15: *Clause order and iconicity for the spoken data*

As can be seen in Figure 15, when the converb clause comes before the main clause, 83,24% of sentences display an iconic structure; however, when the converb clause follows the main clause, only 25,74% percent exhibit an iconic ordering (X^2 (1, N=3161) = 523.1771, p <0.00001). Notably, complex sentences with initial converb clauses adhere more closely to the principle of iconicity compared to those with final converb clauses for the spoken data. A significant percentage of complex sentences violates the iconicity of sequence for the final converb clauses. Similarly, Figure 16 below show the relationship between the clause order and iconicity for the written data.

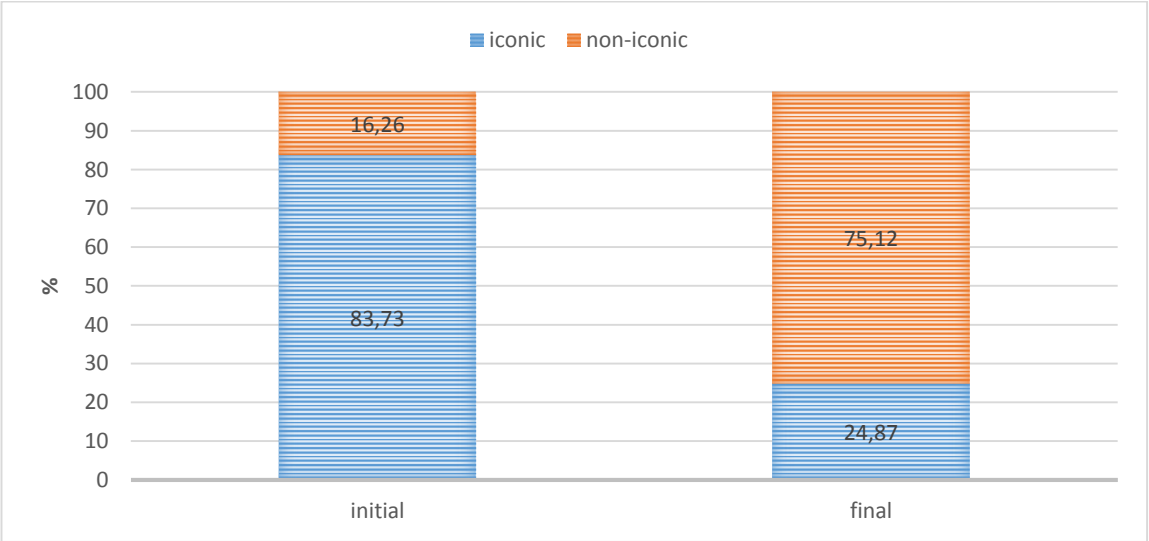

Figure 16: *Clause order and iconicity for the written data*

As depicted in Figure 16, in the situations where the converb clause precedes the main clause, 83,73% of sentences demonstrate an iconic structure. Conversely, when the converb clause follows the main clause, only 24,87% exhibit an iconic ordering ((X^2 (1, N=3655) = 691.3206, p <0.00001). Significantly, in written data, complex sentences featuring initial converb clauses align more closely with the principle of iconicity than those with final converb clauses. A notable portion of complex sentences deviates from the iconic sequence for final converb clauses.

Another finding from the corpus data is that both in written and spoken data, the percentages of initial and final temporal converbial clauses are nearly the same. In the written data, 91,36% of prior converb clauses, 86,40% of simultaneous converb clauses and 86,00% of posterior converb clauses are initial. In the spoken data, 90,32% of prior converb clauses, 85,79% of simultaneous converb clauses and 84,55% of posterior converb clauses are initial. Similarly, 8,64% of prior converb clauses, 13,60% of simultaneous converb clauses and 14,00% of posterior converb clauses are in final position in the spoken data while 9,68% of prior converb clauses, 14,21% of simultaneous converb clauses and 15,45% of posterior converb clauses are in final position in the written data. In the domain of cognitive linguistics, Chafe (1979, 1982) suggests that syntactically complex structures are more prevalent in written discourse as opposed to spoken discourse. He further suggests that the complexity observed in writing stems from the distant relationship between the writer and the audience. Given the typical temporal and spatial separation between the writer and audience, writing tends to possess a "detached" quality, in contrast to the "involved" quality characteristic of speech. Furthermore, the leisurely pace of writing, as opposed to the rapid pace of speaking, affords the writer the opportunity to systematically "integrate" their ideas into a more intricate and cohesive structure. This stands in contrast to the "fragmented" and spur-of-the-moment nature inherent in speech. Likewise, Beaman (1984) states that due to the extended timeframe available for organizing thoughts, written discourse inherently tends to be more carefully planned than its spoken equivalent. Consequently, it can be inferred that written discourse is expected to exhibit greater syntactic complexity compared to spoken discourse. Regarding that using temporal converb clauses in non-default positions in Turkish creates complexity, the percentage of using converb clauses in final position should have been higher in written data when compared to spoken data as the studies in the literature present that syntactically more complex structures occur more frequently in written discourse (Chafe, 1979, 1982; Beaman, 1984; Kroll, 1977; O'Donnell, 1974, Lakoff, 1979; Ochs, 1979). This result is not in line with the syntactic complexity theory, which is supported by Ochs (1979) who outlines four traits that are typical of discourse that is not planned. These traits are; (a) dependence on the immediate context for articulating propositions, (b) dependence on morphosyntactic features acquired early in life, (c) inclination to reiterate and substitute lexical items in proposition expression, and (d)

resemblance in the structure and substance of sequentially organized social events. The second trait is important in supporting the idea that unplanned discourse exhibits syntactic structures similar to those used by children in the early stages of language development. Developmentally, younger children more than older children have been found to use less syntactically complex sentences. However, syntactically complex structures are nearly same in written discourse and spoken discourse according to the findings from the corpus data.

The corpus analysis for the specific positional patterns of nine temporal clauses also reveal interesting results. The placement of the *-(y)IncA* (when) temporal converb clauses aligns with the conceptual order, as 84,12% of the clauses come before the main clause. As Slobin (1995) states, there are no restrictions on co-reference between the two clauses in *-(y)IncA* (when) constructions. The only plausible interpretation is that the commencement of the second event aligns with the conclusion of the first. Thus, only 15,88% of the clauses violate the iconicity of sequence for the *-(y)IncA* (when) clauses.

As Çetintaş Yıldırım (2004) states, the suffix *-DIğIndA* (when) indicates simultaneity, posteriority, and anteriority. In general, 87,7% of the clauses are positioned before the main clause, whereas 12,3% of them occur after it both for spoken and written data. The placement of the *-DIğIndA* (when) temporal converb clauses aligns with the conceptual order for the prior converb clause constructions (92,05% of the clauses are initial and 7,95% of them are final). For the posterior converb clause constructions, *-DIğIndA* (when) temporal converb clauses do not align with the conceptual order as prior converb clauses do (69,42% of the clauses are initial and 30,58% of them are final). A notable portion of posterior converb clauses deviates from the iconic sequence for final converb clauses.

Göksel and Kerslake (2005) state that in meaning relationship, *-DIğI zaman* (when) denotes simultaneity, posteriority and anteriority. Specifically, 89,3% of the clauses are positioned before the main clause, while 10,7% of them appear after it both for the spoken and written data. The placement of the *-DIğI zaman* (when) temporal converb clauses aligns with the conceptual order for the prior converb clause constructions clearly (93,70% of the clauses are initial and 6,30% of them are final). For the posterior converb clause constructions, *-DIğI zaman* (when) temporal converb clauses do not align with the conceptual order as prior converb clauses do (67,19% of the clauses are initial and 32,81% of them are final). As it was stated in the *-DIğIndA* (when) temporal converb clauses, although a significant portion of posterior converb clauses diverges from the iconic sequence observed in final converb clauses.

The placement of the *-ken* (while) clauses aligns with the conceptual order, as 86,30% of the clauses come before the main clause while 13,70% of the clauses come after the main clause. Slobin (1995) states that in *-(y)ken* (while) clause construction, the initial event must be durative and unbounded, while there are no limitations on the temporal characteristics of the second event. Thus, only 15,88% of the clauses violate the iconicity of sequence for the *-(y)ken* (while) clauses.

The sentential positions of the *-(A/I) r…-mAz* (as soon as) temporal converb clauses align with the conceptual order since 90,10% of them come before the main clause. Çetintaş Yıldırım (2004) states that the *-(A/I) r…-mAz* (as soon as) converb clause establishes an anterior temporal relationship with the main clause and does not convey other temporal connections like simultaneity or posteriority. It specifically signifies the immediate succession of the main clause within the complex sentence. Only 9.9% of the clauses violate the iconicity of sequence for the *-(A/I) r…-mAz* (as soon as) clauses.

The placement of the *-DIğIndAn beri* (since) temporal converb clauses corresponds to the conceptual order as 91,70% of the prior clauses come before the main clause. Banguoğlu (1995) states that *-DIğIndAn beri* (since) falls within the category of initial converbs (gérondif initial). It signifies a starting point relationship with the predicate in the main clause. In the light of this information, only 8.3% of the clauses violate the iconicity of sequence for the constructions with this particular converbial ending.

Gračanin-Yüksek (2015) characterizes the morphological aspect of *-mAdAn önce* (before) as conveying temporal antecedence, aligning in meaning with English clauses headed by the subordinator "before". As the events in the *-mAdAn önce* (before) clauses happen after the event in the main clause, these clauses need to come after the main clause in the linear structure of the complex sentence. However, the corpus data results reveal that 88,30% of the clauses come before the main clause while 11,70% of them come after the main clause, which does not correspond to the conceptual order.

Çetintaş Yıldırım (2004) states that *-DIktAn sonra* (after) indicates only the anteriority of the converb clause and does not express any other temporal relationships, such as simultaneity or posteriority. As the events in the *-DIktAn sonra* (after) clauses happen before the event in the main clause, these clauses need to come before the main clause in the linear structure of the complex sentence according to iconicity of sequence theory. The results of the findings show that conceptual order and linear structure are clearly related for *-DIktAn sonra* (after) temporal converb clauses as 93,30% of the prior clauses come before the main clause while only 6,70% of them come after it.

Banguoğlu (1995) states that *-DIkçA* (whenever) falls within the category of temporal converbs (*gérondif temporal*), conveying the meaning relationship of repetition. The findings show that the placement of the converb clauses aligns with the conceptual order, as 88,90% of the simultaneous clauses come before the main clause while 11,10% of the simultaneous clauses come after the main clause.

The findings of the corpus study show that the converbial ending *-mAdAn önce* (before) does not correspond to the conceptual order. Thus, another study; namely experimental study, was held to analyse the reasons behind the positioning of temporal converbial constructions in Turkish.

After the findings and discussion on corpus-based study, the next subsection presents the findings and discussion on experimental study on the positioning of temporal converb clauses in Turkish.

5.2. DISCUSSION OF THE FINDINGS ON EXPERIMENTAL STUDY

In this subsection, a detailed presentation of the experimental data findings and discussion is provided, as the structure outlined in the previous subsection. The presentation begins with the results of the statistical analyses related to the experimental data, and the subsequent discussion of these findings is presented later in the same subsection.

5.2.1. Findings Concerning Experimental Data

The findings of the experimental study are analysed separately for each temporal converbial ending, namely *-(y)IncA (when), -DIğIndA (when), -DIğI zaman (when), -ken (while), -(A/I) r…-mAz (as soon as), -DIğIndAn beri (since), -mAdAn (önce) (before), -DIktAn sonra (after),* and *-DıkçA (whenever).* As it was stated in the methodology chapter, for each temporal converbial ending, there are four experimental sentence sets and two conditions. Regarding that 50 participants attended for each experiment, for two conditions of each temporal converbial ending, there are 400 sentences that were read by the participants. Moreover, as one experimental sentence consists of seven areas of interest, there are 2800 areas of interest for one temporal converbial ending. The tables below show the numerical variables for these 2800 areas of interest. The statistical analysis for each experimental sentence was given in Appendix 3. Table 39 below shows reading times analysis for *-(y)IncA* (when) temporal converbial ending. It should be kept in mind that area of interest 1 (AI1) in initial converb clauses equals area of interest 4 (AI4) in final converb clauses; area of interest 2 (AI2) in initial converb clauses equals area of interest 5 (AI5) in final converb clauses; area of interest 3 (AI3) in initial converb clauses equals area of

interest 6 (AI6) in final converb clauses; area of interest 4 (AI4) in initial converb clauses equals area of interest 1 (AI1) in final converb clauses; area of interest 5 (AI5) in initial converb clauses equals area of interest 2 (AI2) in final converb clauses and area of interest 6 (AI6) in initial converb clauses equals area of interest 3 (AI3) in final converb clauses as it was already explained in detail in part 4.2.2.3. Since the area of interest 7 (AI7) consists of *spill-over* and *sentence-wrap* area, it is same for both conditions.

To comprehend the tables better, one example experimental sentence, namely, the nine versions of "*Müdür tatile çıkınca biz ofisi kapattık zaten (When the manager went holiday, we closed the office)*" are displayed on the left side of the tables.

Table 39 below shows reading times analysis for *-(y)IncA* (when) temporal converbial ending.

Table 39: *-(y)IncA (when) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\bar{X} \pm SD$	**Median (min-max)**		$\bar{X} \pm SD$	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	842,52 ±60,01	837,5 (710-1001)	AI 4	2158,28 ±33,68	2159,5 (2106-2218)	**0**	**<0,001 *****
tatile holiday-DAT	AI 2	773,00 ±78,22	774 (619-889)	AI 5	2096,06 ±70,45	2083 (2000-2236)	**0**	**<0,001 *****
çıkınca go-CON	AI 3	1294,76 ±83,70	1309,5 (1104-1470)	AI 6	3237,04 ±108,20	3223,5 (3077-3422)	**0**	**<0,001 *****
biz we	AI 4	1163,50 ±50,81	1160,5 (1020-1289)	AI 1	994,84 ±58,16	997 (905-1100)	**15,5**	**<0,001 *****
ofisi office -ACC	AI 5	1071,60 ±50,45	1048,5 (1003-1231)	AI 2	986,34 ±54,29	975,5 (886-1089)	**357,5**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1220,68 ±58,08	1207 (1101-1332)	AI 3	1103,82 ±66,84	1108 (995-1213)	**246,5**	**<0,001 *****
zaten already	AI 7	2236,44 ±75,30	2237 (2112-2400)	AI 7	3597,92 ±64,80	3605,5 (3492-3700)	**0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 39 shows that a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the final position (U=15,5; p<0,001); AI5 in the initial position and AI2 in the final position (U=357,5; p<0,001); AI6 in the initial position and AI1 in the final position (U=246,5; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

The results further show that the median score for the reading times of AI4 in the final position [2159,5 (2106-2218)] is statistically higher than AI1 in the initial position [837,5 (710-1001)]; AI5 in the final position [2083 (2000-2236)] is statistically higher than AI2 in the initial position [774 (619-889)]; AI6 in the final position [3223,5 (3077-3422)] is statistically higher than AI3 in the initial position [1309,5 (1104-1470)]; AI4 in the initial position [1160,5 (1020-1289)] is statistically higher than AI1 in the final position [997 (905-1100)]; AI5 in the initial position [1048,5 (1003-1231)] is statistically higher than AI2 in the final position [975,5 (886-1089)]; AI6 in the initial position [1207 (1101-1332)] is statistically higher than AI3 in the final position [1108 (995-1213)] and; AI7 in the final position [3605,5 (3492-3700)] is statistically higher than AI7 in the initial position [2237 (2112-2400)].

Table 40 below shows reading times analysis for -*DIğIndA* (when) temporal converbial ending.

Table 40: -*DIğIndA (when) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\bar{X} \pm SD$	**Median (min-max)**		**$\bar{X} \pm SD$**	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	966,94 ±20,72	969,5 (924-1001)	AI 4	2143,28 ±24,00	2144 (2101-2187)	**t=-262,383**	**<0,001 *****
tatile holiday-DAT	AI 2	689,56 ±24,96	687,5 (645-733)	AI 5	2016,78 ±13,53	2015,5 (2000-2044)	**U=0**	**<0,001 *****
çıktığında go-CON	AI 3	1120,72 ±60,19	1104 (1035-1239)	AI 6	2919,42 ±44,28	2909,5 (2858-2994)	**U=0**	**<0,001 *****
biz we	AI 4	1206,90 ±61,99	1200,5 (1108-1313)	AI 1	1018,08 ±50,39	1027,5 (932-1095)	**U=0**	**<0,001 *****
ofisi office -ACC	AI 5	1189,28 ±59,39	1193 (1102-1297)	AI 2	1052,66 ±24,49	1051 (1003-1094)	**U=0**	**<0,001 *****

kapattık close-PST-1PL	AI 6	1259,50 ±53,93	1259 (1175-1347)	AI 3	1149,20 ±53,95	1144,5 (1050-1237)	**U=207,5**	**<0,001 *****
zaten already	AI 7	2033,88 ±21,42	2037,5 (2001-2065)	AI 7	3075,28 ±39,74	3073,5 (3003-3154)	**U=0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 40 shows that statistically a significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (t=262,383; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the final position (U=0; p<0,001); AI5 in the initial position and AI2 in the final position (U=0; p<0,001); AI6 in the initial position and AI1 in the final position (U=207,5; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

The results further show that the mean score for the reading times of AI4 in the final position (2143,28±24,00) is statistically higher than AI1 in the initial position (966,94±20,72); the median score for the reading times of AI5 in the final position [2015,5 (2000-2044)] is statistically higher than AI2 in the initial position [687,5 (645-733)]; AI6 in the final position [2909,5 (2858-2994)] is statistically higher than AI3 in the initial position [1104 (1035-1239)]; AI4 in the initial position [1200,5 (1108-1313)] is statistically higher than AI1 in the final position [1027,5 (932-1095)]; AI5 in the initial position [1193 (1102-1297)] is statistically higher than AI2 in the final position [1051 (1003-1094)]; AI6 in the initial position [1259 (1175-1347)] is statistically higher than AI3 in the final position [1144,5 (1050-1237)] and; AI7 in the final position [3073,5 (3003-3154)] is statistically higher than AI7 in the initial position [2037,5 (2001-2065)].

Table 41 below shows reading times analysis for *-DIğI zaman* (when) temporal converbial ending.

Table 41: *-DIğI zaman (when) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\bar{X} \pm SD$	**Median (min-max)**		$\bar{X} \pm SD$	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	956,72 ±25,57	956,5 (915-1000)	AI 4	2598,84 ±46,51	2600 (2497-2681)	**0**	**<0,001 *****
tatile holiday-DAT	AI 2	561,68 ±33,61	567 (502-618)	AI 5	2164,96 ±58,64	2163,5 (2068-2263)	**0**	**<0,001 *****

çıktığı zaman go-CON	AI 3	1326,26 ±62,28	1334,5 (1210-1416)	AI 6	2852,22 ±26,41	2857 (2799-2901)	**0**	**<0,001 *****
biz we	AI 4	1213,98 ±52,46	1219,5 (1136-1310)	AI 1	1057,86 ±26,20	1057 (1012-1099)	**0**	**<0,001 *****
ofisi office -ACC	AI 5	1186,36 ±48,97	1184 (1103-1266)	AI 2	1082,28 ±33,87	1072,5 (1035-1145)	**102,5**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1141,28 ±50,26	1141,5 (1047-1223)	AI 3	1183,64 ±31,56	1185 (1131-1231)	**641,5**	**<0,001 *****
zaten already	AI 7	2122,32 ±23,26	2121 (2086-2156)	AI 7	2718,26 ±59,75	2719,5 (2615-2800)	**0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 41 shows that a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the final position (U=0; p<0,001); AI5 in the initial position and AI2 in the final position (U=102,5; p<0,001); AI6 in the initial position and AI1 in the final position (U=641,5; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

The results further show that the median score for the reading times of AI4 in the final position [2600 (2497-2681)] is statistically higher than AI1 in the initial position [956,5 (915-1000)]; AI5 in the final position [2163,5 (2068-2263)] is statistically higher than AI2 in the initial position [567 (502-618)]; AI6 in the final position [2857 (2799-2901)] is statistically higher than AI3 in the initial position [1334,5 (1210-1416)]; AI4 in the initial position [1219,5 (1136-1310)] is statistically higher than AI1 in the final position [1057 (1012-1099)]; AI5 in the initial position [1184 (1103-1266)] is statistically higher than AI2 in the final position [1072,5 (1035-1145)]; AI3 in the final position [1185 (1131-1231)] is statistically higher than AI6 in the initial position [1141,5 (1047-1223)] and; AI7 in the final position [2719,5 (2615-2800)] is statistically higher than AI7 in the initial position [2121 (2086-2156)].

Table 42 below shows reading times analysis for *-ken* (while) temporal converbial ending.

Table 42: *-ken (while) temporal converbial ending reading time analysis*

	Initial Converb Clause	**Final Converb Clause**

		$\bar{X} \pm SD$	Median (min-max)		$\bar{X} \pm SD$	Median (min-max)	U	p
müdür manager	AI 1	937,36 ±28,63	946,5 (890-978)	AI 4	3022,70 ±12,14	2526 (2000-2541)	**0**	**<0,001 *****
tatile holiday-DAT	AI 2	548,18 ±25,37	549 (502-598)	AI 5	2422,26 ±59,07	2420,5 (2321-2512)	**0**	**<0,001 *****
çıkarken go-CON	AI 3	1207,66 ±55,62	1203,5 (1109-1310)	AI 6	2960,92 ±53,23	2959 (2879-3059)	**0**	**<0,001 *****
biz we	AI 4	1184,06 ±60,76	1201 (1089-1275)	AI 1	1024,42 ±28,11	1020,5 (980-1069)	**0**	**<0,001 *****
ofisi office -ACC	AI 5	1163,72 ±38,91	1163 (1087-1223)	AI 2	1104,22 ±29,59	1106 (1051-1150)	**315,5**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1264,98 ±56,77	1261 (1177-1378)	AI 3	1229,06 ±32,14	1224,5 (1180-1284)	**790**	**<0,001 *****
zaten already	AI 7	2045,60 ±30,12	2043,5 (1999-2090)	AI 7	3016,50 ±15,15	3019,5 (2989-3043)	**0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 42 shows that a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the initial position (U=0; p<0,001); AI5 in the initial position and AI2 in the initial position (U=315,5; p<0,001); AI6 in the initial position and AI1 in the initial position (U=790; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

The results further show that the median score for the reading times of AI4 in the final position [2526 (2000-2541)] is statistically higher than AI1 in the initial position [946,5 (890-978)]; AI5 in the final position [2420,5 (2321-2512)] is statistically higher than AI2 in the initial position [549 (502-598)]; AI6 in the final position [2959 (2879-3059)] is statistically higher than AI3 in the initial position [1203,5 (1109-1310)]; AI4 in the initial position [1201 (1089-1275)] is statistically higher than AI1 in the final position [1020,5 (980-1069)]; AI5 in the initial position [1163 (1087-1223)] is statistically higher than AI2 in the final position [1106 (1051-1150)]; AI6 in the initial position [1261 (1177-1378)] is statistically higher than AI3 in the final position

[1224,5 (1180-1284)] and; AI7 in the final position [3019,5 (2989-3043)] is statistically higher than AI7 in the initial position [2043,5 (1999-2090)].

Table 43 below shows reading times analysis for *-(A/I) r…-mAz* (as soon as) temporal converbial ending.

Table 43: *-(A/I) r…-mAz (as soon as) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\bar{X} \pm SD$	**Median (min-max)**		$\bar{X} \pm SD$	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	887,96 ±58,17	887 (800-984)	AI 4	2501,90 ±53,38	2500 (2413-2596)	**U=0**	**<0,001 *****
tatile holiday-DAT	AI 2	726,92 ±29,16	727,5 (681-776)	AI 5	2175,74 ±51,05	2170,5 (2089-2274)	**U=0**	**<0,001 *****
çıkar çıkmaz go-CON	AI 3	1441,06 ±55,22	1445,5 (1352-1547)	AI 6	2907,84 ±54,50	2907,5 (2804-3006)	**t=-133,681**	**<0,001 *****
biz we	AI 4	1261,52 ±42,31	1257 (1198-1336)	AI 1	1034,50 ±35,29	1036 (977-1089)	**U=0**	**<0,001 *****
ofisi office -ACC	AI 5	1306,96 ±48,84	1307,5 (1226-1394)	AI 2	1150,38 ±33,67	1148 (1101-1200)	**U=0**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1299,70 ±23,23	1297,5 (1255-1342)	AI 3	1296,22 ±54,98	1300 (1199-1377)	U=1239,5	0,942
zaten already	AI 7	2270,44 ±52,33	2269 (2176-2368)	AI 7	2741,42 ±26,94	2743,5 (2701-2782)	**U=0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 43 indicates that a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (t=133,681; p<0,001); AI4 in the initial position and AI1 in the final position (U=0; p<0,001); AI5 in the initial position and AI2 in the final position (U=0; p<0,001) and between AI7 in both conditions (U=0; p<0,001). However, there is no statistically significant difference between the reading times of AI6 in the initial position and AI3 in the final position (U=1239,5; $p>0,05$).

When the results are analysed further, it is seen that the median score for the reading times of AI4 in the final position [2500 (2413-2596)] is statistically higher than AI1 in the initial position [887 (800-984)]; AI5 in the final position [2170,5 (2089-2274)] is statistically higher than AI2 in the initial position [727,5 (681-776)]; the mean score for the reading times of AI6 in the final position (2907,84±54,50) is statistically higher than AI3 in the initial position (1441,06±55,22); the median score for the reading times of AI4 in the initial position [1257 (1198-1336)] is statistically higher than AI1 in the final position [1036 (977-1089)]; AI5 in the initial position [1307,5 (1226-1394)] is statistically higher than AI2 in the final position [1148 (1101-1200)] and; AI7 in the final position [2743,5 (2701-2782)] is statistically higher than AI7 in the initial position [2269 (2176-2368)].

Table 44 below shows reading times analysis for *-DIğIndAn beri* (since) temporal converbial ending.

Table 44: *-DIğIndAn beri (since) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\overline{X} \pm SD$	**Median (min-max)**		$\overline{X} \pm SD$	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	1046,60 ±35,33	1056 (983-1100)	AI 4	2648,82 ±47,50	2649 (2578-2731)	**0**	**<0,001 *****
tatile holiday-DAT	AI 2	680,56 ±24,97	673,5 (645-721)	AI 5	2650,00 ±87,20	2672 (2319-2972)	**0**	**<0,001 *****
çıktığından beri go-CON	AI 3	1384,34 ±47,40	1385,5 (1302-1467)	AI 6	3156,96 ±33,98	3155,5 (3101-3212)	**0**	**<0,001 *****
biz we	AI 4	1247,36 ±32,44	1248,5 (1200-1296)	AI 1	954,82 ±25,17	956,5 (912-992)	**0**	**<0,001 *****
ofisi office -ACC	AI 5	1331,78 ±26,52	1327 (1281-1376)	AI 2	1148,34 ±19,80	1153 (1110-1178)	**0**	**<0,001 *****
kapalı tuttuk keep closed-PST-1PL	AI 6	1249,92 ±28,46	1248,5 (1201-1297)	AI 3	1153,16 ±23,83	1156 (1108-1187)	**0**	**<0,001 *****
zaten already	AI 7	2145,24 ±35,98	2141 (2098-2203)	AI 7	2766,74 ±34,07	2763,5 (2704-2831)	**0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

As shown in Table 44, a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the initial position (U=0; p<0,001); AI5 in the initial position and AI2 in the initial position (U=0; p<0,001); AI6 in the initial position and AI1 in the initial position (U=0; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

Table 44 also shows that the median score for the reading times of AI4 in the final position [2649 (2578-2731)] is statistically higher than AI1 in the initial position [1056 (983-1100)]; AI5 in the final position [2672 (2319-2972)] is statistically higher than AI2 in the initial position [673,5 (645-721)]; AI6 in the final position [3155,5 (3101-3212)] is statistically higher than AI3 in the initial position [1385,5 (1302-1467)]; AI4 in the initial position [1248,5 (1200-1296)] is statistically higher than AI1 in the final position [956,5 (912-992)]; AI5 in the initial position [1327 (1281-1376)] is statistically higher than AI2 in the final position [1153 (1110-1178)]; AI6 in the initial position [1248,5 (1201-1297)] is statistically higher than AI3 in the final position [1156 (1108-1187)] and; AI7 in the final position [2763,5 (2704-2831)] is statistically higher than AI7 in the initial position [2141 (2098-2203)].

Table 45 below shows reading times analysis for -*mAdAn önce* (before) temporal converbial ending.

Table 45: -*mAdAn önce (before) temporal converbial ending reading time analysis*

		Initial Converb Clause			**Final Converb Clause**			
		$\bar{X} \pm SD$	**Median (min-max)**		$\bar{X} \pm SD$	**Median (min-max)**	**U**	**p**
müdür manager	AI 1	1046,86 ±22,55	1039,5 (1012-1089)	AI 4	2439,88 ±26,54	2436 (2401-2485)	**U=0**	**<0,001 *****
tatile holiday-DAT	AI 2	662,06 ±37,52	659,5 (605-733)	AI 5	2347,06 ±27,64	2347,5 (2304-2397)	**U=0**	**<0,001 *****
çıkmadan önce go-CON	AI 3	1501,82 ±45,45	1506 (1412-1586)	AI 6	3435,52 ±57,55	3422,5 (3345-3529)	**U=0**	**<0,001 *****
biz we	AI 4	1324,08 ±43,21	1328,5 (1248-1396)	AI 1	1032,70 ±17,23	1034,5 (1002-1061)	**t=44,291**	**<0,001 *****

ofisi office -ACC	AI 5	1263,78 ±48,40	1258 (1191-1349)	AI 2	1099,32 ±12,96	1099 (1078-1120)	**U=0**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1497,80 ±56,79	1498,5 (1405-1579)	AI 3	1421,34 ±24,09	1417 (1388-1465)	**U=323,5**	**<0,001 *****
zaten already	AI 7	2179,58 ±43,12	2175 (2102-2263)	AI 7	3079,16 ±41,78	3081 (3008-3157)	**t=-105,949**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

Table 45 indicates that a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the initial position (t=44,291; p<0,001); AI5 in the initial position and AI2 in the initial position (U=0; p<0,001); AI6 in the initial position and AI1 in the initial position (U=323,5; p<0,001) and between AI7 in both conditions (U=105,949; p<0,001).

Table 45 also indicates that the median score for the reading times of AI4 in the final position [2649 (2578-2731)] is statistically higher than AI1 in the initial position [1056 (983-1100)]; AI5 in the final position [2672 (2319-2972)] is statistically higher than AI2 in the initial position [673,5 (645-721)]; AI6 in the final position [3155,5 (3101-3212)] is statistically higher than AI3 in the initial position [1385,5 (1302-1467)]; the mean score for the reading times of AI4 in the initial position (1324,08±43,21) is statistically higher than AI1 in the final position (1032,70±17,23); the median score for the reading times of AI5 in the initial position [1327 (1281-1376)] is statistically higher than AI2 in the final position [1153 (1110-1178)]; AI6 in the initial position [1248,5 (1201-1297)] is statistically higher than AI3 in the final position [1156 (1108-1187)] and; the mean score for the reading times of AI7 in the final position (3079,16±41,78) is statistically higher than AI7 in the initial position (2179,58±43,12).

Table 46 below shows reading times analysis for *-DIktAn sonra* (after) temporal converbial ending.

Table 46: *-DIktAn sonra (after) temporal converbial ending reading time analysis*

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**U**	**p**

müdür manager	AI 1	1064,20 ±24,62	1069 (1021-1100)	AI 4	2610,70 ±41,38	2606,5 (2547-2696)	**U=0**	**<0,001 *****
tatile holiday-DAT	AI 2	712,06 ±12,08	712,5 (693-734)	AI 5	2330,82 ±21,59	2335,5 (2291-2364)	**U=0**	**<0,001 *****
çıktıktan sonra go-CON	AI 3	1433,22 ±30,29	1429,5 (1383-1498)	AI 6	3483,46 ±37,82	3488,5 (3413-3545)	**t=-299,189**	**<0,001 *****
biz we	AI 4	1280,76 ±36,00	1275,5 (1227-1345)	AI 1	1051,32 ±17,38	1051 (1021-1083)	**U=0**	**<0,001 *****
ofisi office -ACC	AI 5	1219,28 ±9,98	1220 (1202-1237)	AI 2	1134,80 ±21,75	1134 (1102-1171)	**U=0**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1392,88 ±17,16	1390 (1366-1421)	AI 3	1324,48 ±18,72	1325 (1291-1355)	**U=0**	**<0,001 *****
zaten already	AI 7	2190,42 ±25,19	2190,5 (2150-2232)	AI 7	2543,63 ±28,24	2599,5 (2012-3034)	**U=578**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

As shown in Table 46, a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (t=299,189; p<0,001); AI4 in the initial position and AI1 in the initial position (U=0; p<0,001); AI5 in the initial position and AI2 in the initial position (U=0; p<0,001); AI6 in the initial position and AI1 in the initial position (U=0; p<0,001) and between AI7 in both conditions (U=578; p<0,001).

Table 46 also illustrates that the median score for the reading times of AI4 in the final position [2649 (2578-2731)] is statistically higher than AI1 in the initial position [1056 (983-1100)]; AI5 in the final position [2672 (2319-2972)] is statistically higher than AI2 in the initial position [673,5 (645-721)]; the mean score for the reading times of AI6 in the final position (3483,46±37,82) is statistically higher than AI3 in the initial position (1433,22±30,29); the median score for the reading times of AI4 in the initial position [1248,5 (1200-1296)] is statistically higher than AI1 in the final position [956,5 (912-992)]; AI5 in the initial position [1327 (1281-1376)] is statistically higher than AI2 in the final position [1153 (1110-1178)]; AI6 in the initial position [1248,5 (1201-1297)] is statistically higher than AI3 in the final position [1156 (1108-1187)] and; AI7 in the final position [2763,5 (2704-2831)] is statistically higher than AI7 in the initial position [2141 (2098-2203)].

Table 47 below shows reading times analysis for -*DIkçA* (whenever) temporal converbial ending.

Table 47: -*DIkçA (whenever) temporal converbial ending reading time analysis*

		Initial Converb Clause			Final Converb Clause			
		$\overline{X} \pm SD$	Median (min-max)		$\overline{X} \pm SD$	Median (min-max)	U	p
müdür manager	AI 1	1019,26 ±17,90	1020 (990-1045)	AI 4	2801,98 ±25,94	2807 (2756-2844)	**0**	**<0,001 *****
tatile holiday-DAT	AI 2	625,18 ±14,67	627 (601-649)	AI 5	2149,30 ±28,68	2147 (2100-2195)	**0**	**<0,001 *****
çıktıkça go-CON	AI 3	1309,90 ±31,19	1306,5 (1261-1377)	AI 6	2753,50 ±35,03	2751 (2698-2812)	**0**	**<0,001 *****
biz we	AI 4	1256,20 ±25,35	1255,5 (1212-1297)	AI 1	1071,52 ±17,66	1071 (1044-1103)	**0**	**<0,001 *****
ofisi office -ACC	AI 5	1129,42 ±23,24	1133,5 (1087-1165)	AI 2	1069,16 ±14,42	1068,5 (1045-1093)	**18,5**	**<0,001 *****
kapattık close-PST-1PL	AI 6	1245,90 ±29,71	1249 (1198-1295)	AI 3	1070,54 ±16,75	1069 (1045-1099)	**0**	**<0,001 *****
zaten already	AI 7	2046,58 ±21,59	2050 (2009-2086)	AI 7	2800,04 ±21,84	2798,5 (2767-2840)	**0**	**<0,001 *****

t: Independent Samples T Test; U: Mann-Whitney U Test
***p<0,001

As can be seen in Table 47, a statistically significant difference was found between the reading times of AI1 in the initial position and AI4 in the final position (U=0; p<0,001); AI2 in the initial position and AI5 in the final position (U=0; p<0,001); AI3 in the initial position and AI6 in the final position (U=0; p<0,001); AI4 in the initial position and AI1 in the initial position (U=0; p<0,001); AI5 in the initial position and AI2 in the initial position (U=18,5; p<0,001); AI6 in the initial position and AI1 in the initial position (U=0; p<0,001) and between AI7 in both conditions (U=0; p<0,001).

Table 47 also shows that the median score for the reading times of AI4 in the final position [2807 (2756-2844)] is statistically higher than AI1 in the initial position [1020 (990-1045)]; AI5 in the final position [2147 (2100-2195)] is statistically higher than AI2 in the initial position [627 (601-

649)]; AI6 in the final position [2751 (2698-2812)] is statistically higher than AI3 in the initial position [1306,5 (1261-1377)]; AI4 in the initial position [1255,5 (1212-1297)] is statistically higher than AI1 in the final position [1071 (1044-1103)]; AI5 in the initial position [1133,5 (1087-1165)] is statistically higher than AI2 in the final position [1068,5 (1045-1093)]; AI6 in the initial position [1249 (1198-1295)] is statistically higher than AI3 in the final position [1069 (1045-1099)] and; AI7 in the final position [2798,5 (2767-2840)] is statistically higher than AI7 in the initial position [2050 (2009-2086)].

After presenting the findings of the experimental data for each specific converbial ending, the next subsection provides the discussion of these findings.

5.2.2. Discussion of the Experimental Data Findings

The discussion related to experimental findings is presented for each specific converbial ending through line charts as suggested by Jiang (2012). For each converbial ending, a line chart for initial converbial ending and another line chart for the final counterpart are displayed. The line charts show means ($\bar{x}$) of the reading times and standard deviations (*sd*) for each area of interest for both conditions. The standard deviations are shown with the red lines on each area of interest. To comprehend the line charts better, one example experimental sentence, namely, the nine versions of "*Müdür tatile çıkınca biz ofisi kapattık zaten* (*When the manager went holiday, we closed the office*)" will be displayed under the areas of interests.

Figure 17 below shows the visual presentation of reading time analysis for *-(y)IncA* (when) initial converbial construction.

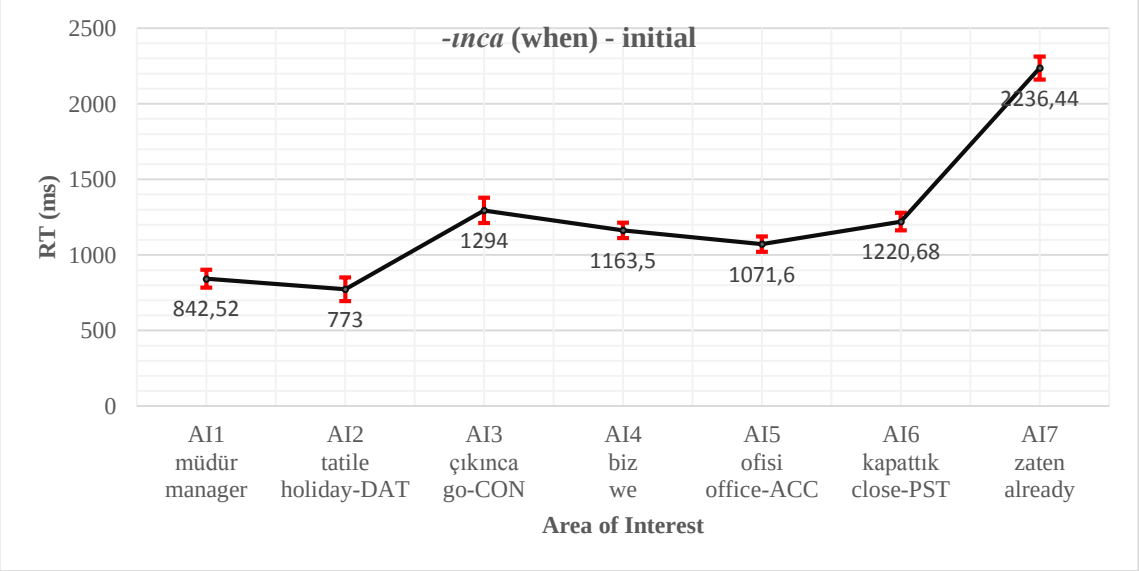

Figure 17: *Visual presentation of reading time analysis for -(y)IncA (when) - initial converbial construction*

Figure 17 shows that when the converbial ending *-(y)IncA* (when) clause is in initial position, there is a slight increase in the reading time in AI3, which is the predicate of the subordinate clause and in AI6, which is the predicate of the main clause. Considering that the standard deviation (*sd*) for AI3 is higher when compared to other areas of interest, this slight increase in the reading time for AI3 is not significant. The distinct increase in AI7 is because of the *wrap-up* effect. When the AI7 is excluded from the analysis, it is clearly seen that there is a smooth flow of processing for *-(y)IncA* (when) construction in initial position.

Figure 18 below shows the visual presentation of reading time analysis for *-(y)IncA* (when) converbial construction in final position.

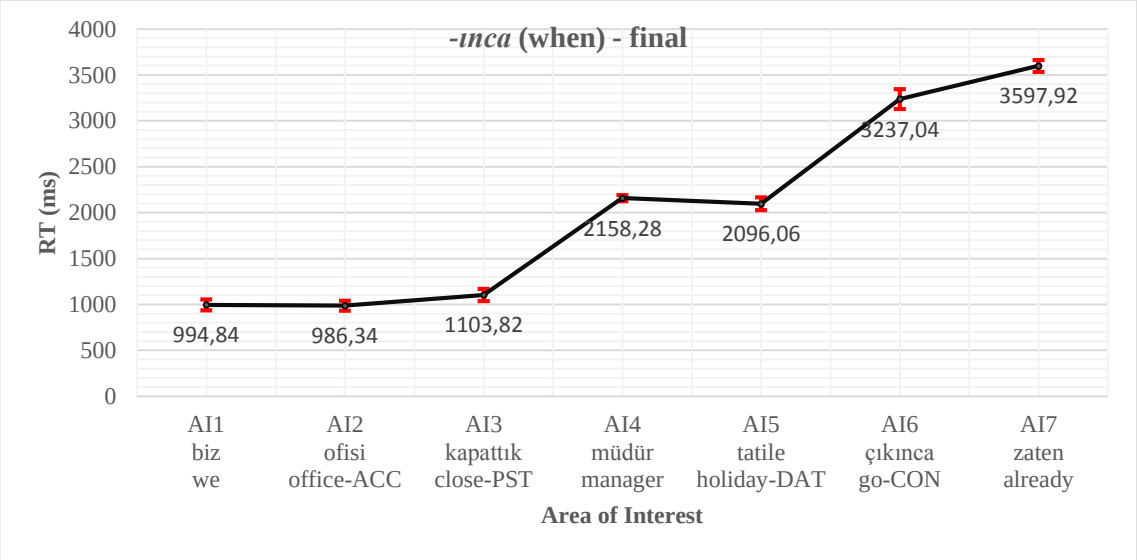

Figure 18: *Visual presentation of reading time analysis for -(y)IncA (when) - final converbial construction*

As shown in Figure 18, when the converbial ending *-(y)IncA* (when) clause is in final position, the reading times start to increase with AI4, which is the subject of the subordinate clause. The reading times of the AI4, AI5 and AI6 (subordinate clause) are relatively higher when compared to the reading times of the AI1, AI2 and AI3 (main clause). Moreover, the standard deviations (*sd*) in the reading times of the AI4, AI5 and AI6 are relatively low, which shows that the increase in the reading time for subordinate clause is significant. Based on these findings, it is safe to argue that when the converb clause comes after the main clause in the linear structure, participants have difficulty in processing the complex sentence. This processing difficulty can also be

observed in the total reading time analysis. When the converb clause comes before the main clause, the total reading time for *-(y)IncA* (when) construction is 8601,22 milliseconds. When the converb clause comes after the main clause, the total reading time for *-(y)IncA* (when) construction is 14174,3 milliseconds. Both the specific and total reading times for both conditions show that when the temporal converbial ending, namely, *-(y)IncA* (when) construction is in the non-default position in the linear structure, there is a processing difficulty in the sentences.

Figure 19 below shows the visual presentation of reading time analysis for *-DIğIndA* (when) converbial construction in initial position.

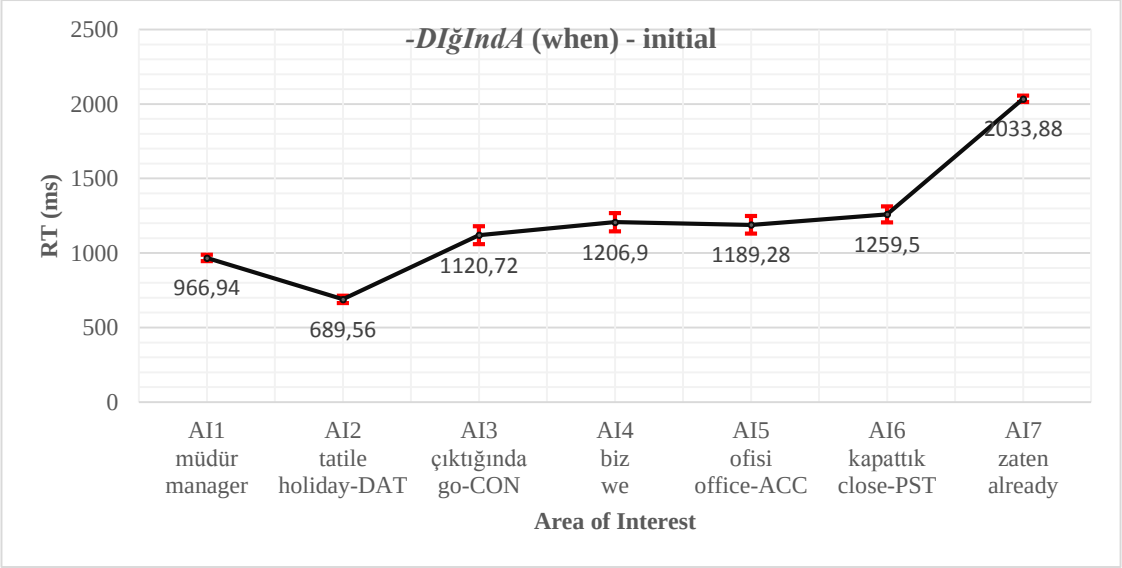

Figure 19: *Visual presentation of reading time analysis for -DIğIndA (when) - initial converbial construction*

As presented in Figure 19, when the converbial ending *-DIğIndA* (when) clause is in initial position, the reading times for each area of interest are nearly the same expect for slight decrease in AI2, which is the object of the subordinate clause and distinct increase in AI7, which is wrap-up area. Thus, it is safe to argue that it there is a smooth flow of processing for *-DIğIndA* (when) construction in initial position.

Figure 20 below shows the visual presentation of reading time analysis for *-DIğIndA* (when) converbial construction in final position.

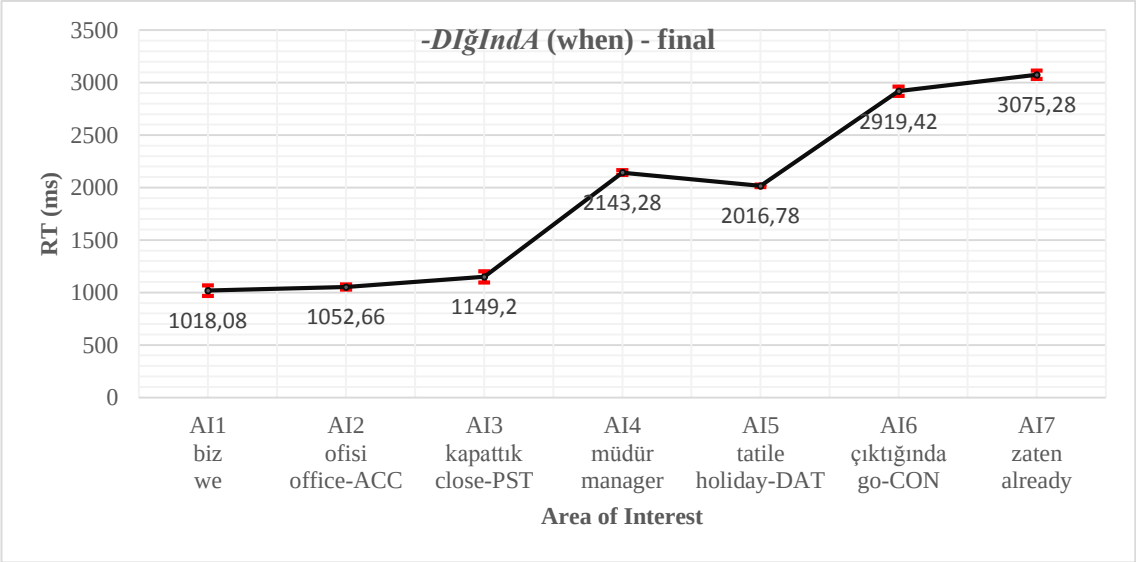

Figure 20: *Visual presentation of reading time analysis for -DIğIndA (when) - final converbial construction*

As shown in Figure 20, when the converbial ending *-DIğIndA* (when) clause is in final position, the reading times start to increase with AI4, which is the subject of the subordinate clause. The reading times of the AI4, AI5 and AI6 (subordinate clause) are relatively higher when compared to the reading times of the AI1, AI2 and AI3 (main clause). Moreover, the standard deviations (*sd*) in the reading times of the AI4, AI5 and AI6 are relatively low, which shows that the increase in the reading time for subordinate clause is significant. Drawing conclusions from these results, it is reasonable to state that participants encounter difficulties in processing complex sentences when the converb clause follows the main clause in the linear structure. The difficulty in processing is evident in the overall reading time analysis as well. For instance, when the converb clause precedes the main clause in *-DIğIndA* (when) construction, the total reading time is 8466,78 milliseconds. In contrast, when the converb clause follows the main clause, the total reading time increases to 13374,7 milliseconds. The specific and overall reading times for both conditions indicate that a processing difficulty arises in sentences when the temporal converbial ending, specifically the *-DIğIndA* (when) construction, is situated in a non-default position within the linear structure.

Figure 21 below shows the visual presentation of reading time analysis for *-DIğI zaman* (when) converbial construction in initial position.

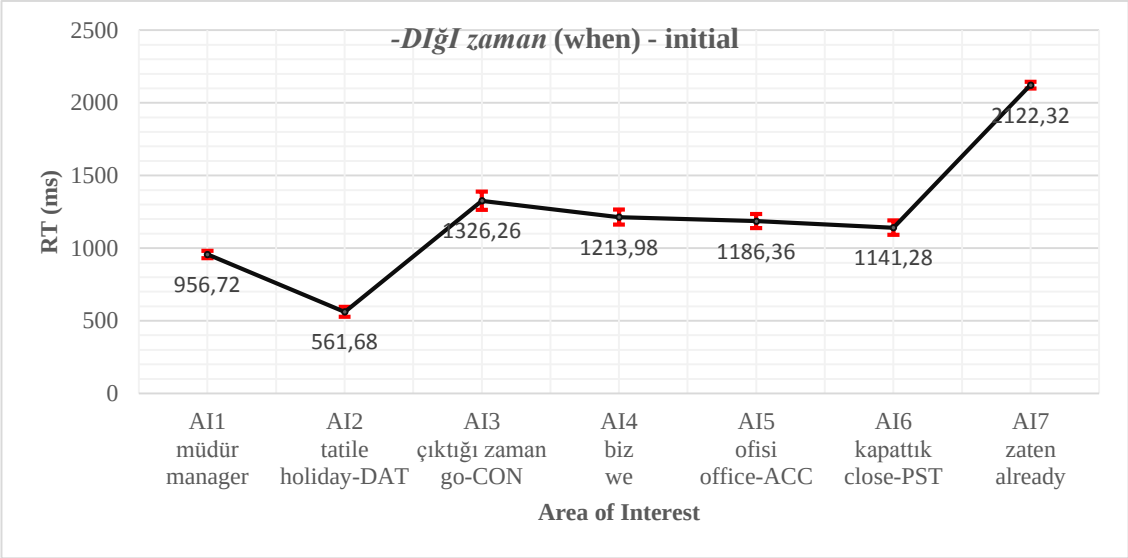

Figure 21: *Visual presentation of reading time analysis for -DIğI zaman (when) - initial converbial construction*

Figure 21 illustrates that when the converbial ending *-DIğI zaman* (when) clause is in the initial position, there is a decrease in reading time in AI2, which is the object of the subordinate clause and there is a slight increase in reading time in AI3, which is the predicate of the subordinate clause. This tendency of increase in reading time in AI3 is also observed in *-(y)IncA* (when) and *-DIğIndA* (when) converb clauses in the initial position. However, it should be noted that because the converbial marker is composite in *-DIğI zaman* (when), consisting of the subordinator which is followed by a postposition, it is normal that the reading time is longer in this specific converbial ending when compared to *-(y)IncA* (when) and *-DIğIndA* (when) converbial endings. Except for these slight differences in reading times of AI2 and AI3 as well as the distinct increase in AI7, it can be said that the reading times for each area of interest are nearly the same when the converbial ending *-DIğI zaman* (when) clause is in the initial position.

Figure 22 below shows the visual presentation of reading time analysis for *-DIğI zaman* (when) converbial construction in final position.

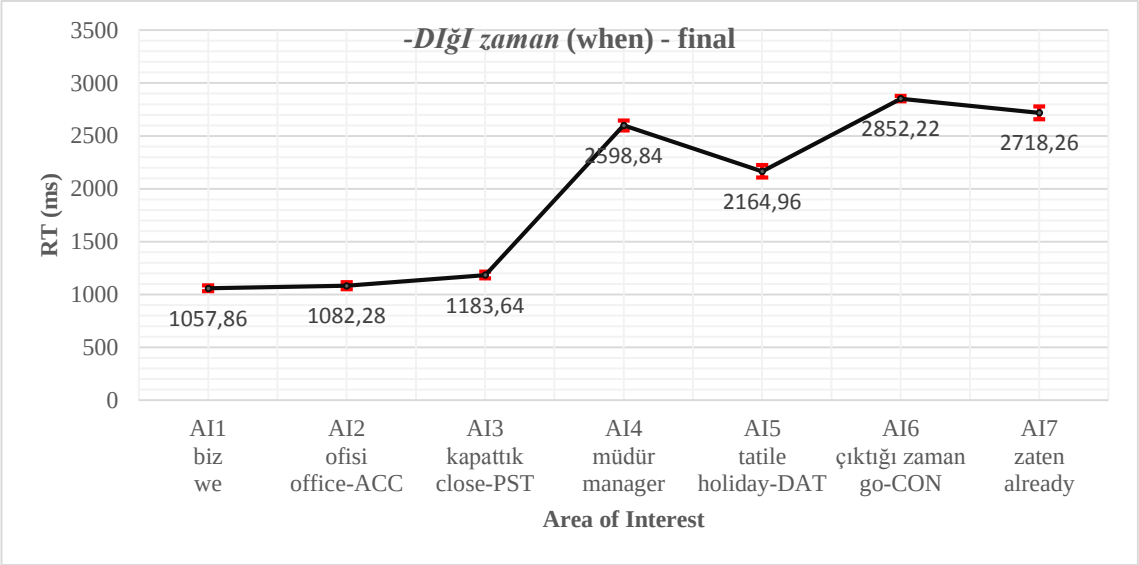

Figure 22: *Visual presentation of reading time analysis for -DIğI zaman (when) - final converbial construction*

It is clearly seen in Figure 22 that when the converbial ending *-DIğI zaman* (when) clause is positioned after the main clause, the reading times begin to increase, particularly with AI4, which serves as the subject of the subordinate clause. The reading times for AI4, AI5, and AI6 (in the subordinate clause) are comparatively longer than the reading times for AI1, AI2, and AI3 (in the main clause). Additionally, the standard deviations (*sd*) in the reading times for AI4, AI5, and AI6 are relatively low, indicating that the increase in reading time for the subordinate clause is noteworthy. Based on these findings, it is justifiable to assert that participants face difficulties in comprehending complex sentences when the converb clause comes after the main clause in the linear structure. Moreover, the overall reading times for both conditions show that if the converb clause comes before the main clause in *-DIğI zaman* (when) construction, the total reading time is 8508,6 milliseconds. Conversely, if the converb clause follows the main clause, the total reading time rises to 13568,06 milliseconds. This suggests that there is a difficulty in processing sentences when the temporal converbial ending *-DIğI zaman* (when) construction is positioned in a non-default location within the linear structure.

Figure 23 below shows the visual presentation of reading time analysis for *-ken (*while) converbial construction in initial position.

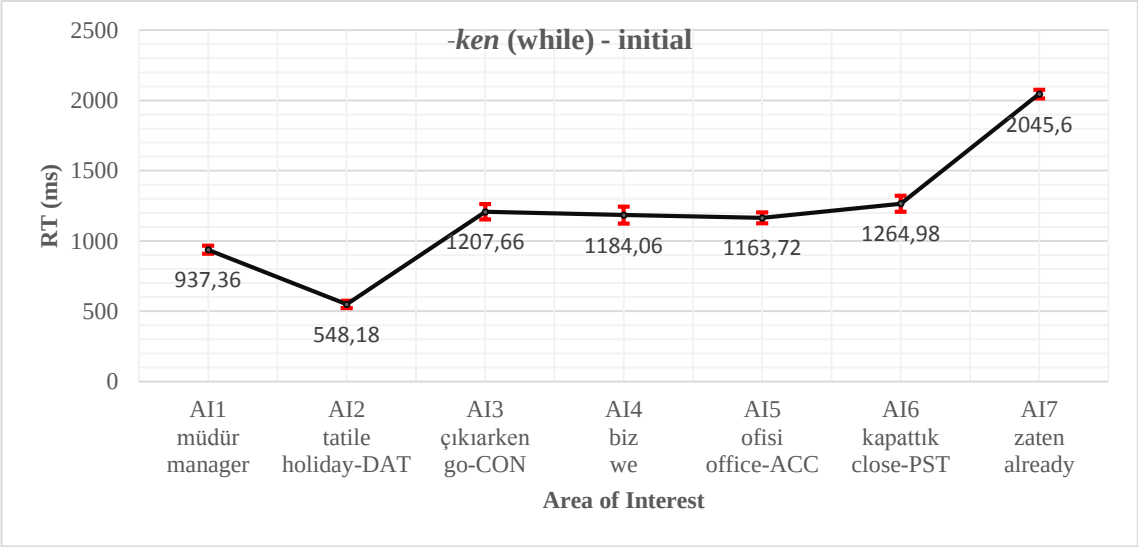

Figure 23: *Visual presentation of reading time analysis for -ken (while) - initial converbial construction*

Figure 23 shows that there is a decrease in the reading time for AI2, which serves as the object of the subordinate clause. This tendency of decrease in AI2 is also observed in *-DIğI zaman* (when), *-DIğIndA* (when) and *-(y)IncA* (when) converbial constructions when they are in the initial position in the linear structure. Except for this difference in the AI2, the other areas of interest have the similar reading times when the converbial ending *-ken (*while) clause is in the initial position.

Figure 24 below shows the visual presentation of reading time analysis for *-ken* (while) converbial construction in final position.

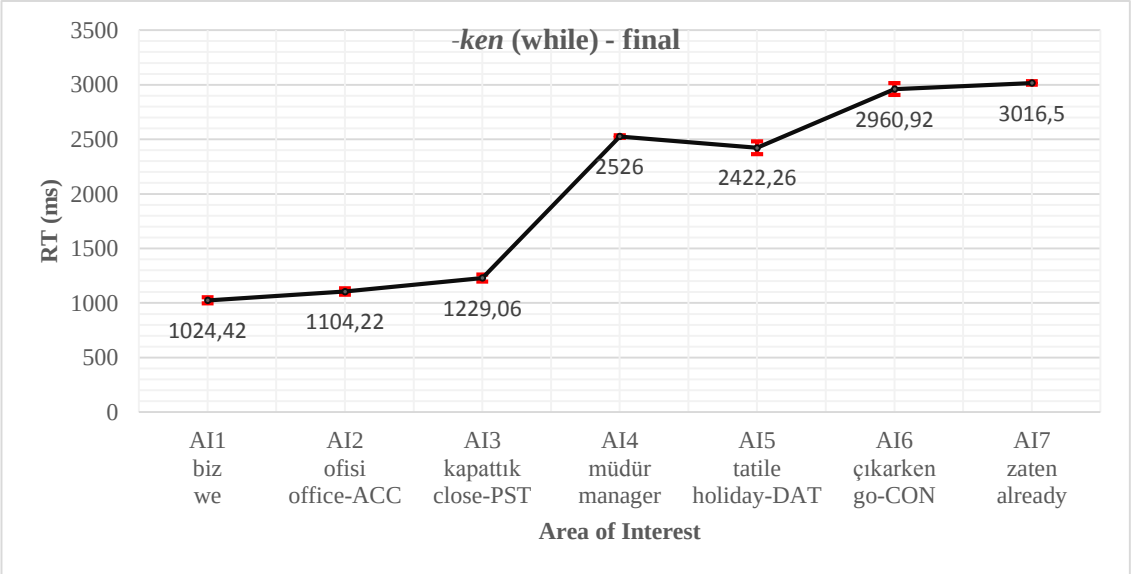

Figure 24: *Visual presentation of reading time analysis for -ken (while) - final converbial construction*

It is clearly seen in Figure 24 that the reading times start to increase, especially concerning AI4, which functions as the subject of the subordinate clause. The reading times of the AI4, AI5 and AI6 (subordinate clause) are relatively higher when compared to the reading times of the AI1, AI2 and AI3 (main clause). The standard deviations (*sd*) in the reading times for AI4, AI5, and AI6 are comparatively low, indicating that the increase in reading time for the subordinate clause is noteworthy. Especially the standard deviation (*sd*) is relatively low in AI4. In other words, the reaction times of the participants to this area of interest are similar. It means that when the parser shifts from the predicate of the main clause to the subject of the subordinate clause, there happens a notable processing difficulty, and this difficulty continues until the end of the subordinate clause. Thus, it is reasonable to assert that participants experience difficulty in processing the complex sentence when the converb clause follows the main clause in the linear structure. When the total reading times for both conditions are analysed, it is seen that the total reading time for initial *-ken* (while) clause is 8315,56 milliseconds while it is 14283,38 for final *-ken* (while) clause. These findings support the idea that there is a processing difficulty when *-ken* (while) construction is in the non-default position.

Figure 25 below shows the visual presentation of reading time analysis for *-(A/I) r…-mAz* (as soon as) converbial construction in initial position.

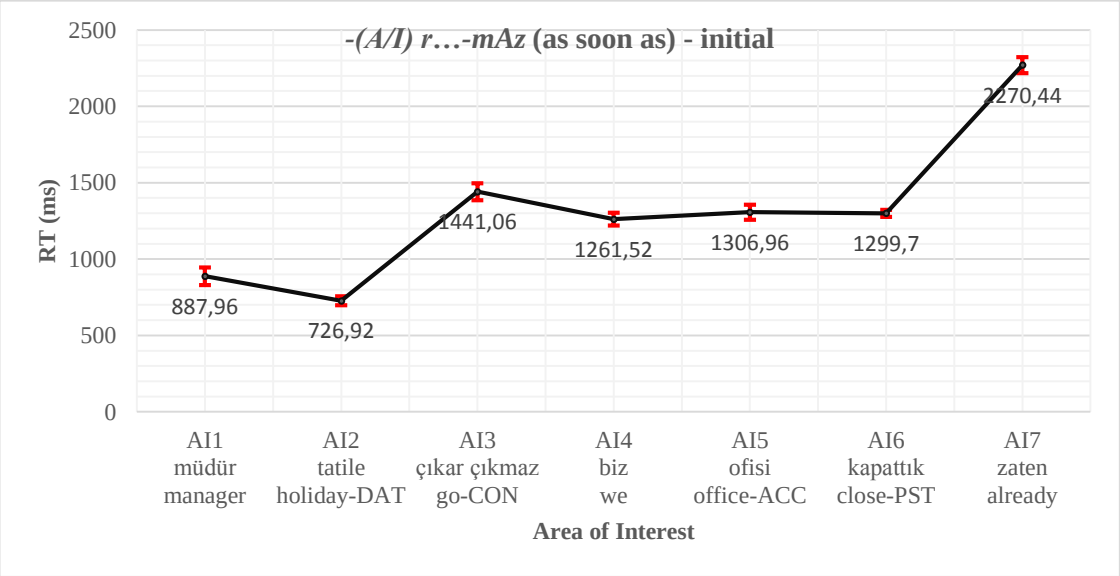

Figure 25: *Visual presentation of reading time analysis for -(A/I) r…-mAz (as soon as) - initial converbial construction*

Figure 25 shows that there is a decrease in the reading time for AI2, which functions as the object in the subordinate clause as already observed in *-DIğI zaman* (when), *-DIğIndA* (when), *-(y)IncA* (when) and *-ken* (while) converb clauses in the initial positions. Except for this decrease in this specific area, the reading times for the other areas of interest remain consistent when the converbial ending *-(A/I) r…-mAz* (as soon as) clause is positioned at the beginning.

Figure 26 below shows the visual presentation of reading time analysis for *-(A/I) r…-mAz* (as soon as) converbial construction in final position.

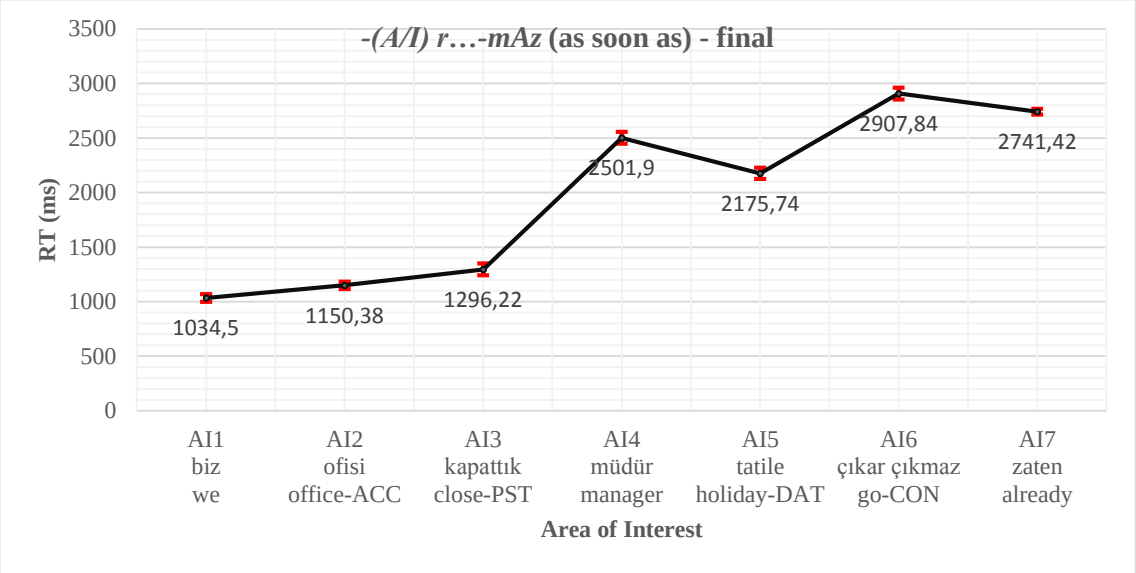

Figure 26: *Visual presentation of reading time analysis for -(A/I) r…-mAz (as soon as) - final converbial construction*

As shown in Figure 26, the reading times begin to rise, particularly with respect to AI4, which serves as the subject of the subordinate clause. The reading times for AI4, AI5, and AI6 (in the subordinate clause) are comparatively higher than the reading times for AI1, AI2, and AI3 (in the main clause). Moreover, the standard deviations (*sd*) in the reading times for AI4, AI5, and AI6 are relatively low, suggesting that the increase in reading time for the subordinate clause is significant. The biggest difference in parsing is observed between AI3 (the predicate of the main clause) and AI4 (the subject of the subordinate clause) in that after the parser leaves the main clause, processing difficulty is encountered beginning with the subordinate clause and this difficulty lasts until the end of the subordinate clause. Therefore, it is justifiable to claim that participants encounter difficulties in comprehending the complex sentence when the converb clause comes after the main clause in the linear structure. These findings are also supported by total reading times of the both conditions. The total reading time for initial *-(A/I) r…-mAz* (as

soon as) clause is 9194,56 milliseconds while it is 13808 for final *-(A/I) r…-mAz* (as soon as) clause.

Figure 27 below shows the visual presentation of reading time analysis for *-DIğIndAn beri* (since) converbial construction in initial position.

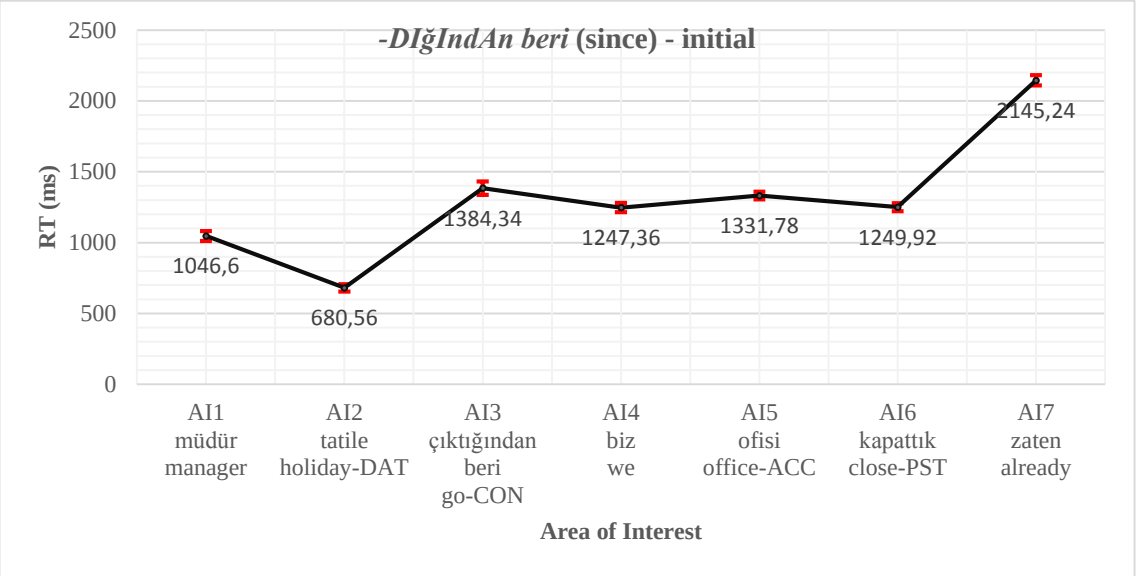

Figure 27: *Visual presentation of reading time analysis for -DIğIndAn beri (since) - initial converbial construction*

As seen in Figure 27, when the converbial *-DIğIndAn beri* (since) clause is in the initial position, there is a decrease in reading time in AI2, which is the object of the subordinate clause and there is a slight increase in reading time in AI3, which is the predicate of the subordinate clause. It should be noted that because the converbial marker is composite in *-DIğIndAn beri* (since), consisting of the subordinator which is followed by a postposition, it is normal that the reading time is longer in this specific converbial ending. Except for these slight differences in reading times of AI2 and AI3 as well as the distinct increase in AI7, it can be said that the reading times for each area of interest are nearly the same when the converbial *-DIğIndAn beri* (since) clause is in the initial position.

Figure 28 below shows the visual presentation of reading time analysis for *-DIğIndAn beri* (since) converbial construction in final position.

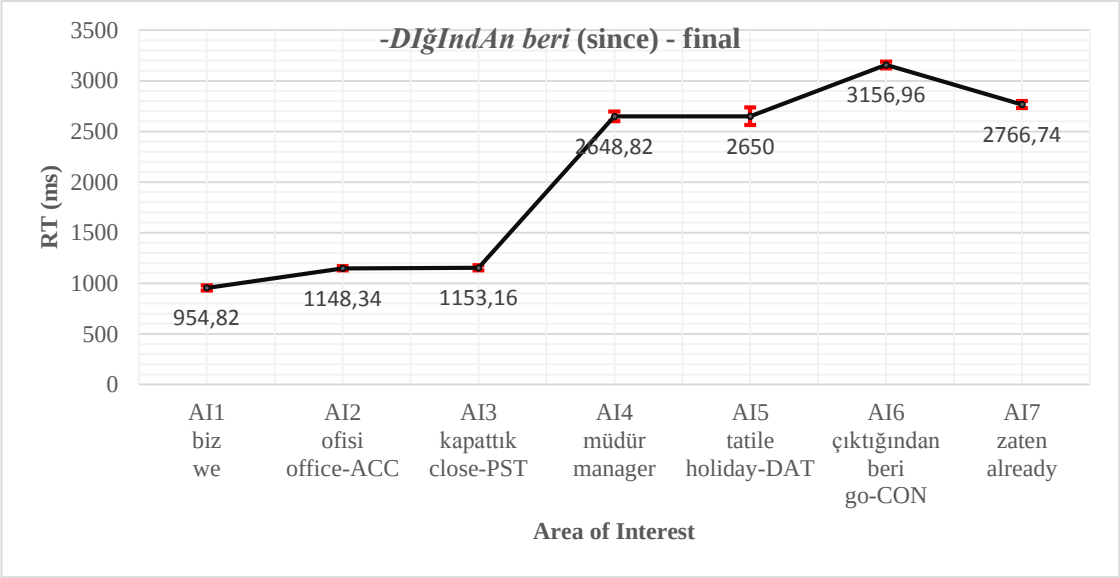

Figure 28: *Visual presentation of reading time analysis for -DIğIndAn beri (since) - final converbial construction*

As shown in Figure 28, when the converbial *-DIğIndAn beri* (since) clause is positioned after the main clause, the reading times begin to increase, particularly with AI4, which serves as the subject of the subordinate clause. The reading times for AI4, AI5, and AI6 (in the subordinate clause) are comparatively longer than the reading times for AI1, AI2, and AI3 (in the main clause). Additionally, the standard deviations (*sd*) in the reading times for AI4, AI5, and AI6 are relatively low, indicating that the increase in reading time for the subordinate clause is noteworthy. Moreover, the overall reading times for both conditions show that if the converb clause comes before the main clause in *-DIğIndAn beri* (since) construction, the total reading time is 9085,8 milliseconds. Conversely, if the converb clause follows the main clause, the total reading time rises to 14478,84 milliseconds. Regarding these findings, it is safe to state that there is a processing difficulty when *-DIğIndAn beri* (since) temporal clause is in the non-default position.

Figure 29 below shows the visual presentation of reading time analysis for *-mAdAn önce* (before) converbial construction in initial position.

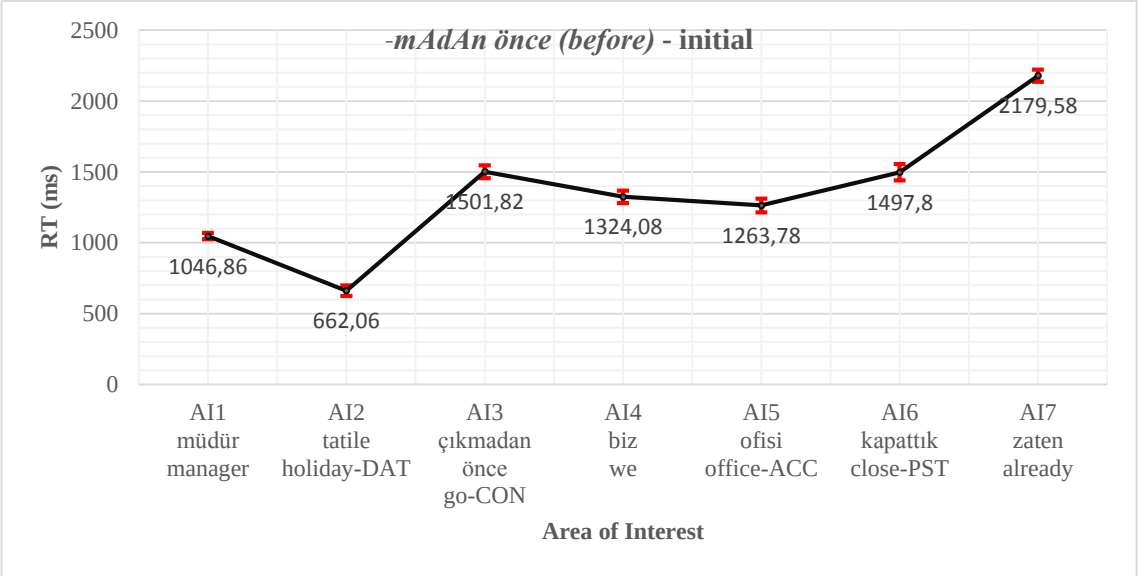

Figure 29: *Visual presentation of reading time analysis for -mAdAn önce (before) - initial converbial construction*

Figure 29 shows that when *-mAdAn önce* (before) clause is positioned before the main clause, there is a decrease in reading time in the AI2, which is the object of the subordinate clause. This tendency of decrease in AI2 is also observed in *-DIğIndAn beri* (since), *-(A/I) r…-mAz* (as soon as), *-ken (*while), *-DIğI zaman* (when), *-DIğIndA* (when) and *-(y)IncA* (when) clauses when they come before the main clause. Also an increase in the reading time in AI3, which is the predicate of the subordinate clause stems from the fact that the converbial marker is composite as in *-DIğIndAn beri* (since), *-(A/I) r…-mAz* (as soon as) and *-DIğI zaman* (when). Apart from these minor variations in the reading times of AI2 and AI3, along with the notable increase in AI7 in the wrap-up area, it can be asserted that the reading times for each area of interest are almost same when the converbial *-mAdAn önce* (before) clause is positioned at the beginning.

Figure 30 below shows the visual presentation of reading time analysis for *-mAdAn önce* (before) converbial construction in final position.

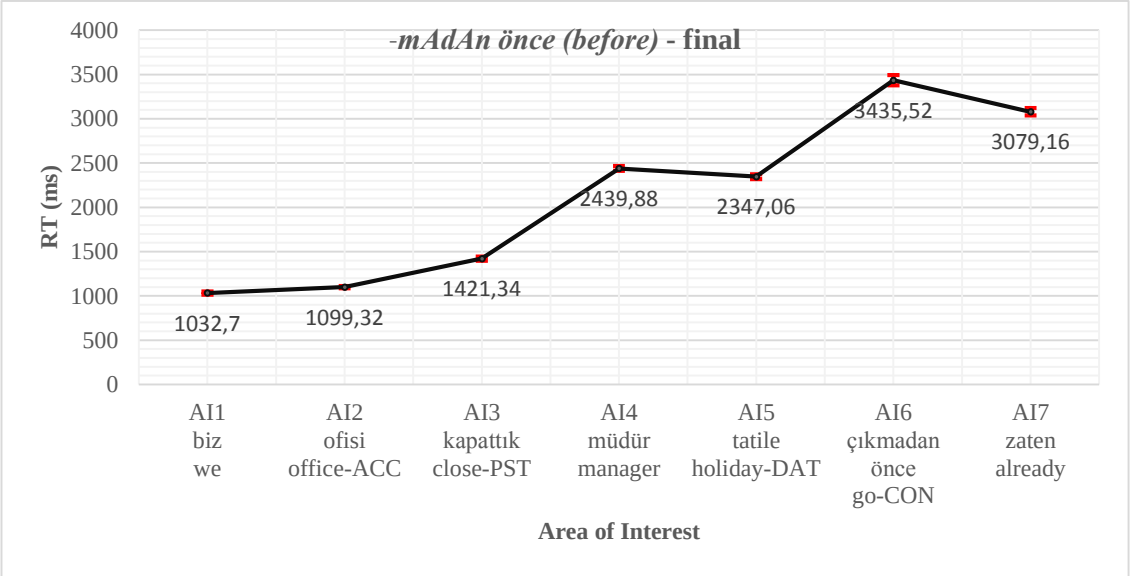

Figure 30: *Visual presentation of reading time analysis for -mAdAn önce (before) - final converbial construction*

As seen in Figure 30, the reading time begins to rise, particularly with regard to AI4, which serves as the subject of the subordinate clause. The reading times for AI4, AI5, and AI6 (in the subordinate clause) are relatively longer when compared to the reading times for AI1, AI2, and AI3 (in the main clause). The most significant difference in parsing is noted between AI3 (the predicate of the main clause) and AI4 (the subject of the subordinate clause). Once the parser leaves from the main clause, a difficulty in processing arises, commencing with the subordinate clause and persisting until the end of the subordinate clause. The other difference in parsing is observed between AI5 (the object of the subordinate clause) and AI6 (the predicate of the subordinate clause). This notable difference in the same clause may stem from the fact that converbial marker is composite as was observed in Figure 28, where was a difference between AI2 (the object of the subordinate clause) and AI3 (the predicate of the subordinate clause). When the overall reading times for both conditions are analysed, it is seen that if the converb clause comes before the main clause in *-mAdAn önce* (before) construction, the total reading time is 9475,98 milliseconds. Conversely, if the converb clause follows the main clause, the total reading time rises to 14854,98 milliseconds. These findings support the idea that there is a processing difficulty when *-mAdAn önce* (before) construction is in the non-default position.

Figure 31 below shows the visual presentation of reading time analysis for *-DIktAn sonra* (after) *converbial* construction in initial position.

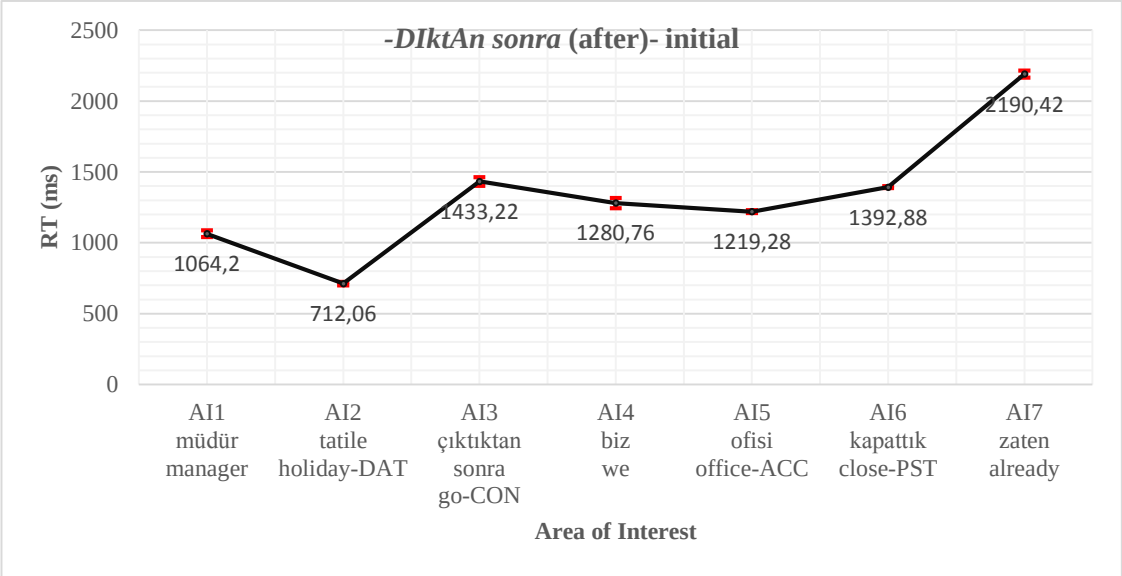

Figure 31: *Visual presentation of reading time analysis for -DIktAn sonra (after) - initial converbial construction*

Figure 31 shows that when the *-DIktAn sonra* (after) clause is placed before the main clause, there is a decrease in reading time for AI2, which functions as the object in the subordinate clause. It seems that the parser does not have difficulty in comprehending the object of the subordinate clause in converb clause. The fact that the standard deviation (*sd*) is lower in AI2 when compared to AI1 and AI3 supports that this decrease in reading time is notable. It is also observed in Figure 31 that there is an increase in reading time in AI3, namely the predicate of the subordinate clause. As it was stated in *-mAdAn önce* (before) converbial constructions, this increase in reading time for this specific area of interest seems to be the result of the fact that *-DIktAn sonra* (after) consists of a subordinator and postposition rather than just one subordinator. Except for these slight differences in reading times of AI2 and AI3 as well as the distinct increase in AI7, it can be said that the reading times for each area of interest are nearly the same when the converbial *-DIktAn sonra* (after) clause is in the initial position.

Figure 32 below shows the visual presentation of reading time analysis for *-DIktAn sonra* (after) *converbial* construction in final position.

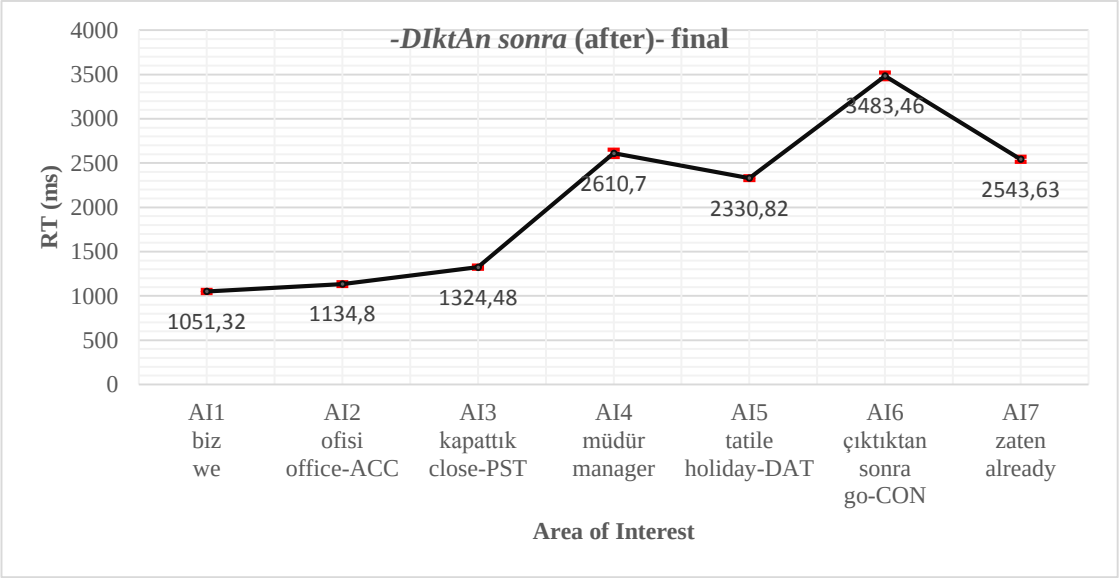

Figure 32: *Visual presentation of reading time analysis for -DIktAn sonra (after) - final converbial construction*

As shown in Figure 32, the reading times for AI4, AI5, and AI6 (within the subordinate clause) are relatively longer than the reading times for AI1, AI2, and AI3 (within the main clause). Moreover, the standard deviations (*sd*) in the reading times for AI4, AI5, and AI6 are comparatively low, suggesting that the rise in reading time for the subordinate clause is significant. As it was seen in *-mAdAn önce* (before) clauses in final position, there is a difference in parsing between AI3 (the predicate of the main clause) and AI4 (the subject of the subordinate clause). When the parser encounters the subject of the subordinate clause, processing difficulty arises. The other difference in reading times is observed in AI6, which serves as the predicate of the subordinate clause. After the parser processes AI5 easily, the reading times start to increase in AI6. As it was seen in *-mAdAn önce* (before) clauses, this longer reaction time seems to be the result of the converbial ending's being composite. When the total reading times for both positions are analysed, it is seen that the total reading time for initial *-DIktAn sonra* (after) clause is 9292,82 milliseconds while it is 14479,21 for final *-DIktAn sonra* (after) clause. These findings support the idea that there is a processing difficulty when *-DIktAn sonra* (after) clause is situated after the main clause.

Figure 33 below shows the visual presentation of reading time analysis for *-DIkçA* (whenever) converbial construction in initial position.

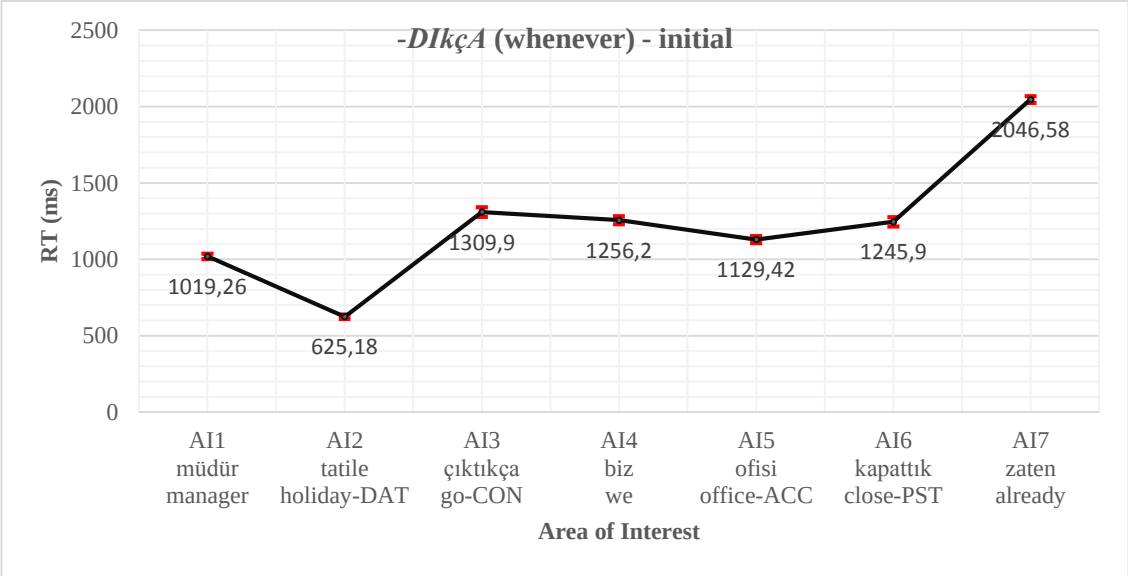

Figure 33: *Visual presentation of reading time analysis for -DIkçA (whenever) - initial converbial construction*

As seen in Figure 33, there is a decrease in the reading time for AI2, which functions as the object in the subordinate clause as already observed in *-DIğI zaman* (when), *-DIğIndA* (when), *-(y)IncA* (when) and *-ken* (while), *-(A/I) r…-mAz* (as soon as), *-DIğIndAn beri* (since), *-mAdAn önce* (before), and *-DIktAn sonra* (after) converb clauses in the initial positions. Except for this decrease in this specific area, the reading times for the other areas of interest remain consistent when the converbial ending *-DIkçA* (whenever) clause is positioned at the beginning.

Figure 34 below shows the visual presentation of reading time analysis for *-DIkçA* (whenever) converbial construction in final position.

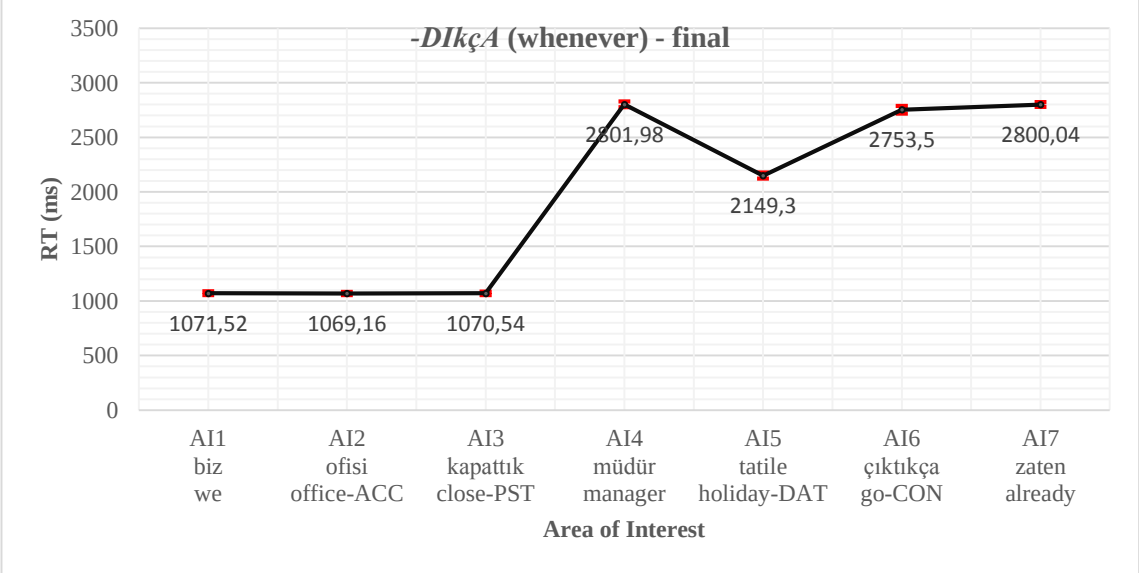

Figure 34: *Visual presentation of reading time analysis for -DIkçA (whenever) - final converbial construction*

Figure 34 shows that if the converbial *-DIkçA* (whenever) clause is situated after the main clause, the reading times start to increase, especially in relation to AI4, which serves as the subject of the subordinate clause. When the parser encounters the subject of the subordinate clause, processing difficulty arises. The reading times for AI4, AI5, and AI6 (within the subordinate clause) are relatively longer than the reading times for AI1, AI2, and AI3 (within the main clause). Considering that the standard deviations (*sd*) in the reading times in all areas of interest are comparatively low, the increase in the subordinate clause is significant. Another noteworthy result is in AI6 in that while in composite converbial endings as in *-mAdAn önce* (before), and *-DIktAn sonra* (after), AI6 has the longest reading times; in *-DIkçA* (whenever) converbial ending, AI6 does not have longest reading time. When the overall reading times for both conditions are analysed, it is seen that if the converb clause comes before the main clause in *-DIkçA* (whenever) construction, the total reading time is 8632,44 milliseconds. Conversely, if the converb clause follows the main clause, the total reading time rises to 13716,04 milliseconds. These findings support the idea that there is a processing difficulty when *-DIkçA* (whenever) construction is in the non-default position.

The reading time analysis for these specific nine converbial endings show that the processing difficulty is guided by principle that prefers those orders of words and phrasal constituents that allow for a rapid access to all immediate constituents (ICs) of a mother node (M), once the first IC has been recognized as a daughter of M. Sentences in which converb clause is situated after the main clause require keeping the entire main clause (IC^2) in the short term memory until the subordinate clause (IC^1) is accessed, while sentences in which converb clause is situated before the main clause simply add the main clause (IC^2) to the structure that has been created by parsing the subordinate clause (IC^1). Figure 35 below shows the structure of immediate constituents for a sample temporal converbial construction, namely, "*Müdür tatile çıkınca biz ofisi kapattık* (*When the manager went holiday, we closed the office*)".

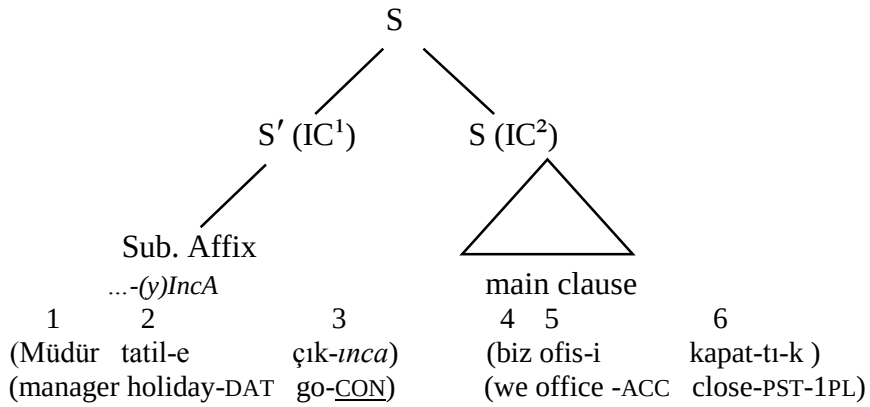

Figure 35: *The structure of immediate constituents for a sample temporal converb clause construction; namely, "Müdür tatile çıkınca biz ofisi kapattık (When the manager went holiday, we closed the office)"*

As shown in Figure 35, the parser needs to scan a single-word recognition domain to create both ICs of mother node. After the parser leaves area of interest (AI3) in the subordinate clause, namely the converb; and enters area of interest (AI4), namely the subject of the main clause, both immediate constituents are accessed, thus the structure carries lower processing load. In contrast, accessing to both immediate constituents (ICs) of a mother node (M) is different in sentences in which converb clause is situated after the main clause. Figure 36 below shows the structure of immediate constituents for a sample temporal converbial construction, namely, "*Biz ofisi kapattık müdür tatile çıkınca* (*When the manager went holiday, we closed the office*)".

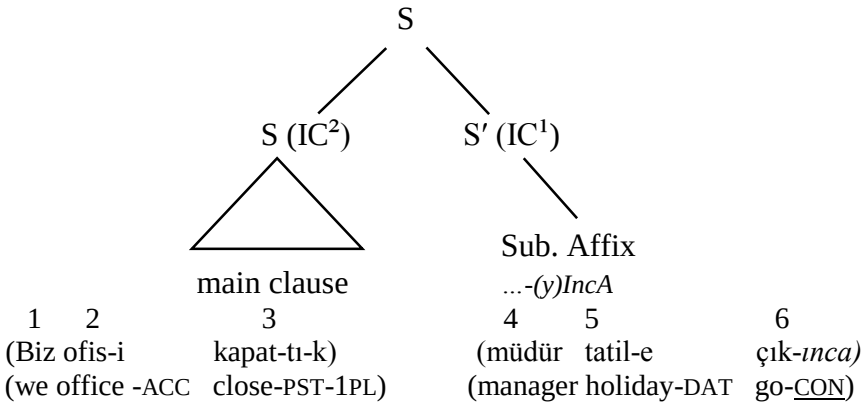

Figure 36: *The structure of immediate constituents for a sample temporal converb clause construction; namely, "Biz ofisi kapattık müdür tatile çıkınca (We closed the office when the manager went holiday)"*

As shown in Figure 36, the parser needs to scan four words of recognition domain to create both ICs of mother node. After the parser leaves area of interest (AI3) in the subordinate clause, namely

the verb of the main clause; there are four areas of interests in order to reach the converb, which is in area of interest 6 (AI6). AI6 is the place where both immediate constituents are accessed. When the adverbial clause comes after the main clause, it is not immediately evident that the sentence is composed of two clauses. In this scenario, the parser cannot create the mother node "S" that governs the entire sentence until it encounters the subordinating suffix in AI6, which organizes the complex sentence after processing the main clause. In other words, when the adverbial clause comes after the main clause, the parser identifies the mother node "S" when it can immediately access both ICs: main and adverbial clauses can be attached to "S" as soon as this node is constructed. Hence, the recognition domain is significantly longer when the adverbial clause comes after the main clause. This structure thus carries a much higher processing load than the structure in Figure 35.

When the findings and discussion of corpus based study and experimental study are regarded, it is safe to state that iconicity of sequence does not have a role in explaining the positioning of temporal converbial constructions in Turkish and the related theory does not give information about why the positioning of temporal converb clauses varies depending on the converb suffix used. However, processing theory of constituent order shows that positioning of temporal converbial constructions in Turkish can be explained in terms of processing difficulties.

After the findings and discussion on corpus-based and experimental study are presented in detail, the next chapter gives answers to the research questions of the study.

CONCLUSION

This study's main aim is to investigate the syntactic parsing and semantic factors influencing the positioning of temporal converb clause constructions in Turkish. Drawing findings from both a corpus-based study and an experimental study, the following section provides the answers to the research questions.

RQ1: *What are the positions of temporal converb clauses in Turkish based on the converbial suffixes?*

The findings of the spoken and written data reveal that *-(y)IncA* (when), *-DIğIndA* (when), *-DIğI zaman* (when), *-ken* (while), *-(A/I) r…-mAz* (as soon as), *-DIğIndAn beri* (since), *-mAdAn önce* (before), *-DIktAn sonra* (after) and *-DIkçA* (whenever) temporal converbial clauses in Turkish appear mostly before the main clause. In terms of the categories of the converb clauses, a similar result was found in both written and spoken data. In regard to the converbs expressing events that occur before the event mentioned in the main clause (*-(y)IncA* (when), *-DIğIndA* (when), *-DIğI zaman* (when), *-(A/I) r…-mAz* (as soon as), *-DIğIndAn beri* (since) and *-DIktAn sonra* (after)), they are generally found to come before the main clause. Concerning the converbs expressing events which occur at the same temporal point as expressed by the embedded and main clauses (*-DIğIndA* (when), *-DIğI zaman* (when), *-ken* (while) and *-DIkçA* (whenever)), it is also found that the temporal clauses appear mostly before the main clause. Those converbs expressing posteriority in which the event expressed in the embedded clause occurs after the event expressed in the main clause (*-DIğIndA* (when), *-DIğI zaman* (when) and *-mAdAn önce* (before)) have a tendency to precede the main clause.

These results are in line with the views of Kornfilt (1997) on the positioning of adverbial clauses in Turkish. She states that all kinds of adverbial clauses in Turkish come before the main clause in default word order. However, given the general flexibility of word order in Turkish, the adverbial clause can appear in a non-default position. The results also support the hypothesis of Diessel (2001) on the positioning of adverbial clause constructions. He hypothesizes that the positioning of main clause / predicate and subordinate clause shows a significant correlation with the placement of the subordinator in the subordinate clause. Adverbial clauses introduced by a final subordinator tend to come before the main clause / predicate. On the other hand, adverbial clauses marked by an initial subordinator can be found in both initial and final positions, irrespective of the order of the verb and object in the sentence. Since Turkish converbial clauses include final converbial endings, the results of this study support Diessel's (2001) hypothesis.

RQ2: *What is the role of iconicity of sequence in the positioning of temporal converb clauses in Turkish?*

It is possible to state that iconicity of sequence does not have a role on the positioning of the temporal converb clauses in Turkish. Temporal converb clauses indicating either an event that occurred earlier or a simultaneous event are more commonly placed before the main clause. The positioning of these converb clause types are in line with the iconicity of sequence. However, the positions of the converb constructions that express posteriority is not consistent with the iconicity of sequence because only around 15% of the converb clauses are placed after the main clause. Although it seems that for *-DIğIndA* (when) clauses which denote posteriority, there is a tendency for iconic clause order (69,42% of the clauses are initial and 30,58% of them are final) and for *-DIğI zaman* (when) clauses which denote posteriority, this tendency is similar,(67,19% of the clauses are initial and 32,81% of them are final); for *-mAdAn önce* (before) clauses which express pure posteriority, linear structure does not correspond to the conceptual order (88,30% of the clauses come before the main clause while only 11,70% of them come after the main clause).

Another result is that both in written and spoken data, the percentages of initial and final temporal converbial clauses are nearly same. It is stated in the literature that syntactically complex structures are more prevalent in written discourse as opposed to spoken discourse (Chafe, 1979; 1982; Beaman, 1984; Kroll, 1977; O'Donnell, 1974, Lakoff, 1979; Ochs, 1979). Regarding that using temporal converb clauses in non-default positions in Turkish creates complexity, the percentage of using converb clauses in final position should have been higher in written data when compared to spoken data. This result is not in line with the syntactic complexity theory, which is supported by Ochs (1979), who states that unplanned discourse exhibits syntactic structures that favour using less syntactically complex sentences.

As it was stated before, the principle of iconicity cannot determine the sequential organization of complex sentences, namely temporal converbial constructions in Turkish. Furthermore, the principle of iconicity fails to elucidate why complex sentences with converb clauses positioned at the beginning are more frequently characterized by iconicity compared to complex sentences with converb clauses placed at the end. Additionally, it does not give information about why the placement of temporal adverbial clauses varies depending on the converb suffix used. For example, while both *-(y)IncA* (when) and *-(A/I) r…-mAz* (as soon as) introduce prior adverbial clauses, *-(A/I) r…-mAz* (as soon as) clauses are more frequently positioned before the main clause compared to *-(y)IncA* (when) clauses.

RQ3: *What are the roles of different orders of subordinate and main clause in temporal converb clause constructions in the processing of temporal converb clauses in Turkish?*

The findings of the experimental study show that when the converb clause is positioned before the main clause, there is a smooth flow of processing except for the last item of the experimental sentence, which is the sentence wrap-up and spill-over area. It is clearly observed that the objects of the subordinate clause and the main clause are processed faster than the other areas in the experimental sentences. The reaction times to the subjects and predicates of the subordinate clause and main clause remain consistent when temporal converbial clauses are in initial position. Conversely, when the temporal converbial clause is positioned after the main clause, the reading times begin to increase, particularly with the subject of the subordinate clause. The reading times for areas of interest in the subordinate clause are comparatively longer than the reading times for areas of interest in the main clause when temporal converbial clauses are in final position. Additionally, the standard deviations (*sd*) in the reading times for areas of interest of the subordinate clause in the final position are relatively low, indicating that the increase in reading time for the subordinate clause is significant. Based on these findings, it is justifiable to assert that participants face difficulties in comprehending complex sentences when the converb clause comes after the main clause in the linear structure. Moreover, the overall reading times for both positions show that if the temporal converb clause comes before the main clause, the mean ($\bar{x}$) of the total reading time for all converbial constructions is 8840,8 milliseconds. Conversely, if the converb clause follows the main clause, the mean ($\bar{x}$) of the total reading time rises to 14081,5 milliseconds. Regarding these findings, it is safe to state that there is a processing difficulty when temporal clauses in Turkish are in the non-default position. The results are in line with Diessel (2005) who states that in right branching languages, adverbial clauses marked by a final subordinator affix exhibit a significantly shorter recognition domain when placed before the main clause. This indicates that, in such positions, adverbial clauses are easier to process and, therefore, more strongly preferred when they appear at the beginning of a sentence. The results also support Hawkins (1994) who states that when the mother node construction category of the adverbial clause (i.e. the subordinating conjunction or subordinating affix) always occurs at the end of the clause as in Turkish and Japanese, adverbial clauses are processed easily and usually come before the main clause.

Suggestions for further studies and implications

In this study, semantic considerations and syntactic parsing were investigated to analyse the positioning of temporal converb clause constructions in Turkish. Diessel (2005) states that initial and final adverbial clauses fulfil distinct discourse pragmatic roles. Chafe (1984), for example, states that initial adverbial clauses are employed to structure the flow of information in continuous discourse, serving to establish a thematic foundation or orientation for subsequent clauses. Givon (1990) states that adverbial clauses play a crucial role in discourse pragmatics when positioned before the main clause: they establish the groundwork for the subsequent discourse. In line with these studies; the third factor, namely discourse-pragmatic factor, can be analysed in future studies to have a full understanding of the positioning of temporal converbial constructions in Turkish.

While the primary objective of this study is to make a contribution to the field through corpus based and experimental psycholinguistic studies, the literature gap regarding the positioning in adverbial clauses in Turkish is substantial. In addition to theoretical investigations, there is a clear need for further experimental studies. In this regard, certain elements of the current study could be enhanced, and additional points that were not addressed could be explored in future research. For instance, the current study employs a self-paced reading test as the data collection tool in the experimental study. In future investigations, scholars may choose to create research projects employing varied data collection tools like Event-Related Potentials or eye-tracking devices. This approach would ensure that the acquired data is derived from unconscious processes. Also, self-paced listening may be employed as the data collection tool in the future studies. Vandergrift (2007) states that listening comprehension is a challenging activity that requires the real-time processing of linguistic information. Unlike readers, who can revisit written texts and control the pace of their reading, listeners cannot adjust the speed of the spoken language. Additionally, listeners must retain more information in their working memory, making listening comprehension more cognitively demanding than reading comprehension. Thus, self-paced listening task may be useful in analysing the positioning of temporal converb clause constructions in Turkish.

In this study, the subjects of the main and subordinate clauses were not taken into consideration as parameters in analysing the positioning of temporal converb clause constructions. In terms of control structure in converbial constructions in Turkish, Çetintaş Yıldırım (2004) states that the co-indexation of subordinate and main clause subjects is an important aspect. The subordinate clause and the main clause may be both co-referential and non-co-referential. She also states that when the subjects are non-co-referential, an overt subject should appear in the converb clause. Otherwise, the empty category PRO is co-indexed with the matrix clause and the subjects become co-referential. With this knowledge at hand, co-indexation of subordinate and main clause

subjects may be analysed whether different referentiality affects the positioning of temporal converb clause constructions or not.

Another aspect worth considering for future research could involve analysing other types of converbial constructions. In this study, temporal converbial constructions were analysed in terms of positioning of the main and subordinate clauses. In the future studies, converbial constructions of addition, agreement, concession, condition, dismissal, manner, preference, proportionality, purpose, quantity, reason and substitution could be analysed in terms of positioning.

The study's findings may assist educators of Turkish as a second or foreign language in understanding the reasons on positioning of main and subordinate clauses in temporal converb constructions. Consequently, this knowledge may help them to develop their curriculum in a more informed and effective manner. Moreover, high frequent temporal converbial endings may be selected while teaching Turkish as a second or foreign language because selection of the high frequency linguistic elements helps the students learn the language more effectively.

The study's findings may also be helpful in translation studies, especially in the studies using artificial intelligence translation tools. The results of the corpus study and experimental study may be helpful in creating the syntax of the artificial intelligence translation tools. Thus, while translating the complex sentences from one language to another one, the results will be more in line with the naturalistic data of the languages.

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APPENDIX 1: EXPERIMENTAL SENTENCES AND COMPREHENSION QUESTIONS

1.	Müdür tatile çıkınca biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"When the manager went holiday, we closed the office"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
2.	Biz ofisi kapattık müdür tatile çıkınca zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office when the manager went holiday"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
3.	Müdür tatile çıktığında biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"When the manager went holiday, we closed the office"*
	Comprehension Question: Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
4.	Biz ofisi kapattık müdür tatile çıktığında zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office when the manager went holiday"*
	Comprehension Question: Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
5.	Müdür tatile çıktığı zaman biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"When the manager went holiday, we closed the office"*
	Comprehension Question:

	Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
6.	Biz ofisi kapattık müdür tatile çıktığı zaman zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office when the manager went holiday"*
	Comprehension Question: Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
7.	Müdür tatile çıkarken biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"While the manager went holiday, we closed the office"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
8.	Biz ofisi kapattık müdür tatile çıkarken zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office while the manager went holiday"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
9.	Müdür tatile çıkar çıkmaz biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"As soon as the manager went holiday, we closed the office"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
10.	Biz ofisi kapattık müdür tatile çıkar çıkmaz zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office as soon as the manager went holiday"*
	Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"

11. Müdür tatile çıktığından beri biz ofisi kapalı tuttuk zaten manager holiday-DAT go-CON we office -ACC keep-closed-PST-1PL already *"Since the manager went holiday, we closed the office"*
Comprehension Question: Kapalı tutul-an ne? closed keep-PASS-ADJ what "*What was kept closed?*
12. Biz ofisi kapalı tuttuk müdür tatile çıktığından beri zaten we office -ACC keep-closed-PST-1PL manager holiday-DAT go-CON already *"We closed the office as soon since the manager went holiday,"*
Comprehension Question: Kapalı tutul-an ne? closed keep-PASS-ADJ what "*What was kept closed?*
13. Müdür tatile çıkmadan önce biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"Before the manager went holiday, we closed the office"*
Comprehension Question: Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
14. Biz ofisi kapattık müdür tatile çıkmadan önce zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office before the manager went holiday"*
Comprehension Question: Ofis-i kapat-an kim? office-ACC close-ADJ who "*Who closed the office?*"
15. Müdür tatile çıktıktan sonra biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"After the manager went holiday, we closed the office"*
Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
16. Biz ofisi kapattık müdür tatile çıktıktan sonra zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office after the manager went holiday"*

Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
17. Müdür tatile çıktıkça biz ofisi kapattık zaten manager holiday-DAT go-CON we office -ACC close-PST-1PL already *"Whenever the manager went holiday, we closed the office"*
Comprehension Question: Tatil-e çık-an kim? holiday-DAT go-ADJ who "*Who goes holiday?*"
18. Biz ofisi kapattık müdür tatile çıktıkça zaten we office -ACC close-PST-1PL manager holiday-DAT go-CON already *"We closed the office whenever the manager went holiday"*
19. Öğrenciler okula gidince ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*When the students went to school, I remembered the old times.*"
Comprehension Question: Eski-ler-i hatırla-yan kim? Old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
20. Ben eskileri hatırladım öğrenciler okula gidince yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times when the students went to school.*"
Comprehension Question: Eski-ler-i hatırla-yan kim? old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
21. Öğrenciler okula gittiğinde ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*When the students went to school, I remembered the old times.*"
Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
22. Ben eskileri hatırladım öğrenciler okula gittiğinde yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times when the students went to school.*"

	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
23.	Öğrenciler okula gittiği zaman ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*When the students went to school, I remembered the old times.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? Old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
24.	Ben eskileri hatırladım öğrenciler okula gittiği zaman yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times when the students went to school.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
25.	Öğrenciler okula giderken ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*While the students went to school, I remembered the old times.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
26.	Ben eskileri hatırladım öğrenciler okula giderken yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times while the students went to school.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
27.	Öğrenciler okula gider gitmez ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*As soon as the students went to school, I remembered the old times.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? Old-time-PL-ACC remember-ADJ who

	"*Who remembered the old times?*"
28.	Ben eskileri hatırladım öğrenciler okula gider gitmez yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times as soon as the students went to school.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
29.	Öğrenciler okula gittiğinden beri ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*Since the students went to school, I remembered the old times.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
30.	Ben eskileri hatırladım öğrenciler okula gittiğinden beri yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times since the students went to school.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
31.	Öğrenciler okula gitmeden önce ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*Before the students went to school, I remembered the old times.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? Old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
32.	Ben eskileri hatırladım öğrenciler okula gitmeden önce yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times before the students went to school.*"
	Comprehension Question: Eski-ler-i hatırla-yan kim? old-time-PL-ACC remember-ADJ who "*Who remembered the old times?*"
33.	Öğrenciler okula gittikten sonra ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again

	"*After the students went to school, I remembered the old times.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
34.	Ben eskileri hatırladım öğrenciler okula gittikten sonra yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times after the students went to school.*"
	Comprehension Question: Okul-a gid-en kim? school-DAT go-ADJ who "*Who goes to school?*"
35.	Öğrenciler okula gittikçe ben eskileri hatırladım yine student-PL school-DAT go-CON I old time-PL-ACC remember-PST-1SG again "*Whenever the students went to school, I remembered the old times.*"
	Comprehension Question: Hatırla-nan ne? remember-PASS-ADJ who "*What was remembered?*"
36.	Ben eskileri hatırladım öğrenciler okula gittikçe yine I old time-PL-ACC remember-PST-1SG student-PL school-DAT go-CON again "*I remembered the old times whenever the students went to school.*"
	Comprehension Question: Hatırla-nan ne? remember-PASS-ADJ who "*What was remembered?*"
37.	Öğretmen dersi anlatınca çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*When the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Konu-yu- anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
38.	Çocuklar konuyu anladı öğretmen dersi anlatınca zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic when the teacher explained the subject."*
	Comprehension Question: Konu-yu anla-yan kim?

	topic-ACC understand-ADJ who "*Who understood the topic?*"
39.	Öğretmen dersi anlattığında çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*When the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
40.	Çocuklar konuyu anladı öğretmen dersi anlattığında zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic when the teacher explained the subject."*
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
41.	Öğretmen dersi anlattığı zaman çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*When the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
42.	Çocuklar konuyu anladı öğretmen dersi anlattığı zaman zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic when the teacher explained the subject."*
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
43.	Öğretmen dersi anlatırken çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*While the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
44.	Çocuklar konuyu anladı öğretmen dersi anlatırken zaten

	child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic while the teacher explained the subject."*
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
45.	Öğretmen dersi anlatır anlatmaz çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*As soon as the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
46.	Çocuklar konuyu anladı öğretmen dersi anlatır anlatmaz zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic as soon as the teacher explained the subject."*
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
47.	Öğretmen dersi anlattığından beri çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*Since the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
48.	Çocuklar konuyu anladı öğretmen dersi anlattığından beri zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic since the teacher explained the subject."*
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
49.	Öğretmen dersi anlatmadan önce çocuklar konuyu anlamamıştı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-NEG-PER-3PL already "*Before the teacher explained the subject, the students did not comprehend the topic.*"
	Comprehension Question:

	Konu-yu anla-ma-yan kim? topic-ACC understand-NEG-ADJ who "*Who did not understand the topic?*"
50.	Çocuklar konuyu anlamamıştı öğretmen dersi anlatmadan önce zaten child-PL topic-ACC comprehend-NEG-PER-3PL teacher subject-ACC explain-CON already "*The students did not comprehend the topic before the teacher explained the subject."*
	Comprehension Question: Konu-yu anla-ma-yan kim? topic-ACC understand-NEG-ADJ who "*Who did not understand the topic?*"
51.	Öğretmen dersi anlattıktan sonra çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*After the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
52.	Çocuklar konuyu anladı öğretmen dersi anlattıktan sonra zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic after the teacher explained the subject."*
	Comprehension Question: Konu-yu anla-yan kim? topic-ACC understand-ADJ who "*Who understood the topic?*"
53.	Öğretmen dersi anlattıkça çocuklar konuyu anladı zaten teacher subject-ACC explain-CON child-PL topic-ACC comprehend-PST-3PL already "*Whenever the teacher explained the subject, the students comprehended the topic.*"
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"
54.	Çocuklar konuyu anladı öğretmen dersi anlattıkça zaten child-PL topic-ACC comprehend-PST-3PL teacher subject-ACC explain-CON already "*The students comprehended the topic whenever the teacher explained the subject."*
	Comprehension Question: Ders anla-tan kim? subject explain-ADJ who "*Who explained the subject?*"

55. Tamirci arabayı çalıştırınca duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*When the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
56. Duman etrafı sardı tamirci arabayı çalıştırınca yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment when the mechanic starter the car."*
Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
57. Tamirci arabayı çalıştırdığında duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*When the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
58. Duman etrafı sardı tamirci arabayı çalıştırdığında yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment when the mechanic starter the car."*
Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
59. Tamirci arabayı çalıştırdığı zaman duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*When the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
60. Duman etrafı sardı tamirci arabayı çalıştırdığı zaman yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment when the mechanic starter the car."*

Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
61. Tamirci arabayı çalıştırırken duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*While the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
62. Duman etrafı sardı tamirci arabayı çalıştırırken yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment while the mechanic starter the car."*
Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
63. Tamirci arabayı çalıştırır çalıştırmaz duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*As soon as the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
64. Duman etrafı sardı tamirci arabayı çalıştırır çalıştırmaz yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment as soon as the mechanic starter the car*."
Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
65. Tamirci arabayı çalıştırdığından beri duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*Since the mechanic starter the car, the fog surrounded the environment.*"
Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST

	"*What surrounded the environment?*"
66.	Duman etrafı sardı tamirci arabayı çalıştırdığından beri yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment since the mechanic starter the car.*"
	Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
67.	Tamirci arabayı çalıştırmadan önce duman etrafı sarmamıştı zaten mechanic car-ACC start-CON fog environment-ACC surround-NEG-PERF-3sg already "*Before the mechanic starter the car, the fog surrounded the environment.*"
	Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
68.	Duman etrafı sarmamıştı tamirci arabayı çalıştırmadan önce zaten fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON already *"The fog surrounded the environment before the mechanic starter the car.*"
	Comprehension Question: Arabay-ı çalıştır-an kim? Car-ACC start-ADJ who "*Who started the car?*"
69.	Tamirci arabayı çalıştırdıktan sonra duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again "*After the mechanic starter the car, the fog surrounded the environment.*"
	Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
70.	Duman etrafı sardı tamirci arabayı çalıştırdıktan sonra yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment after the mechanic starter the car.*"
	Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
71.	Tamirci arabayı çalıştırdıkça duman etrafı sardı yine mechanic car-ACC start-CON fog environment-ACC surround-PST-3SG again

	"*Whenever the mechanic starter the car, the fog surrounded the environment.*"
	Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"
72.	Duman etrafı sardı tamirci arabayı çalıştırdıkça yine fog environment-ACC surround-PST-3SG mechanic car-ACC start-CON again *"The fog surrounded the environment after the mechanic starter the car.*"
	Comprehension Question: Etraf-ı ne sar-dı? environment-ACC what surround-PST "*What surrounded the environment?*"

APPENDIX 2: FILLER SENTENCES AND COMPREHENSION QUESTIONS

1.	Çocuğ-a dondurma al-mak için araba-yı kenar-a yanaştır-dı-m. child-DAT ice-cream buy-CON car-ACC road-side-DAT pull-PST-1SG *"I pulled the car over to the side in order to buy ice cream to the child."*
	<u>Comprehension Question:</u> Dondurma alınacak kim? Ice-cream buy-PAS-ADJ who "*Who will be bought ice-cream?*"
2.	Durum-umuz-u bil-diği halde Hasan bize yardım et-me-di. situation-POSS-ACC know-CON Hasan us help-NEG-PST-3SG "*Although he knows our situation, Hasan did not help us.*"
	<u>Comprehension Question:</u> Kim yardım etmedi? Who help-NEG-PAST "*Who did not help?*"
3.	Ahmet'e borç para ver-di-m geri öde-mek şartıyla. Ahmet-DAT a loan of money spot-PST-1SG repay-CON "*I spotted Ahmet a loan of money provided that he would repay."*
	<u>Comprehension Question:</u> Borç para verilen kim? money spot-PAS-PST who "*Who was spotted a loan of money?*"
4.	Dışarısı soğuk ol-duğu için öğrenci-ler sıkı giy-in-di. Outside cold be-CON student-PL warmly dress-PAS-3PL "*Since it was cold outside, the students dressed warmly.*"
	<u>Comprehension Question:</u> Öğrenciler nasıl giyindi? student-PL how get-dress- PST "*How did the students get dressed?*"
5.	Ahmet dersi-ne çalışacağına bütün gün-ü uyuy-arak geçir-di. Ahmet lesson-DAT study-CON whole day-ACC sleep-GER spend-PST-3SG "*Ahmet spent the whole day sleeping instead of studying his lessons.*"
	<u>Comprehension Question:</u>

	Ahmet günü nasıl geçirdi? Ahmet day how spend-PST "*How did Ahmet spend the day?*"
6.	Ahmet araba-yı kullan-saydı biz ev-e erken varır-dık Ahmet car-ACC drive-CON we home-DAT early arrive-PST "*If Ahmet had driven the car, we would have arrived the home earlier.*"
	<u>Comprehension Question:</u> Eve varan kim? home-DAT arrive-ADJ who "*Who arrived home?*"
7.	Ayşe iş-e gel-meyecek ol-saydı siz-e haber verir-dim. Ayşe work-DAT come-NEG-FUT-CON you-DAT inform-PST "*I would have told you if Ayşe was not coming to work.*"
	<u>Comprehension Question:</u> Haber ver-en kim? News give-ADJ who "*Who gave the news?*"
8.	Kışın üşü-memek için bizim ev-e kalorifer yap-tır-dı-k. winter get-cold-CON our house-DAT central heating install-CAU-PST-3PL "*In order not to be cold in winter, we had central heating installed in our house*."
	<u>Comprehension Question:</u> Ev-e yaptır-ılan ne? Hause-DAT install-CAU-ADJ what "*What was installed in the house?*"
9.	Ali araba-yı sat-mak için tekrar köy-e git-ti Ali car-ACC sell-CON again village-DAT go-PST-3SG "*Ali went to the village again to sell the car.*"
	<u>Comprehension Question:</u> Ali nere-ye git-ti? Ali where-DAT go-PST-3SG "*Where did Ali go?*"
10.	Fatma araba-yı kullan-mak için babasından izin iste-di Fatma car-ACC drive-CON father-ABL ask-permission-PST-3SG "*Fatma asked her father for permission to drive the car.*"
	<u>Comprehension Question:</u> Araba-yı kullan-acak kim? car-ACC drive-FUT-ADJ who "*Who will drive the car?*"

11. Hüseyin doctor-a git-mesine rağmen hastalığ-ı tam geç-me-di Hüseyin doctor-DAT go-CON illness-POSS completely disappear-NEG-PST-3SG "*Although Hüseyin went to the doctor, his illness did not completely disappear.*"
<u>Comprehension Question:</u> Doktora gid-en kim? doctor-DAT go-FUT-ADJ who "*Who will go to the doctor?*"
12. Bayram-da eczane kapan-dığı için ilaç-lar-ı şimdi al-dı-m. holiday-LOC pharmacy close-PASS-CON medicine-PL-ACC now buy-PST-1SG "*I bought the medicines now because the pharmacy was closed on the holiday.*"
<u>Comprehension Question:</u> Eczane ne zaman kapalı? pharmacy when closed "*When is the pharmacy closed?*"
13. Beğen-me-diğim film-i seyretmek-tense ev-de kal-ma-yı tercih etti-m. like-NEG-ADJ film watch-CON home-LOC stay-GER-ACC prefer-PST-1SG "*I preferred staying at home than watching a film I didn't like.*"
<u>Comprehension Question:</u> Tercih edil-en yer neresi? prefer-PASS-ADJ place where "*Which place was preferred?*"
14. Biraz fazla çalış-saydı Yasemin sınav-ı rahatlıkla geçer-di a little more study-CON Yasemin exam-ACC easily pass-PST-3SG "*If Yasemin had studied a little more, she would have passed the exam easily.*"
<u>Comprehension Question:</u> Sınav-a gir-en kim? exam-DAT take-ADJ who "*Who will take the exam?*"
15. Ali okul-a gid-eceğine arkadaş-larıyla internet kafe-ye git-ti. Ali school-DAT go-CON friend-PL- internet café-DAT go-PST-3SG "*Ali went to an internet cafe with his friends instead of going to school.*"
<u>Comprehension Question:</u> Ali nereye git-ti? Ali where go-PST-3SG "*Where did Ali go?*"
16. Bu para yet-meyeceği için Gürkan-dan borç para iste-di-m. this money be-enough-CON Gürkan-ABL a loan of money ask-PST-1SG "*I asked Gürkan for a loan as this money was not enough.*"

Comprehension Question: Borç para iste-nen kim? a loan of money ask-PASS-ADJ who "*Who was asked for a loan of money?*"
17. On-u çok üz-düğüm için babam-dan özür dile-di-m. him-ACC upset-CON father-ABL apologise-PST-1SG "*I apologised to my dad for upsetting him so much.*"
Comprehension Question: Özür dilen-en kim? apologise-ADJ who "*Who was apologised?*"
18. İstanbul-da otur-uyor olsaydım dün akşam-ki tiyatro-ya gider-di-m. Istanbul-LOC live-CON yesterday-ADJ theatreDAT go-PST-1SG "*If I lived in Istanbul, I would have gone to the theatre last night.*"
Comprehension Question: Tiyatro ne zaman? theatre when "*When is the theatre?*"
19. Ankara-da oku-masına rağmen Ali hiç Kızılay-a gi-tme-di. Ankara-LOC study-CON Ali never Kızılay-DAT go-NEG-PST-3SG "*Although he studied in Ankara, Ali never went to Kızılay.*"
Comprehension Question: Ali nereye git-me-di? Ali where go-NEG-pst-3SG "*Where did not Ali go?*"
20. Annem ban-a kız-dığı için bilgisayar kullan-mamı yasakla-dı. mother me-DAT get-anry-CON computer use-GER-ACC forbid-PST-3SG "*My mum forbade me to use the computer because she got angry with me.*"
Comprehension Question: Kız-an kim? get-anry-ADJ who "*Who got angry?*"
21. Ders-i-ne fazla çalış-saydı sınav-dan iyi not alır-dı. lesson-POSS-DAT more study-CON exam-ABL good grade get-PST-3SG "*He would have got a good grade in the exam if he had studied more*"
Comprehension Question: Ders-i-ne nasıl çalış-tı? lesson-POSS-DAT how study-PST-3SG

"*How did he(she) study for his (her) lesson?*"
22. Sabah erken kalk-tığı halde iş-e geç kal-dı. morning early wake-up-CON work-DAT be-late-PST-3SG "*He was late for work even though he woke up early in the morning.*"
<u>Comprehension Question:</u> Sabah ne zaman kalk-tı? morning when wake-up-PST-3SG "*When did he (she) wake up in the morning?*"
23. Çamaşır makine-si bozul-duğu için Mahmut tamirci-ye git-ti. washing machine break-down-CON Mahmut repair-shop-DAT go-PST-3SG "*Mahmut went to the repair shop because the washing machine broke down.*"
<u>Comprehension Question:</u> Mahmut nereye git-ti? Mahmut where go "*Where did Mahmut go?*"
24. Yasemin özür dile-yeceğine kapı-yı çarp-ıp dışarı çık-tı. Yasemin apologise-CON door-ACC slam-GER outside go-out-PST-3SG "*Instead of apologising, Jasmine slammed the door and went out.*"
<u>Comprehension Question:</u> Yasemin nereye çık-tı? Yasemin where go "*Where did Yasemin go?*"
25. Maaş-ı-nı hemen bitir-diği için Emre para-sız kal-dı. Salary-POSS-ACC immediately finish-CON Emre penniless leave-PST-3SG "*Emre was left penniless because he finished his salary immediately.*"
<u>Comprehension Question:</u> Kim para-sız kal-dı? who penniless leave-PST "*Who was lest penniless?*"
26. İş-ten erken dön-seydi Fatma akşam yemeği-ne yetişir-di. work-ABL early return-CON Fatme dinner-DAT make-PST-3SG "*If she'd come home from work early, Fatma would have made it in time for dinner.*"
<u>Comprehension Question:</u> Fatma ne zaman dön-dü? Fatma when return-PST-3SG "*When did Fatma return?*"
27. Ali ilaç kullan-masına rağmen baş ağrı-sı geç-me-di. Ali medicine take-CON headache go-away-NEG-PST-3SG

"*Although Ali took medication, his headache did not go away.*"
<u>Comprehension Question:</u> İlaç kullan-an kim? medicine take-ADJ who "*Who took the medicine?*"
28. Tayin-i çık-tığı için Hilal başka şehre taşın-dı. transfer-CON Hilal another city move-PST-3SG "*Hilal moved to another city because of her transfer.*"
<u>Comprehension Question:</u> Hilal nereye taşın-dı? Hilal where move-PST-3SG "*Where did Hilal move?*"
29. Moral-im bozuk ol-duğu için bugün-ü ev-de geçir-di-m. mood-POSS be-bad-CON today-ACC home-LOC spend-PST-1SG "*I spent the day at home because I was in a bad mood.*"
<u>Comprehension Question:</u> Bugünü nerede geçir-di? today-ACC where spend-PST-3SG "*Where did he (she) spend the day?*"
30. İş-ten geç çık-masına rağmen Hasan toplantı-ya yetis-ti. work-ABL late leave-CON Hasan meeting-DAT make-PST-3SG "*Despite leaving work late, Hasan made it to the meeting.*"
<u>Comprehension Question:</u> Toplantı-ya yetiş-en kim? meeting-DAT make-ADJ who "*Who made it to the meeting?*"
31. Bilgisayar bozuk ol-duğu için ödev-i-ni elle yaz-dı. computer be-broken-CON homework-POSS-ACC by-hand write-PST-3SG "*He wrote his homework by hand because the computer was broken.*"
<u>Comprehension Question:</u> Ödev-i-ni nasıl yaz-dı? Homework-POSS-ACC how write-PST-3SG "*How did he (she) write her homework?*"
32. Anne-si-ne yardım ed-eceğine Ayşe gün boyu uyu-du. Mother-POSS-ACC help-CON Ayşe all-day-long sleep-PST-3SG "*Instead of helping her mother, Ayşe slept all day long.*"
<u>Comprehension Question:</u> Gün boyu uyu-yan kim?

	All-day-long sleep-ADJ who "*Who slept all day long?*"
33.	Üniversite-de matematik oku-saydım bu problem-i hemen çözer-di-m. university-LOC maths study-CON this problem-ACC immediately solve-PST-1SG "*If I had studied maths at university, I would have solved this problem immediately.*"
	<u>Comprehension Question:</u> Çözül-ecek olan ne? solve-ADJ what "*What will be solved?*"
34.	Yarın düğün-e gid-eceği için Sinan kıyafet-ler-i-ni ütüle-di. Tomorrow wedding-DAT go-CON Sinan cloth-PL-POSS-ACC iron-PST-3SG "*Sinan ironed his clothes because he's going to the wedding tomorrow.*"
	<u>Comprehension Question:</u> Düğün-e gid-en kim? Wedding-DAT go-ADJ who "*Who will go to the wedding?*"
35.	Talimat-lar-ı dikkatlice oku-saydı Işıl yazıcı-yı kurabilir-di. Instruction-PL-ACC carefully read-CON Işıl printer-ACC set-up-PST-3SG "*If she had read the instructions carefully, Işıl could have set up the printer.*"
	<u>Comprehension Question:</u> Kur-ul-acak ol-an ne? set-up-PASS-FUT-ADJ what "*What will be set up?*"
36.	Sevdiği araba-yı satın al-mak için kredi çek-ti. favorite car-ACC buy-CON loan take-out-PST-3SG "*He took out a loan to buy his favourite car.*"
	<u>Comprehension Question:</u> Hangi araba-yı al-mak için kredi çek-ti? Which car-ACC buy-CON loan take-out-PST-3SG? "W*hich car did he take out a loan to buy?*"

APPENDIX 3: STATISTICAL ANALYSIS FOR EACH EXPERIMENTAL SENTENCE

1. Statistical analysis for *-(y)IncA (when)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	842,52±60,01	837,5 (710-1001)	3158,28±33,68	3159,5 (3106-3218)	**0**	**<0,001*****
tatile *holiday-DAT*	773,00±78,22	774 (619-889)	2096,06±70,45	2083 (2000-2236)	**0**	**<0,001*****
çıkınca *go-CON*	1294,76±83,70	1309,5 (1104-1470)	3237,04±108,20	3223,5 (3077-3422)	**0**	**<0,001*****
biz *we*	1163,50±50,81	1160,5 (1020-1289)	994,84±58,16	997 (905-1100)	**15,5**	**<0,001*****
ofisi *office -ACC*	1071,60±50,45	1048,5 (1003-1231)	986,34±54,29	975,5 (886-1089)	**357,5**	**<0,001*****
kapattık *close-PST-1PL*	1220,68±58,08	1207 (1101-1332)	1103,82±66,84	1108 (995-1213)	**246,5**	**<0,001*****
zaten *already*	2236,44±75,30	2237 (2112-2400)	3597,92±64,80	3605,5 (3492-3700)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	896,74±38,05	896,5 (850-970)	2909,86±116,10	2898,5 (2722-3096)	**U=0**	**<0,001*****
okula *school-DAT*	702,04±59,86	705,5 (517-807)	2342,70±112,86	2341 (2144-2545)	**t=-90,814**	**<0,001*****
gidince *go-CON*	1230,14±143,04	1231,5 (1003-1499)	2799,36±54,85	2799,5 (2704-2893)	**t=-72,432**	**<0,001*****
ben *I*	1200,36±118,51	1178,5 (996-1393)	918,72±12,27	916,5 (899-938)	**U=0**	**<0,001*****
eskileri *old time-PL-ACC*	1101,20±70,17	1102,5 (1003-1256)	1232,60±143,61	1233 (1000-1472)	**U=587,5**	**<0,001*****
hatırladım *remember-PST-1SG*	1220,06±147,91	1191,5 (1000-1499)	1260,34±92,72	1249,5 (1120-1420)	U=1011	0,099
yine *again*	2056,88±94,25	2042	2469,14±149,18	2489	**U=46**	**<0,001*****

		(1998-2675)		(2202-2695)		
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	889,98±37,04	895,5 (817-958)	2806,96±55,22	2801 (2701-2899)	**t=-203,870**	**<0,001*****
dersi *subject-ACC*	653,36±80,61	645,5 (523-778)	2119,22±141,37	2096,5 (2011-2769)	**U=0**	**<0,001*****
anlatınca *explain-CON*	1398,26±54,11	1395 (1300-1498)	2705,02±118,65	2703 (2517-2866)	**U=0**	**<0,001*****
çocuklar *child-PL*	1254,82±145,11	1234 (981-1497)	990,00±52,83	993,5 (890-1076)	**t=12,126**	**<0,001*****
konuyu *topic-ACC*	1089,22±86,73	1098 (929-1224)	1083,42±52,80	1089,5 (996-1163)	U=1153	0,504
anladı *comprehend-PST-3PL*	1154,82±36,77	1153,5 (1098-1224)	1145,22±50,23	1151,5 (1052-1218)	U=1135	0,428
zaten *already*	2050,02±32,79	2053,5 (1998-2106)	2707,36±52,36	2709,5 (2605-2789)	**U=0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	962,22±63,10	943 (863-1083)	2027,88±25,53	2024 (1988-2079)	**U=0**	**<0,001*****
arabayı *car-ACC*	598,70±40,01	593,5 (549-677)	2001,62±3,61	2002 (1987-2007)	**U=0**	**<0,001*****
çalıştırınca *start-CON*	1262,96±157,63	1242,5 (1003-1596)	2848,78±81,29	2847 (2653-2975)	**U=0**	**<0,001*****
duman *fog*	1319,90±158,04	1309,5 (1019-1588)	902,54±57,26	911 (802-1006)	**t=17,556**	**<0,001*****
etrafı *environment-ACC*	1266,16±138,55	1253 (1010-1532)	1152,28±78,18	1148 (1020-1280)	**U=617**	**<0,001*****
sardı *surround-PST-3SG*	1259,54±83,53	1265,5 (1111-1392)	1147,76±70,62	1146,5 (1012-1282)	**U=401**	**<0,001*****
yine *again*	1973,48±22,22	1972,5 (1938-2018)	2929,72±50,21	2919,5 (2845-3028)	**t=-123,144**	**<0,001*****

2. Statistical analysis for *-DIğIndA (when)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**

müdür *manager*	877,56±57,61	892 (779-967)	3019,38±13,88	3018,5 (3000-3043)	**0**	**<0,001*****
tatile *holiday-DAT*	568,32±45,61	575,5 (485-651)	2242,54±65,45	2247,5 (2146-2355)	**0**	**<0,001*****
çıktığında *go-CON*	1220,94±58,62	1216 (1132-1341)	2690,24±52,44	2697,5 (2601-2771)	**0**	**<0,001*****
biz *we*	1201,86±60,78	1205,5 (1112-1302)	1035,20±21,12	1034,5 (997-1075)	**0**	**<0,001*****
ofisi *office -ACC*	1149,96±48,88	1146 (1071-1235)	1097,74±46,23	1093 (1023-1173)	**573**	**<0,001*****
kapattık *close-PST-1PL*	1188,98±51,57	1198 (1091-1266)	1093,40±28,04	1089 (1052-1146)	**161,5**	**<0,001*****
zaten *already*	2135,62±45,07	2142 (2056-2221)	2712,54±91,70	2708 (2568-2866)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	970,70±16,65	969,5 (944-998)	2822,70±46,60	2827 (2740-2905)	**0**	**<0,001*****
okula *school-DAT*	535,84±53,53	542 (439-620)	2233,88±57,95	2242 (2130-2324)	**0**	**<0,001*****
gittiğinde *go-CON*	1269,24±46,45	1259,5 (1188-1353)	2683,78±44,89	2693 (2603-2758)	**0**	**<0,001*****
ben *I*	1196,80±58,02	1197 (1089-1287)	890,32±17,77	889 (870-990)	**0**	**<0,001*****
eskileri *old time-PL-ACC*	1235,78±59,18	1232,5 (1130-1341)	1143,56±56,84	1144,5 (1056-1238)	**352,5**	**<0,001*****
hatırladım *remember-PST-1SG*	1210,68±77,66	1190,5 (1097-1356)	1192,58±50,43	1196,5 (1108-1283)	1128	0,400
yine *again*	2105,58±13,36	2105,5 (2085-2130)	2741,52±82,09	2753 (2609-2883)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	859,22±3069	860,5 (806-909)	2656,76±58,76	2674,5 (2565-2756)	**U=0**	**<0,001*****
dersi *subject-ACC*	453,30±33,65	455 (403-505)	2222,36±56,75	2231 (2126-2317)	**U=0**	**<0,001*****
anlattığında *explain-CON*	1256,54±57,49	1255,5 (1157-1357)	2729,54±55,98	2732 (2622-2819)	**t=-129,795**	**<0,001*****
çocuklar *child-PL*	1184,46±53,59	1176,5 (1103-1280)	966,98±24,10	964 (932-1009)	**U=0**	**<0,001*****

konuyu *topic-ACC*	1067,88±36,17	1066 (999-1124)	1035,02±19,08	1033 (1002-1068)	**U=598**	**<0,001*** **
anladı *comprehend-PST-3PL*	1120,00±44,95	1123 (1043-1200)	1101,04±55,48	1113,5 (1011-1197)	U=999,5	0,084
zaten *already*	2106,84±63,73	2115 (2003-2210)	2766,52±65,95	2793,5 (2660-2869)	**U=0**	**<0,001*** **

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	966,94±20,72	969,5 (924-1001)	2143,28±24,00	2144 (2101-2187)	**t=-262,383**	**<0,001*** **
arabayı *car-ACC*	689,56±24,96	687,5 (645-733)	2016,78±13,53	2015,5 (2000-2044)	**U=0**	**<0,001*** **
çalıştırdığında *start-CON*	1120,72±60,19	1104 (1035-1239)	2919,42±44,28	2909,5 (2858-2994)	**U=0**	**<0,001*** **
duman *fog*	1206,90±61,99	1200,5 (1108-1313)	1018,08±50,39	1027,5 (932-1095)	**U=0**	**<0,001*** **
etrafı *environment-ACC*	1189,28±59,39	1193 (1102-1297)	1052,66±24,49	1051 (1003-1094)	**U=0**	**<0,001*** **
sardı *surround-PST-3SG*	1259,50±53,93	1259 (1175-1347)	1149,20±53,95	1144,5 (1050-1237)	**U=207,5**	**<0,001*** **
yine *again*	2033,88±21,42	2037,5 (2001-2065)	3075,28±39,74	3073,5 (3003-3154)	**U=0**	**<0,001*** **

3. Statistical analysis for *-DIğI zaman (when)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	902,60±27,86	901,5 (853-949)	2511,46±71,04	2496 (2408-2639)	**0**	**<0,001*** **
tatile *holiday-DAT*	708,98±45,18	706 (640-785)	2189,22±63,70	2197,5 (2087-2286)	**0**	**<0,001*** **
çıktığı zaman *go-CON*	1439,08±74,52	1448,5 (1341-1545)	2972,54±84,17	2974 (2836-3100)	**0**	**<0,001*** **
biz *we*	1212,04±42,10	1212,5 (1129-1292)	1009,56±16,01	1009 (984-1034)	**0**	**<0,001*** **
ofisi *office -ACC*	1228,62±61,13	1238,5 (1134-1326)	1119,60±39,29	1114,5 (1059-1183)	**201,5**	**<0,001*** **
kapattık *close-PST-1PL*	1280,86±54,54	1291 (1175-1367)	1199,08±61,59	1195 (1105-1301)	**419,5**	**<0,001*** **

zaten *already*	2229,52±55,88	2226,5 (2130-2329)	2716,72±62,97	2710 (2614-2823)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	1013,56±37,89	1008,5 (944-1082)	2724,96±128,46	2736 (2512-2930)	**U=0**	**<0,001*****
okula *school-DAT*	674,34±27,04	678,5 (630-719)	2318,02±52,03	2318,5 (2211-2398)	**U=0**	**<0,001*****
gittiği zaman *go-CON*	1290,28±48,79	1288,5 (1210-1383)	2817,54±57,56	2836 (2705-2908)	**U=0**	**<0,001*****
ben *I*	1272,66±50,10	1277,5 (1179-1369)	951,28±28,66	952 (902-1004)	**t=39,370**	**<0,001*****
eskileri *old time-PL-ACC*	1362,30±63,94	1366 (1251-1463)	1112,40±61,37	1110 (1025-1223)	**U=0**	**<0,001*****
hatırladım *remember-PST-1SG*	1249,82±52,54	1252,5 (1167-1344)	1091,40±46,78	1098,5 (1008-1161)	**U=0**	**<0,001*****
yine *again*	2016,18±9,47	2016,5 (2000-2032)	2539,14±59,31	2540,5 (2422-2630)	**U=0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	956,72±25,57	956,5 (915-1000)	2598,84±46,51	2600 (2497-2681)	**0**	**<0,001*****
dersi *subject-ACC*	561,68±33,61	567 (502-618)	2164,96±58,64	2163,5 (2068-2263)	**0**	**<0,001*****
anlattığı zaman *explain-CON*	1326,26±62,28	1334,5 (1210-1416)	2852,22±26,41	2857 (2799-2901)	**0**	**<0,001*****
çocuklar *child-PL*	1213,98±52,46	1219,5 (1136-1310)	1057,86±26,20	1057 (1012-1099)	**0**	**<0,001*****
konuyu *topic-ACC*	1186,36±48,97	1184 (1103-1266)	1082,28±33,87	1072,5 (1035-1145)	**102,5**	**<0,001*****
anladı *comprehend-PST-3PL*	1141,28±50,26	1141,5 (1047-1223)	1183,64±31,56	1185 (1131-1231)	**641,5**	**<0,001*****
zaten *already*	2122,32±23,26	2121 (2086-2156)	2718,26±59,75	2719,5 (2615-2800)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	1010,94±19,26	1011,5 (977-1045)	2231,84±55,34	2239,5 (2126-2320)	**0**	**<0,001*****
arabayı *car-ACC*	586,92±46,71	579,5 (516-669)	2184,18±56,22	2174,5 (2086-2283)	**0**	**<0,001*****

çalıştırdığı zaman *start-CON*	1339,08±54,59	1351 (1246-1425)	2958,12±29,62	2964,5 (2901-3006)	**0**	**<0,001*** **
duman *fog*	1149,42±43,42	1139 (1086-1225)	993,48±18,12	994 (966-1020)	**0**	**<0,001*** **
etrafı *environment-ACC*	1248,34±63,31	1244,5 (1147-1355)	1135,36±51,62	1139 (1045-1230)	**228,5**	**<0,001*** **
sardı *surround-PST-3SG*	1283,28±55,06	1289,5 (1187-1362)	1202,88±32,22	1203,5 (1151-1253)	**306,5**	**<0,001*** **
yine *again*	1905,34±35,89	1907 (1847-1955)	3017,16±15,81	3017 (2993-3043)	**0**	**<0,001*** **

4. Statistical analysis for *-(y)ken (while)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	882,86±50,82	878 (808-969)	2360,82±341,00	2285,5 (1854-2962)	**0**	**<0,001*** **
tatile *holiday-DAT*	598,82±47,46	601,5 (517-676)	2173,30±58,71	2175,5 (2081-2266)	**0**	**<0,001*** **
çıkarken *go-CON*	1348,98±52,56	1346 (1245-1431)	2559,04±57,50	2555,5 (2462-2649)	**0**	**<0,001*** **
biz *we*	1269,06±49,83	1273 (1190-1354)	1023,62±32,35	1024,5 (971-1081)	**0**	**<0,001*** **
ofisi *office -ACC*	1178,24±49,63	1180,5 (1084-1257)	999,82±57,71	1011 (903-1097)	**6**	**<0,001*** **
kapattık *close-PST-1PL*	1218,40±54,46	1216 (1124-1312)	1134,48±59,75	1137 (1029-1230)	**419**	**<0,001*** **
zaten *already*	2146,08±29,69	2147,5 (2100-2189)	2684,36±59,18	2688,5 (2569-2776)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	937,36±28,63	946,5 (890-978)	3022,70±12,14	3026 (3000-3041)	**0**	**<0,001*** **
okula *school-DAT*	548,18±25,37	549 (502-598)	2422,26±59,07	2420,5 (2321-2512)	**0**	**<0,001*** **
giderken *go-CON*	1207,66±55,62	1203,5 (1109-1310)	2960,92±53,23	2959 (2879-3059)	**0**	**<0,001*** **
ben *I*	1184,06±60,76	1201 (1089-1275)	1024,42±28,11	1020,5 (980-1069)	**0**	**<0,001*** **

eskileri *old time-PL-ACC*	1163,72±38,91	1163 (1087-1223)	1104,22±29,59	1106 (1051-1150)	**315,5**	**<0,001*****
hatırladım *remember-PST-1SG*	1264,98±56,77	1261 (1177-1378)	1229,06±32,14	1224,5 (1180-1284)	**790**	**0,002****
yine *again*	2045,60±30,12	2043,5 (1999-2090)	3016,50±15,15	3019,5 (2989-3043)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	882,30±22,81	884,5 (840-922)	2706,44±54,40	2711 (2609-2796)	**t=-218,668**	**<0,001*****
dersi *subject-ACC*	509,66±46,46	504 (440-587)	2097,62±50,98	2093 (2006-2186)	**U=0**	**<0,001*****
anlatırken *explain-CON*	1274,90±52,87	1270 (1180-1359)	2632,72±58,19	2626,5 (2542-2733)	**U=0**	**<0,001*****
çocuklar *child-PL*	1237,96±36,63	1239,5 (1189-1297)	1118,16±62,59	1126,5 (1008-1216)	**U=89**	**<0,001*****
konuyu *topic-ACC*	1124,40±45,15	1123 (1047-1207)	1065,76±41,51	1070,5 (999-1130)	**U=454**	**<0,001*****
anladı *comprehend-PST-3PL*	1186,88±53,27	1187,5 (1084-1265)	1125,30±47,84	1133 (1045-1212)	**U=516**	**<0,001*****
zaten *already*	2045,08±28,54	2041 (2001-2089)	2811,42±54,02	2808 (2719-2899)	**U=0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	961,62±23,80	965 (919-1001)	2212,24±57,25	2221,5 (2100-2299)	**0**	**<0,001*****
arabayı *car-ACC*	611,72±47,69	607,5 (537-685)	2021,42±11,28	2019,5 (2001-2040)	**0**	**<0,001*****
çalıştırırken *start-CON*	1306,78±30,62	1307 (1251-1355)	2888,52±48,98	2878,5 (2805-2978)	**0**	**<0,001*****
duman *fog*	1320,98±57,42	1313,5 (1223-1419)	1180,44±52,31	1189,5 (1076-1269)	**52,5**	**<0,001*****
etrafı *environment-ACC*	1296,12±51,36	1296,5 (1205-1387)	1128,50±59,78	1118 (1041-1232)	**32**	**<0,001*****
sardı *surround-PST-3SG*	1302,46±49,28	1303,5 (1207-1375)	1125,52±52,38	1127 (1028-1210)	**2**	**<0,001*****
yine *again*	1947,46±40,06	1948,5 (1884-2018)	3021,04±15,08	3021 (2998-3045)	**0**	**<0,001*****

5. Statistical analysis for *(A/I)r…-mAz (as soon as)* experimental sentences set

	Initial Converb Clause		Final Converb Clause			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	887,96±58,17	887 (800-984)	2501,90±53,38	2500 (2413-2596)	**U=0**	**<0,001*** **
tatile *holiday-DAT*	726,92±29,16	727,5 (681-776)	2175,74±51,05	2170,5 (2089-2274)	**U=0**	**<0,001*** **
çıkar çıkmaz *go-CON*	1441,06±55,22	1445,5 (1352-1547)	2907,84±54,50	2907,5 (2804-3006)	**t=-133,681**	**<0,001*** **
biz *we*	1261,52±42,31	1257 (1198-1336)	1034,50±35,29	1036 (977-1089)	**U=0**	**<0,001*** **
ofisi *office -ACC*	1306,96±48,84	1307,5 (1226-1394)	1150,38±33,67	1148 (1101-1200)	**U=0**	**<0,001*** **
kapattık *close-PST-1PL*	1299,70±23,23	1297,5 (1255-1342)	1296,22±54,98	1300 (1199-1377)	U=1239,5	0,942
zaten *already*	2270,44±52,33	2269 (2176-2368)	2741,42±26,94	2743,5 (2701-2782)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	1038,64±34,07	1043 (979-1095)	2611,56±51,44	2615 (2519-2700)	**t=-180,273**	**<0,001*** **
okula *school-DAT*	742,86±25,50	742 (700-785)	2296,72±56,63	2298,5 (2209-2400)	**U=0**	**<0,001*** **
gider gitmez *go-CON*	1378,56±51,23	1367,5 (1302-1471)	2860,26±68,85	2848 (2752-2990)	**U=0**	**<0,001*** **
ben *I*	1283,18±53,65	1283 (1187-1374)	945,78±27,53	949 (900-995)	**U=0**	**<0,001*** **
eskileri *old time-PL-ACC*	1339,88±22,39	1339,5 (1300-1385)	1130,40±18,64	1125 (1102-1162)	**U=0**	**<0,001*** **
hatırladım *remember-PST-1SG*	1241,48±29,33	1238,5 (1200-1299)	1106,56±3,87	1107 (1100-1112)	**U=0**	**<0,001*** **
yine *again*	2116,48±67,79	2128,5 (2005-2219)	2510,58±34,58	2511,5 (2454-2560)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	945,26±29,29	944 (900-999)	2670,62±119,43	2686,5 (2482-2857)	**U=0**	**<0,001*** **
dersi *subject-ACC*	668,22±22,58	669,5 (630-710)	2146,02±25,38	2144,5 (2100-2190)	**t=-307,636**	**<0,001*** **
anlatır anlatmaz	1376,54±52,28	1366,5	2823,40±61,79	2821,5	**U=0**	**<0,001*** **

explain-CON		(1288-1463)		(2713-2922)		
çocuklar *child-PL*	1223,62±48,19	1220,5 (1151-1298)	1051,22±27,37	1048 (1001-1095)	**U=0**	**<0,001*** **
konuyu *topic-ACC*	1195,68±14,31	1197,5 (1170-1221)	1043,54±23,46	1044,5 (1002-1087)	**U=0**	**<0,001*** **
anladı *comprehend-PST-3PL*	1133,36±20,65	1133,5 (1101-1177)	1141,92±19,08	1143,5 (1110-1169)	**U=935**	**0,030***
zaten *already*	2144,38±25,21	2146,5 (2100-2183)	2772,74±37,05	2773,5 (2700-2830)	**U=0**	**<0,001*** **

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	1018,28±10,12	1017,5 (1001-1035)	2221,86±54,83	2228 (2128-2314)	**U=0**	**<0,001*** **
arabayı *car-ACC*	788,60±11,96	787 (766-810)	2163,00±57,31	2167,5 (2071-2266)	**U=0**	**<0,001*** **
çalıştırır çalıştırmaz *start-CON*	1473,54±50,99	1478,5 (1379-1551)	2978,22±43,61	2982 (2891-3056)	**U=0**	**<0,001*** **
duman *fog*	1177,62±14,73	1178,5 (1151-1200)	629,32±310,11	671,5 (117-1088)	**U=0**	**<0,001*** **
etrafı *environment-ACC*	1251,46±17,17	1251 (1222-1278)	1145,50±27,80	1151 (1101-1189)	**U=0**	**<0,001*** **
sardı *surround-PST-3SG*	1276,18±51,96	1265 (1198-1364)	1242,80±29,34	1238 (1201-1289)	**U=802,5**	**0,002****
yine *again*	1947,52±28,50	1951 (1880-1991)	3022,56±11,54	3023 (3002-3043)	**t=-247,262**	**<0,001*** **

6. Statistical analysis for *-DIğIndAn beri (since)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	933,36±23,63	934 (891-973)	2498,04±50,35	2502 (2404-2594)	**t=-198,902**	**<0,001*** **
tatile *holiday-DAT*	693,92±51,60	698,5 (604-786)	2184,30±54,19	2185,5 (2096-2270)	**U=0**	**<0,001*** **
çıktığından beri *go-CON*	1483,24±51,00	1489 (1392-1574)	3249,26±28,09	3251,5 (3203-3295)	**U=0**	**<0,001*** **
biz *we*	1226,52±14,64	1227,5 (1200-1251)	1042,06±35,29	1052,5 (978-1091)	**U=0**	**<0,001*** **

ofisi *office -ACC*	1178,32±48,92	1176 (1108-1264)	1112,20±29,00	1110 (1062-1157)	**U=333,5**	**<0,001*** **
kapalı tuttuk *keep-closed-PST-1PL*	1353,22±40,67	1352 (1281-1447)	1342,66±49,72	1340 (1256-1423)	U=1115	0,352
zaten *already*	2326,14±56,79	2321,5 (2235-2416)	2742,64±23,62	2745 (2702-2780)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	1046,60±35,33	1056 (983-1100)	2648,82±47,50	2649 (2578-2731)	**0**	**<0,001*** **
okula *school-DAT*	680,56±24,97	673,5 (645-721)	2650,00±187,20	2672 (2319-2972)	**0**	**<0,001*** **
gittiğinden beri *go-CON*	1384,34±47,40	1385,5 (1302-1467)	3156,96±33,98	3155,5 (3101-3212)	**0**	**<0,001*** **
ben *I*	1247,36±32,44	1248,5 (1200-1296)	954,82±25,17	956,5 (912-992)	**0**	**<0,001*** **
eskileri *old time-PL-ACC*	1331,78±26,52	1327 (1281-1376)	1148,34±19,80	1153 (1110-1178)	**0**	**<0,001*** **
hatırladım *remember-PST-1SG*	1249,92±28,46	1248,5 (1201-1297)	1153,16±23,83	1156 (1108-1187)	**0**	**<0,001*** **
yine *again*	2145,24±35,98	2141 (2098-2203)	2766,74±34,07	2763,5 (2704-2831)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	1035,40±30,46	1035 (981-1087)	2631,02±58,76	2630,5 (2535-2724)	**0**	**<0,001*** **
dersi *subject-ACC*	642,90±34,12	650 (588-692)	2185,06±44,81	2192 (2113-2267)	**0**	**<0,001*** **
anlattığından beri *explain-CON*	1401,04±53,77	1408 (1306-1485)	3169,26±47,43	3165 (3100-3273)	**0**	**<0,001*** **
çocuklar *child-PL*	1305,54±38,60	1300 (1242-1373)	1102,98±14,56	1102,5 (1076-1131)	**0**	**<0,001*** **
konuyu *topic-ACC*	1155,36±27,45	1158,5 (1101-1200)	1064,12±14,57	1069 (1034-1087)	**0**	**<0,001*** **
anladı *comprehend-PST-3PL*	1245,72±43,47	1238,5 (1173-1316)	1174,24±25,43	1174 (1134-1224)	**185,5**	**<0,001*** **
zaten *already*	2113,30±18,01	2114,5 (2082-2144)	2775,94±48,31	2772,5 (2706-2851)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	1018,52±22,70	1017 (971-1057)	2378,50±24,48	2370 (2344-2420)	**U=0**	**<0,001*** **

arabayı *car-ACC*	666,24±37,66	664 (605-728)	2231,36±24,45	2230 (2188-2270)	**U=0**	**<0,001*** **
çalıştırdığından beri *start-CON*	1481,98±48,09	1482 (1389-1560)	3208,26±55,66	3207,5 (3106-3294)	**U=0**	**<0,001*** **
duman *fog*	1239,18±32,03	1236 (1190-1288)	1045,24±23,66	1046 (1004-1091)	**U=0**	**<0,001*** **
etrafı *environment-ACC*	1230,22±19,29	1223,5 (1201-1262)	1130,48±25,56	1124 (1089-1174)	**U=0**	**<0,001*** **
sardı *surround-PST-3SG*	1302,78±22,22	1306,5 (1265-1342)	1250,90±25,65	1252 (1201-1292)	**t=10,810**	**<0,001*** **
yine *again*	2099,54±51,03	2099 (2001-2178)	3018,44±10,30	3020 (3000-3043)	**t=-124,807**	**<0,001*** **

7. Statistical analysis for *-mAdAn (önce) (before)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	959,90±16,16	958,5 (935-992)	2565,32±63,03	2576,5 (2467-2658)	**U=0**	**<0,001*** **
tatile *holiday-DAT*	712,40±20,86	712,5 (673-749)	2203,48±31,30	2202,5 (2150-2262)	**t=-280,348**	**<0,001*** **
çıkmadan önce *go-CON*	1379,38±46,17	1370 (1310-1476)	3420,32±54,48	3420,5 (3323-3518)	**U=0**	**<0,001*** **
biz *we*	1138,48±51,34	1133 (1049-1215)	1006,76±14,47	1008,5 (978-1032)	**U=0**	**<0,001*** **
ofisi *office -ACC*	1163,52±41,52	1163,5 (1089-1231)	1095,18±31,28	1097 (1041-1149)	**U=253**	**<0,001*** **
kapattık *close-PST-1PL*	1269,82±41,50	1281 (1200-1333)	1247,60±29,35	1248 (1201-1296)	**U=816,5**	**0,003****
zaten *already*	2252,48±28,09	2253,5 (2206-2297)	2795,04±53,22	2791,5 (2709-2899)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	1043,92±24,43	1043,5 (1000-1084)	2728,58±44,08	2727,5 (2660-2817)	**U=0**	**<0,001*** **
okula *school-DAT*	723,88±18,04	724,5 (693-755)	2450,78±52,07	2444,5 (2356-2550)	**t=-221,598**	**<0,001*** **
gitmeden önce *go-CON*	1410,26±40,42	1418,5 (1334-1465)	3292,96±48,11	3301 (3204-3381)	**U=0**	**<0,001*** **
ben *I*	1297,38±40,00	1293,5 (1235-1370)	968,06±24,98	971,5 (924-1009)	**U=0**	**<0,001*** **

eskileri *old time-PL-ACC*	1243,42±26,07	1245 (1202-1298)	1177,68±26,89	1180 (1134-1219)	**U=90,5**	**<0,001*****
hatırladım *remember-PST-1SG*	1249,52±26,06	1254,5 (1202-1294)	1149,72±26,45	1152 (1100-1188)	**U=0**	**<0,001*****
yine *again*	2081,26±46,62	2071,5 (2013-2156)	2402,08±256,52	2379,5 (1770-2880)	**U=290**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	1032,74±20,01	1036 (1005-1068)	2350,64±24,03	2353,5 (2306-2387)	**0**	**<0,001*****
dersi *subject-ACC*	644,14±21,90	639 (614-682)	2142,86±29,28	2143 (2106-2212)	**0**	**<0,001*****
anlatmadan önce *explain-CON*	1423,02±55,63	1427 (1330-1512)	3358,18±31,19	3356,5 (3303-3411)	**0**	**<0,001*****
çocuklar *child-PL*	1338,78±21,32	1341,5 (1305-1372)	1101,98±34,23	1102,5 (1047-1151)	**0**	**<0,001*****
konuyu *topic-ACC*	1217,08±14,32	1217 (1189-1241)	1138,76±30,33	1140 (1089-1191)	**1**	**<0,001*****
anlamamıştı *comprehend-NEG-PER-3PL*	1589,30±50,94	1590,5 (1490-1669)	1424,16±21,80	1428 (1389-1459)	**0**	**<0,001*****
zaten *already*	2158,94±26,23	2168 (2109-2197)	2897,18±29,88	2902,5 (2851-2953)	**0**	**<0,001*****
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	1046,86±22,55	1039,5 (1012-1089)	2439,88±26,54	2436 (2401-2485)	**U=0**	**<0,001*****
arabayı *car-ACC*	662,06±37,52	659,5 (605-733)	2347,06±27,64	2347,5 (2304-2397)	**U=0**	**<0,001*****
çalıştırmadan önce *start-CON*	1501,82±45,45	1506 (1412-1586)	3435,52±57,55	3422,5 (3345-3529)	**U=0**	**<0,001*****
duman *fog*	1324,08±43,21	1328,5 (1248-1396)	1032,70±17,23	1034,5 (1002-1061)	**t=44,291**	**<0,001*****
etrafı *environment-ACC*	1263,78±48,40	1258 (1191-1349)	1099,32±12,96	1099 (1078-1120)	**U=0**	**<0,001*****
sarmamıştı *surround-NEG-PERF-3SG*	1497,80±56,79	1498,5 (1405-1579)	1421,34±24,09	1417 (1388-1465)	**U=323,5**	**<0,001*****
zaten *already*	2179,58±43,12	2175 (2102-2263)	3079,16±41,78	3081 (3008-3157)	**t=-105,949**	**<0,001*****

8. Statistical analysis for *-DIktAn sonra (after)* experimental sentences set

	Initial Converb Clause		Final Converb Clause			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	984,92±18,70	983 (955-1020)	2559,88±27,21	2556,5 (2514-2612)	**0**	**<0,001*** **
tatile *holiday-DAT*	677,56±30,67	680,5 (622-720)	2334,96±43,21	2322,5 (2256-2400)	**0**	**<0,001*** **
çıktıktan sonra *go-CON*	1348,08±43,23	1350,5 (1276-1416)	3499,38±63,93	3497 (3401-3598)	**0**	**<0,001*** **
biz *we*	1070,10±31,47	1070,5 (1013-1122)	968,74±12,63	971,5 (946-990)	**0**	**<0,001*** **
ofisi *office -ACC*	1121,86±45,05	1128,5 (1055-1200)	1069,90±13,12	1069,5 (1045-1093)	**394,5**	**<0,001*** **
kapattık *close-PST-1PL*	1227,74±16,41	1229 (1200-1254)	1220,28±13,88	1219,5 (1190-1244)	**931**	**0,028***
zaten *already*	2179,46±41,95	2177,5 (2113-2255)	2901,22±26,79	2899 (2858-2944)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	1062,56±16,81	1063,5 (1036-1091)	2817,12±41,98	2811,5 (2753-2891)	**U=0**	**<0,001*** **
okula *school-DAT*	738,66±18,84	736,5 (700-771)	2511,86±39,70	2512,5 (2445-2589)	**t=-285,341**	**<0,001*** **
gittikten sonra *go-CON*	1370,16±47,12	1373,5 (1294-1454)	3361,40±38,58	3359,5 (3304-3433)	**U=0**	**<0,001*** **
ben *I*	1198,86±55,21	1205,5 (1102-1281)	958,80±20,85	965 (924-989)	**U=0**	**<0,001*** **
eskileri *old time-PL-ACC*	1229,64±54,65	1241 (1138-1311)	1158,38±31,96	1160,5 (1104-1208)	**U=401,5**	**<0,001*** **
hatırladım *remember-PST-1SG*	1246,70±28,29	1241,5 (1201-1289)	1144,16±30,54	1142,5 (1104-1192)	**U=0**	**<0,001*** **
yine *again*	2101,18±23,88	2099 (2067-2145)	2816,94±40,46	2817,5 (2752-2882)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	1091,24±25,21	1089 (1055-1135)	2565,06±38,77	2570,5 (2478-2630)	**0**	**<0,001*** **
dersi *subject-ACC*	654,08±38,11	646 (600-733)	2337,06±19,70	2335,5 (2301-2367)	**0**	**<0,001*** **
anlattıktan sonra	1420,16±18,91	1419	3465,26±45,36	3461,5	**0**	**<0,001*** **

explain-CON		(1389-1453)		(3386-3541)		
çocuklar *child-PL*	1267,10±38,77	1271,5 (1204-1345)	1065,20±18,45	1067 (1034-1093)	**0**	**<0,001*** **
konuyu *topic-ACC*	1222,50±19,28	1216 (1193-1255)	1079,22±13,13	1081 (1054-1099)	**0**	**<0,001*** **
anladı *comprehend-PST-3PL*	1369,40±26,34	1371,5 (1325-1411)	1329,34±17,87	1330 (1300-1360)	**301**	**<0,001*** **
zaten *already*	2107,40±23,03	2105 (2068-2145)	2848,98±34,38	2852 (2793-2909)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
tamirci *mechanic*	1064,20±24,62	1069 (1021-1100)	2610,70±41,38	2606,5 (2547-2696)	**0**	**<0,001*** **
arabayı *car-ACC*	712,06±12,08	712,5 (693-734)	2330,82±21,59	2335,5 (2291-2364)	**0**	**<0,001*** **
çalıştırdıktan sonra *start-CON*	1433,22±30,29	1429,5 (1383-1498)	3483,46±37,82	3488,5 (3413-3545)	**t=-299,189**	**<0,001*** **
duman *fog*	1280,76±36,00	1275,5 (1227-1345)	1051,32±17,38	1051 (1021-1083)	**0**	**<0,001*** **
etrafı *environment-ACC*	1219,28±9,98	1220 (1202-1237)	1134,80±21,75	1134 (1102-1171)	**0**	**<0,001*** **
sardı *surround-PST-3SG*	1392,88±17,16	1390 (1366-1421)	1324,48±18,72	1325 (1291-1355)	**0**	**<0,001*** **
yine *again*	2190,42±25,19	2190,5 (2150-2232)	2543,63±28,24	2599,5 (2012-3034)	**578**	**<0,001*** **

9. Statistical analysis for *-DIkçA (whenever)* experimental sentences set

	Initial Converb Clause		**Final Converb Clause**			
	$\bar{X} \pm SD$	**Median (min-max)**	$\bar{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
müdür *manager*	966,70±14,66	967 (940-992)	2928,14±31,64	2925,5 (2877-2985)	**t=-397,719**	**<0,001*** **
tatile *holiday-DAT*	645,66±29,50	638,5 (601-705)	2175,46±40,85	2167,5 (2101-2238)	**U=0**	**<0,001*** **
çıktıkça *go-CON*	1261,70±36,42	1267 (1200-1316)	2637,48±30,35	2638,5 (2575-2689)	**U=0**	**<0,001*** **
biz *we*	1216,48±17,02	1217,5 (1187-1269)	913,50±12,94	917 (889-931)	**U=0**	**<0,001*** **

ofisi *office -ACC*	1174,44±16,21	1178 (1144-1197)	1038,70±19,60	1042 (1004-1069)	**U=0**	**<0,001*** **
kapattık *close-PST-1PL*	1250,90±38,06	1249 (1177-1313)	1119,34±23,62	1118 (1078-1162)	**t=20,767**	**<0,001*** **
zaten *already*	2171,52±10,87	2170 (2156-2191)	2643,52±22,14	2645 (2607-2677)	**U=0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\overline{X} \pm SD$	**Median (min-max)**	$\overline{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğrenciler *student-PL*	990,22±18,76	989 (963-1029)	2929,98±41,24	2929,5 (2869-2999)	**0**	**<0,001*** **
okula *school-DAT*	642,08±19,03	644,5 (613-678)	2584,96±121,51	2574 (2404-2810)	**0**	**<0,001*** **
gittikçe *go-CON*	1257,50±20,53	1257,5 (1221-1292)	2741,32±26,74	2738 (2701-2787)	**0**	**<0,001*** **
ben *I*	1177,46±12,96	1178 (1155-1199)	942,70±22,44	945 (903-976)	**0**	**<0,001*** **
eskileri *old time-PL-ACC*	1151,60±10,66	1153 (1134-1169)	1090,54±34,52	1085,5 (1038-1148)	**111**	**<0,001*** **
hatırladım *remember-PST-1SG*	1244,22±23,64	1240,5 (1203-1288)	1178,22±42,11	1182 (1114-1241)	**216**	**<0,001*** **
yine *again*	2021,56±12,88	2023 (2001-2045)	2928,86±46,73	2924,5 (2850-3010)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\overline{X} \pm SD$	**Median (min-max)**	$\overline{X} \pm SD$	**Median (min-max)**	**t-U**	**p**
öğretmen *teacher*	1019,26±17,90	1020 (990-1045)	2801,98±25,94	2807 (2756-2844)	**0**	**<0,001*** **
dersi *subject-ACC*	625,18±14,67	627 (601-649)	2149,30±28,68	2147 (2100-2195)	**0**	**<0,001*** **
anlattıkça *explain-CON*	1309,90±31,19	1306,5 (1261-1377)	2753,50±35,03	2751 (2698-2812)	**0**	**<0,001*** **
çocuklar *child-PL*	1256,20±25,35	1255,5 (1212-1297)	1071,52±17,66	1071 (1044-1103)	**0**	**<0,001*** **
konuyu *topic-ACC*	1129,42±23,24	1133,5 (1087-1165)	1069,16±14,42	1068,5 (1045-1093)	**18,5**	**<0,001*** **
anladı *comprehend-PST-3PL*	1245,90±29,71	1249 (1198-1295)	1070,54±16,75	1069 (1045-1099)	**0**	**<0,001*** **
zaten *already*	2046,58±21,59	2050 (2009-2086)	2800,04±21,84	2798,5 (2767-2840)	**0**	**<0,001*** **
	Initial Converb Clause		**Final Converb Clause**			
	$\overline{X} \pm SD$	**Median (min-max)**	$\overline{X} \pm SD$	**Median (min-max)**	**t-U**	**p**

tamirci *mechanic*	1004,72±11,00	1006,5 (983-1021)	2639,14±39,49	2644,5 (2570-2700)	**0**	**<0,001*** **
arabayı *car-ACC*	642,00±23,63	639 (606-689)	2070,74±46,47	2066,5 (2003-2145)	**0**	**<0,001*** **
çalıştırdıkça *start-CON*	1229,30±21,03	1228 (1189-1267)	2893,52±56,86	2887 (2806-3001)	**0**	**<0,001*** **
duman *fog*	1346,02±27,22	1345 (1300-1399)	1105,10±7,22	1105,5 (1093-1116)	**0**	**<0,001*** **
etrafı *environment-ACC*	1319,96±22,50	1320,5 (1282-1355)	1518,32±242,66	1524,5 (1165-2003)	**710**	**<0,001*** **
sardı *surround-PST-3SG*	1335,42±25,14	1335 (1287-1373)	1576,08±259,16	1573,5 (1189-2020)	**523**	**<0,001*** **
yine *again*	2010,48±13,74	2008 (1990-2034)	3015,00±15,91	3017 (2987-3042)	**0**	**<0,001*** **

APPENDIX 4: INFORMED CONSENT FORM

Sayın katılımcı,

Bu çalışma Hacettepe Üniversitesi İngiliz Dilbilimi öğretim üyesi Doç. Dr. Emine Yarar yönetiminde yürütülen "Türkçedeki Zamansıl Ulaç Tümcelerinin Deneysel ve Derlem Temelli Çözümlenmesi" adlı doktora tezi için yapılmaktadır. Bu çalışma, Türkçedeki zamansıl ulaç yapılarındaki yan tümce ve temel tümcenin tümce yapısındaki konumlarını çözümlemeyi amaçlamaktadır. Türkçede zamansıl ulaç yan tümceleri ana tümceden önce, sonra ya da ana tümcenin bileşenleri arasında yer alabilmektedir. Bu çalışma ile bu tümceciklerin ulaç yapıları içerisindeki konumlanmalarına etki eden etmenler analiz edilecektir.

Bu çalışmada ana dili Türkçe olan katılımcıların, farklı sözcük dizimi içeren tümcelere yönelik verecekleri tepkiler incelenmek istenmektedir. Bunun için de katılımcılara farklı sözcük dizilimlerine sahip tümceler bir yazılım ile bilgisayar ekranında sunulacaktır. Katılımcının her sözcüğü okur okumaz boşluk tuşuna basması ve diğer sözcüğe geçmesi beklenmektedir. Katılımcıların tümcelere verecekleri tepkiler aynı bilgisayar programı ile kaydedilecek ve çalışma sonunda toplanan veriler incelenerek Türkçedeki sözcük dizimi üzerine bulgulara ulaşılacaktır. Bu araştırma için Hacettepe Üniversitesi'nden izin alınmıştır.

Çalışmaya katılmak için anadili olarak Türkçe konuşan ve daha önce herhangi bir nörolojik ve psikolojik rahatsızlık yaşamadığını ve tam veya düzeltilmiş görmeye sahip olduğunu beyan eden on sekiz yaş üstü ve gönüllü olmak gerekmektedir. İlgili şartları sağlıyorsanız katılıp katılmamak tamamen sizin elinizdedir. Ayrıca, katıldıktan sonra istediğiniz anda vaz geçebileceğinizi ve bundan dolayı da hiçbir sorumluluk almayacağınızı da belirtmek isteriz. Bilgisayar üzerinde deneyi doldurmak hiçbir zarar vermese de çalışma yaklaşık yirmi dakika sürecektir. Rahatsızlık hissedildiğinde çalışmadan çekilebilirsiniz. Rahatsızlığınızın giderilmesi için gereken yardım da mutlaka sağlanacaktır.

Çalışmada hiç bir şekilde kimlik bilgileriniz toplanmayacak veya kaydedilmeyecektir. Sadece çalışmanın başında katılımcıların yaş ve cinsiyet bilgileri anonim olarak toplanacak ve sadece bu çalışmanın amacı kapsamında veya bilimsel çalışmalar amacıyla değerlendirilecektir. Onay vermeden önce aklınıza gelen veya gelecek her türlü sorunuz varsa çekinmeden sorabilirsiniz. Çalışma bittikten sonra da bize aşağıdaki telefon ya da e-posta ile ulaşarak sorularınızı sorabileceğinizi ve sonuçlar hakkında bilgi isteyebileceğinizi unutmayın.

Tarih:	
Katılımcı: Adı, soyadı: Adres: Tel: İmza:	Araştırmacı: Adı, Soyadı: Doğan BAYDAL Adres: Tel: E-posta: İmza:

APPENDIX 5: ETHICS COMMITTEE APPROVAL FORM

T.C.
HACETTEPE ÜNİVERSİTESİ REKTÖRLÜĞÜ
Rektörlük

Sayı : E-35853172-300-00002780333 4.04.2023
Konu : Doğan BAYDAL Hk. (Etik Komisyon İzni)

SOSYAL BİLİMLER ENSTİTÜSÜ MÜDÜRLÜĞÜNE

İlgi : 16.03.2023 tarihli ve E-12908312-300-00002749107 sayılı yazınız.

Enstitünüz İngiliz Dilbilimi Anabilim Dalı Doktora Programı öğrencilerinden **Doğan BAYDAL**'ın **Doç. Dr. Emine YARAR** danışmanlığında hazırladığı **"Türkçedeki Zamansıl Ulaç Tümcelerinin Deneysel ve Derlem Temelli Çözümlenmesi"** başlıklı tez çalışması, Üniversitemiz Senatosu Etik Komisyonunun **28 Mart 2023** tarihinde yapmış olduğu toplantıda incelenmiş olup, etik açıdan uygun bulunmuştur.

Bilgilerinizi ve gereğini rica ederim.

Prof. Dr. Sibel AKSU YILDIRIM
Rektör Yardımcısı

APPENDIX 6: ORIGINALITY REPORT

	HACETTEPE ÜNİVERSİTESİ **SOSYAL BİLİMLER ENSTİTÜSÜ**	Doküman Kodu *Form No.*	FRM-DR-21
		Yayım Tarihi *Date of Pub.*	04.01.2023
	FRM-DR-21 **Doktora Tezi Orijinallik Raporu** *PhD Thesis Dissertation Originality Report*	Revizyon No *Rev. No.*	02
		Revizyon Tarihi *Rev.Date*	25.01.2024

HACETTEPE ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İNGİLİZ DİLBİLİMİ ANABİLİM DALI BAŞKANLIĞINA

Tarih: 03/06/2024

Tez Başlığı: Türkçedeki Zamansıl Ulaç Tümcelerinin Deneysel ve Derlem Temelli Çözümlenmesi

Yukarıda başlığı verilen tezimin a) Kapak sayfası, b) Giriş, c) Ana bölümler ve d) Sonuç kısımlarından oluşan toplam 162 sayfalık kısmına ilişkin, 29/05/2024 tarihinde şahsım danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda işaretlenmiş filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezimin benzerlik oranı % 20 'dir.

Uygulanan filtrelemeler**:

1. ☒ Kabul/Onay ve Bildirim sayfaları hariç
2. ☒ Kaynakça hariç
3. ☐ Alıntılar hariç
4. ☒ Alıntılar dâhil
5. ☒ 5 kelimeden daha az örtüşme içeren metin kısımları hariç

Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Çalışması Orijinallik Raporu Alınması ve Kullanılması Uygulama Esasları'nı inceledim ve bu Uygulama Esasları'nda belirtilen azami benzerlik oranlarına göre tezimin herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumlarda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim.

Gereğini saygılarımla arz ederim.

Doğan BAYDAL

Öğrenci Bilgileri			
	Ad-Soyad	DOĞAN BAYDAL	
	Öğrenci No	N18140808	
	Enstitü Anabilim Dalı	İngiliz Dilbilimi	
	Programı	İngiliz Dilbilimi-Doktora	
	Statüsü	**Doktora** ☒	**Lisans Derecesi ile (Bütünleşik) Dr** ☐

DANIŞMAN ONAYI

UYGUNDUR.
(Doç. Dr. Emine YARAR)

*Tez **Almanca** veya **Fransızca** yazılıyor ise bu kısımda tez başlığı **Tez Yazım Dilinde** yazılmalıdır.
**Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü Tez Çalışması Orjinallik Raporu Alınması ve Kullanılması Uygulama Esasları İkinci bölüm madde (4)/3'te de belirtildiği üzere: Kaynakça hariç, Alıntılar hariç/dahil, 5 kelimeden daha az örtüşme içeren metin kısımları hariç (Limit match size to 5 words) filtreleme yapılmalıdır.

	HACETTEPE ÜNİVERSİTESİ SOSYAL BİLİMLER ENSTİTÜSÜ	Doküman Kodu *Form No.*	FRM-DR-21
		Yayım Tarihi *Date of Pub.*	04.01.2023
	FRM-DR-21 Doktora Tezi Orijinallik Raporu *PhD Thesis Dissertation Originality Report*	Revizyon No *Rev. No.*	02
		Revizyon Tarihi *Rev.Date*	25.01.2024

TO HACETTEPE UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ENGLISH LINGUISTICS

Date: 03/06/2024

Thesis Title (In English): An Experimental and Corpus Based Analysis of Temporal Converb Clauses in Turkish

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I respectfully submit this for approval.

Doğan BAYDAL

Student Information				
	Name-Surname	DOĞAN BAYDAL		
	Student Number	N18140808		
	Department	English Linguistics		
	Programme	English Linguistics - PhD		
	Status	**PhD** ☒	**Combined MA/MSc-PhD**	☐

SUPERVISOR'S APPROVAL

APPROVED
(Assoc. Prof. Dr. Emine YARAR)

**As mentioned in the second part [article (4)/3]of the Thesis Dissertation Originality Report's Codes of Practice of Hacettepe University Graduate School of Social Sciences, filtering should be done as following: excluding refence, quotation excluded/included, Match size up to 5 words excluded.