



Hacettepe University Graduate School of Social Sciences

Department of English Linguistics

**A PSYCHOLINGUISTIC STUDY ON THE PRONOUN
COMPREHENSION AND PROCESSING OF THE TURKISH
ALZHEIMER'S PATIENTS**

Esra KÜÇÜKSAKARYA

Master's Thesis

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KABUL VE ONAY

Esra Küçüksakarya tarafından hazırlanan “A Psycholinguistic Study on the Pronoun Comprehension and Processing of Turkish Alzheimer’s Patients” başlıklı bu çalışma, 22/06/2017 tarihinde yapılan savunma sınavı sonucunda başarılı bulunarak jürimiz tarafından yüksek lisans tezi olarak kabul edilmiştir.



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o Tezimin/Raporumun 22.06.2018 tarihine kadar erişime açılmasını istemiyorum ancak kaynak gösterilmek şartıyla bir kısmı veya tamamının fotokopisinin alınmasını onaylıyorum.

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Bu alıřmadaki bütn bilgi ve belgeleri akademik kurallar erevesinde elde ettiđimi, grsel, iřitsel ve yazılı tm bilgi ve sonuları bilimsel ahlak kurallarına uygun olarak sunduđumu, kullandđım verilerde herhangi bir tahrifat yapmadđımı, yararlandđım kaynaklara bilimsel normlara uygun olarak atıfta bulunduđumu, tezimin kaynak gsterilen durumlar dıřında zgn olduđunu, Do. Dr. Emine YARAR danıřmanlıđında tarafımdan retildeđini ve Hacettepe niversitesi Sosyal Bilimler Enstits Tez Yazım Ynergesine gre yazıldıđımı beyan ederim.

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To the ones whose memories are wiped away...

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ÖZET

KÜÇÜKSAKARYA, Esra. *Türk Alzheimer Hastalarının Adıl Kavrama ve İşleme Özelliklerinin Psikodilbilimsel İncelemesi*, Yüksek Lisans, Ankara, 2017.

Alzheimer hastalarının dikkat, dili anlama, işleme ve dil üretimi gibi pek çok yetisi bu hastalığa bağlı olarak olumsuz değişimler gösterebilmektedir. Alzheimer hastalarının dil yetilerinin kaybı ile ilgili çalışmaların sesbilim, biçimbilim, sözdizim ve anlambilim gibi dilbilimsel alt alanlarda yoğunlaştığı görülmektedir. Bu çalışmalar yoğun olarak üretime dayalı dil problemlerini ve kavrama yetersizliklerini ele almaktadır. Öte yandan, Türkiye’de Alzheimer hastaları üzerinde gerçekleştirilen çalışmalarda hastaların resim seçme, modaliteler arası adlandırma ve yönlendirmeler uyarınca soruları cevaplandırma yetersizliklerine ilişkin bulgular ortaya çıkarılmıştır. Ancak Türkçe konuşucusu olan Alzheimer hastalarının kavramaya yönelik performanslarının yeterince incelenmediği gözlemlenmiştir. Bu nedenle, Türkçe konuşan Alzheimer hastalarının dilbilimsel performanslarının dönüşlü, işteş ve kişi adıları bağlamında incelenmesinin bu alanda var olan eksiklikleri bir ölçüde gidereceği düşünülmektedir. Dolayısıyla, bu çalışmanın amacı yukarıda adı geçen adıların hafif derecede Alzheimer rahatsızlığı olan Türk hastaları tarafından kavranmasını ve işlenmesini çevrim içi ve çevrim dışı yöntemler kullanarak incelemektir. Çalışmada Alzheimer hastalarının söz konusu yapıları kavraması ve işlemesi sağlıklı kontrol grubu ile bağlantılı olarak incelenmiştir. Öte yandan, çalışmada Sözdizimsel Bozukluk Hipotezi, İşler Bellek Bozukluğu Hipotezi, Bilgisel Yük Hipotezinin öngörülleri de adıların kavranması ve işlenmesi açısından değerlendirilmektedir. Bu amaçlar doğrultusunda yirmi hafif Alzheimer tanılı hasta çalışmanın deney grubuna katılımcı olarak dahil edilmiştir. Çalışmanın kontrol grubunda ise yirmi iki bilişsel açıdan sağlıklı birey yer almıştır. Tüm katılımcılar eğitim, yaş ve cinsiyet açısından eşitlenmiştir. Çalışmanın amaçları doğrultusunda kontrol ve deney gruplarına üç test uygulanarak çalışma verileri toplanmıştır: 1. Standardize Mini Mental (SMMSE) test, 2. Tümce-Resim Eşleme (SPM) testi ve 3. İşitsel-Görsel Kişi Adılı Adlandırma (CMN) testi. Standardize Mini Mental test ile katılımcıların bilişsel düzeyleri incelenmiştir. Ardından uygulanan Tümce-Resim

Eşleme testiyle de katılımcıların dönüşlü ve işteş adılları basit ve karmaşık tümcelerdeki göndergesel etkileşime dayanarak kavramaları incelenmiştir. Üçüncü veri toplama aracı olan İşitsel-Görsel Kişi Adılı Adlandırma testi uygulanarak kişi adıllarını katılımcıların işlemesine ilişkin veriler toplanmıştır. SMMSE testinin bulguları, erken evre Alzheimer hastalarından oluşan deney ve sağlıklı bireylerden oluşan kontrol grubu arasında istatistiksel açıdan anlamlı farklılık olduğunu göstermiştir ve deney grubundaki hafif Alzheimer tanılı katılımcılarda bilişsel olarak bozulmalar olduğu saptanmıştır. Ayrıca Mann-Whitney U testinden ulaşılan diğer iki testin bulgularına göre, gruplar arasında adılların kavranması ve işlenmesi bakımından istatistiksel açıdan anlamlı bir fark bulunamamıştır. Ancak katılımcıların performansları Wilcoxon işaretli sıralar testi ile bireysel olarak incelendiğinde, kavrama ve işlemeye dayalı farklılıklar olduğu saptanmıştır. Ayrıca, çalışmanın sonuçları katılımcıların adılları kavraması ve işlemesi açısından Bellek Bozukluğu Hipotezini desteklemektedir.

Anahtar Sözcükler

Alzheimer hastaları, adılların kavranması, adılların işlenmesi, adılların gönderim özellikleri, Alzheimer hastalarının dilbilimsel özellikleri ve bilişsel bozukluklar

ABSTRACT

KÜÇÜKSAKARYA, Esra. *A Psycholinguistic Study on the Pronoun Comprehension and Processing of Turkish Alzheimer's Patients*, A Master's Thesis, Ankara, 2017.

Many abilities of patients of Alzheimer's disease (AD) such as attention, language comprehension, processing and production might demonstrate adverse changes as a result of the disease. It has been observed that studies in relation to loss of language abilities in the AD patients mostly focus on the linguistic subfields such as phonology, morphology, syntax, and semantics. These studies are mostly concerned with the language problems of the AD patients, focusing on their production and comprehension. On the other hand, in studies carried out on the AD patients in Turkey, it is revealed that there have been findings in relation to their inability in giving responses to questions while following instructions and in responding to the cross-modal naming and the sentence-picture matching tests. However, it is observed that there has not been enough investigation conducted on Turkish-speaking-AD patients regarding their comprehension performances. Therefore, it is thought that the investigation on the linguistic performances of the Turkish-speaking AD patients regarding reflexive, reciprocal and personal pronouns will eliminate the deficiencies in this area to some extent. To this end, the aim of this study was to reveal the comprehension and processing performances of the Turkish-speaking AD patients regarding the aforementioned pronouns through the off-line and on-line tests. In the study, the comprehension and processing of the above mentioned structures by the AD patients were analyzed in relation to the performances of the healthy control subjects. On the other hand, the predictions of the Syntactic Deficit Hypothesis (SDH), the Working Memory Deficit Hypothesis (WMDH) and the Informational Load Hypothesis (ILH) were tested in terms of the comprehension and the processing of the pronouns. In parallel with these aims, twenty mild AD patients were involved in the study as the participants of the experimental group. On the other hand, twenty-two cognitively healthy subjects participated in the control group of the study. All participants were matched in terms of education, age and gender. In accordance with the aims of the

study, three tests were employed to the control and experimental subjects to collect the data of the study: 1. The Standardized Mini Mental Examination (SMMSE) test, 2. The Sentence-Picture Matching (SPM) test and 3. The Cross-Modal Naming (CMN) test. The cognitive status of the participants was analyzed by the Standardized Mini Mental Examination test. Following the administration of the SPM test, the comprehension of the reflexive and reciprocal pronouns in relation to their referential dependencies in simple and complex sentences were analyzed. The CMN test, which was the third data collection tool, was employed to gather data on the personal pronoun processing of the participants. The findings of the SMMSE test indicated that there was a statistically significant difference between the mild AD patients and the control group and it was observed that the mild AD patients had cognitive impairments. In addition, the Mann-Whitney U test results of the other two tests demonstrated that there was no statistically significant difference between the groups concerning the performances on the comprehension and processing of the pronouns. However, when the performances of the groups were individually analyzed with the Wilcoxon Signed Rank test, it was observed that there were differences concerning the comprehension and processing performances. In addition, the results of the study supported the predictions of the Working Memory Deficit Hypothesis in terms of the pronoun comprehension and processing of the participants.

Key Words

Alzheimer's disease patients, comprehension of pronouns, processing of pronouns, referential properties of pronouns, linguistic features in Alzheimer's disease patients and cognitive impairments

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Figure 4. Short conditioned sentence fragment: 69

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LIST OF ABBREVIATIONS

*	asterisk (ungrammaticality sign)
1.PL.	first person plural
2.SG.	second person singular
3.PL	third person plural
3.SG.	third person singular
ABL.	ablative case
ACC.	accusative case
AD	Alzheimer's disease
ADAMS	Aging, Demographics, and Memory Study
∅	empty element
ANOM	action nominal
C#	C-sharp
CMN	Cross-Modal Naming
COMIT.	with
DAT.	dative case
E.O.	each other
FEM.	feminine
FUT.	future
GEN.	genitive case
ILH	Informational Load Hypothesis
i/*j	notation
LOC.	locative case
M	mean
MASC.	Masculine
MAX.	Maximum
MIN.	Minimum
MMSE	Mini- Mental State Examination
N	noun
NEG.	negation
NOM.	nominative case

NP	noun phrase
OVS	object-verb-subject order
PERF.	perfect tense
PL.	plural
POSS.PR	progressive pronoun
PRES.	present tense
PROG.	progressive
PRON.	pronoun
PST.	past tense
Q	interrogative particle
RPT	Reference Processing Theory
SD	standard deviation
SDH	Syntactic Deficit Hypothesis
SG.	singular
SLIR	separate language interpretation resource
SMMSE	Standardized Mini Mental State Examination
SOV	subject-object-verb order
SPM	Sentence-Picture Matching
SR	single resource
STM	short-term memory
SVO	subject-verb-object order
TOT	tip-of-the-tongue
UG	Universal Grammar
WHO	World Health Organization
WM	working memory
WMDH	Working Memory Deficit Hypothesis

CHAPTER 1 : INTRODUCTION

1.1. CLEARING THE GROUNDS

Psycholinguistics concentrates on the psychological aspects of language in theoretical and practical ways. This field draws the attention of psychologists, linguists, neuroscientists, philosophers and computer scientists aiming to investigate the mind and mental processes (Stillings et al., 1995). It primarily deals with revealing the mental representations observed during the process of production, comprehension and acquisition mechanisms of individuals (Carroll, 2007). Therefore, these processes represent the subfields of psycholinguistics, which covers many theories to explore and reveal processes about them.

Considering psycholinguistics from a historical perspective, psychologists were less engaged in language studies between the 1920s and 1950s. By the 1950s, the emphasis was on behaviorism which supports the significance of the experience, environmental factors and correct language use. In the mid 20th century, Lees (1957), in his review of Chomsky (1957), argued that this tendency was changed by disproving the insufficient assumptions on language and by offering a new approach. Rather than assuming language as a stimulus-response behavior, Chomsky (1965) introduced a rule-based understanding of language, which has also significant effects on psycholinguistic studies. Transformational generative grammar is crucial to understand human language as it leads researchers to focus on the innate language mechanisms by studying linguistic competence of speakers.

A general fascination with language, where it came from, its plasticity, and its disorders is reflected in discussions from the time of the Enlightenment on. Twentieth-century linguists explicitly trace back their line of thinking to Descartes's reasoning on the nature of ideas and mental functioning (Chomsky, 1966 as cited in Guendouzi et al., 2011: 24).

It was proposed by the universal view on language that human beings are endowed with universal principles and parameters (UG).¹ This proposal had significant effects on psycholinguistics. In Guendouzi et al., (2011: 25)'s words, this perspective implicates "these explanatory models of language, language disorders, and language intervention should be valid and applicable across languages". In other words, as human language faculty is genetically specialized, the specific language faculty could be affected by any acquired disorder.

Psycholinguistics also deals with language disorders due to its focus on humans' skills to speak and understand language. Within psycholinguistics, studies frequently include linguistic problems resulted from dyslexia, stutters, surgery, stroke, aging and the abnormal development in comprehension or use of written and spoken communication systems among the others. On the basis of these facts, Benson (1979 (as cited in Cummings and Benson, 1989:108)) suggests that it is possible to see language anomalies in almost all demented people; however, such disorders may not represent different syndromes adequately.

Some of the researchers have claimed that certain underdeveloped linguistic skills are fundamental to the language disturbances (Rice and Wexler, 1996). For instance, Caplan (1992) suggested that impairments are related to specific brain areas, as seen in the case of aphasia. In other aspects, such impairments are associated with specific variations that are considered to influence language functioning. Despite the oversimplified assumptions on disrupted linguistic components, semantic, lexical, phonological, morphological and syntactic information needs to be processed to interpret utterances efficiently. According to Emery (2000), language processing of these hierarchical ranks reveals the specific language disorders. For instance, it is asserted that Wernicke's region is the key for lexical processing while Broca's region is

¹ Universal Grammar refers to "system of categories, mechanisms and constraints shared by all human languages and considered to be innate" (Chomsky, 1986: 3).

essential for syntactic processing (Just et al., 1996). In pursuing the goal to observe impaired linguistic elements of Alzheimer's disease (AD) sufferers, many scholars have analyzed whether or not there are difficulties in patients' language comprehension (i.e., Kempler, 1995; Tomoeda et al., 1990). In addition, various experimental tasks have been designed to question if such an impairment stems from decrements in syntactic or semantic mechanism or some other cognitive mechanisms such as short-term memory (STM)-considered as working memory² (WM) (Just and Carpenter, 1992; Kempler, 1995; Kempler, Curtiss, and Jackson, 1987; Kempler, Almor, and MacDonald, 1998a; Waters and Caplan, 1997).

Linguistic studies about the AD began in the 1950s with the studies by Sjogren et al., (1952) and Allison, (1962). As enunciated by Sjogren et al., (1952) and Allison (1962), speech impairments are identified within one to three years of the disease and more specifically, it was proposed by Irigaray (1967: 357) that parts of speech elements seemed to be influenced in a decreasing frequency such as "nouns more than adjectives and adjectives more than verbs". In addition, many other scholars have found that these AD patients make use of indirect responses (circumlocutions) in word fluency or sentence completion tasks, thereby, leading to decrease in the referential links of words and things to which they correspond (i.e., Irigaray, 1967; Constantinidis et al., 1978; Schwartz et al., 1979; Obler, 1981 and Allison, 1962). On the other hand, Constantinidis et al., (1978) claimed that sentences produced by the AD patients seemed to be incomplete, because these sentences did not include the phrase markers and grammatical agreement markers. However, syntax was thought to be intact when the lexical items were provided with a context. Appell et al., (1982) in agreement with Irigaray (1967) argued that if little or no context was supplied and sentences were complex, the AD patients would fail to comprehend these constructions.

In recent years, Kertesz (1982) argued that the studies carried out by Bayles (1982),

² Working memory means "a limited-capacity system that retained information on which it is operated to accomplish computational goals" (Baddley and Hitch, 1974 as cited in Caplan and Waters, 1999: 77).

Emery (1983), Appell, Kertesz, and Fisman (1982) were the first systematic examinations on the AD patients by means of standardized language tools. Evidence gathered from the recent studies produced many approaches about the description of the AD patients' language comprehension. The most influential ones are given as follows: (1) The Interpretive Processing based Syntactic Deficit Hypothesis (SDH), which states that some of the lexico-grammatical categories are misunderstood or omitted by the AD patients (Berndt and Caramazza, 1980; Grober and Bang, 1995; Kempler, Curtiss and Jackson, 1987; Schwartz, Marin and Saffran, 1979); (2) The Post-interpretive Processing based Working Memory Deficit Hypothesis (WMDH), which states that language comprehension is realized intra-linguistically (Rochon, Waters and Caplan, 1994; Waters, Caplan and Hildebrandt, 1991; Waters, Caplan and Rochon, 1995); and (3) The Referential Processing based Informational Load Hypothesis (ILH), which refers to the referential impairments by the AD patients in terms of syntax-discourse relations (Almor, 1999).

The above-mentioned approaches are specifically concerned with two processes: Interpretive (simultaneous) and post-interpretive (following comprehension). Of these, the SDH emphasizes interpretive processes. The WMDH, on the other hand, adopts a post-interpretive stance and the ILH also deals with post-interpretive processes. On the basis of these processes, many authors claimed that AD patients could experience interpretive based syntactic deficit or post-interpretive based WM deficit (Emery, 1985; Rochon et al., 1994; Waters et al., 1995; Grober and Bang, 1995; Kempler et al., 1998; Almor et al., 2001; Kempler et al., 2001). More specifically, Caplan and Waters (1999: 98) suggest that interpretive processing based SDH includes "accessing words, computing prosody, constructing syntactic constituents and assigning thematic roles to them, establishing co-reference, and determining a sentence focus-presupposition structure". Therefore, the SDH is about interpreting the linguistic meaning of the presented material. In line with the SDH, Berndt and Caramazza (1980) argue that any problem related to components of syntax (i.e., knowledge of closed class words including prepositions, determiners, auxiliaries, pronouns etc. and knowledge of phrase structure and transformations) could be seen in the comprehension or production of the AD patients. This hypothesis also assumes that as the complexity of sentences is

increased, the errors made by patients also increase.

On the other hand, the post-interpretive processing based WMDH is correlated with working memory, which is influenced by the interpretation of sentences with more than one proposition (Waters et al., 1995). Therefore, the WMDH suggests that despite the lower memory levels, the comprehension of AD patients may not be influenced by the syntactic complexity. However, due to the post-interpretive deficit (i.e., impairments in storing information in memory and using it when it is needed), they may not be efficient in tasks involving sentence-picture matching or discourse dependencies (i.e., pronoun-antecedent relations). This is because such comprehension tests necessitate activating semantic knowledge, which is accessible in working memory.

In support of the WMDH, the ILH claims that the appropriate use of pronouns is influenced by discourse and sentence context. Processing achievement is related to the correct matching of referent expression in prior discourse. Specifically, Almor et al., (2001)'s recommendations by virtue of reassigning problems in discourse are significant since they evaluate the ILH (theory of anaphor³ processing). Studies indicate that referential dependencies show regular patterns in languages (Ariel, 1990; Givon, 1976 as cited in Almor, 2000: 2).

In line with the common view by many scholars (Gordon et al., 1993; Vonk, Hustinx, and Simons, 1992 and Gundel et al., 1993 as cited in Almor, 2000), pronouns, which may occur in non-local domains⁴, have a communicative feature and people use them for the interpretation of the following discourse. On the basis of the ILH, Almor (2000:

³ The term "anaphor" refers to any word, which is co-referential with an antecedent, comprising particular representations (e. g., the cat), reflexive pronouns (e. g., herself), and personal pronouns (e. g., she). That is, this term is used in the syntax literature to identify a subgroup of pronominal expressions (Almor, 2000: 2).

⁴ Local domain refers to the syntactic dependencies such as movements, anaphoric relations and case assignment (Alexiadou et al., 2013).

9) suggests⁵ “the ease of processing a referring expression is determined by the relation between its cost⁶ and discourse function”. In other words, pronouns ‘seen as less explicit expressions’ are mostly used properly when their referent is marked (Ariel, 1990; Gundel et al., 1993 as cited in Almor, 2000). In relation to the studies carried on the AD patients, Almor and his colleagues (2001) argue that in compliance with the ILH, the impairments of the long-distance pronoun-antecedent agreements stem from the less frequency and predictability of pronouns. This is because pronoun comprehension necessitates the activation of semantic processing of the co-referential elements.

1.2. PRESENTATION OF THE STUDY

This section includes information about the statement of the problem, aims of the study, research questions and limitations of the research.

1.2.1. Statement of the Problem

Psychiatrists, neurologists and speech language pathologists in Turkey have carried out studies about the AD patients’ language impairments in terms of their general cognitive and behavioral inability (i.e., Güngen, C., Ertan, T. and Eker, E., 2002; Maviş, İ. and Özbabalık, D., 2006). They mostly used such tasks as Mini-Mental State Examination (Folstein, Folstein, and McHugh, 1975), and Cognitive Status Examination (Kiernan et al., 1987). Their conclusion is that only the lexical level comprehension decrements exist among the AD patients in Turkey. However, Turkish sentence comprehension and processing impairments of Turkish AD patients have not been particularly studied in

⁵ The Informational Load Hypothesis (ILH; Almor, 1996 as cited in Almor et al., 2001: 5) refers to a theory of Noun Phrase (NP) anaphor processing which is dependent on both conceptual and linguistic-pragmatic principles.

⁶ Cost is described by means of conceptual model (rest on the semantic separation between the anaphor and antecedent likeness) not only by virtue of anaphoric form (Almor et al., 2001:5).

syntactic and discursal⁷ aspects. In addition, the studies on the AD patients' linguistic performance have not focused on the different levels of the AD. Therefore, this study is needed to be carried out in order to get some insight into the source of sentence comprehension and processing impairments of Turkish-speaking AD patients, who are mildly affected by the disease. The significance of examining reflexive, reciprocal and personal pronouns is that such a study contributes to the understanding of the coherence⁸ of the sentence fragments produced by the AD patients. Because the examination of pronouns among the AD patients has been a common topic in the studies due to the fact that the comprehension and processing of pronouns have provided information about their linguistic abilities.⁹

1.2.2. Aims of the Study

The aim of this study is to set ground for the division of groups in terms of their SMMSE scores and to reveal the nature of the sentence processing and comprehension of the native Turkish speakers, with the mild AD, in regard to three pronoun categories (namely, reflexive, reciprocal and 3rd person pronouns) in Turkish. The study also deals with the differences between the mild AD patients and the non- AD subjects in terms of both the mental status and the processing and comprehension of the three pronoun categories.

1.2.3. Research Questions

In parallel to the aims given above, the study tries to provide answers for the following research questions:

⁷ In this study, the term discourse refers to short and long sentence fragments including incomplete pronoun items, unlike its conventional meaning.

⁸ Coherence is defined as the understanding of the whole meaning of a discourse by the integration of parts carrying contextual information (Mårdh, 2013). Clark and Sengul (1979: 36) further argue "what a pronoun is taken to refer to depends crucially on the structure of both the sentence containing the pronoun and the sentence mentioning its referent". This means that the entities between the pronoun and referent might influence the comprehension or processing depending on the information structure of the sentence.

⁹ The first study on this topic was that of Rochon, Waters and Caplan (1994).

1. Is there any significant difference between the SMMSE scores of the Turkish-speaking AD patients and the non-AD subjects?
2. Do the Turkish-speaking AD patients and the non-AD subjects comprehend reflexive pronouns, reciprocal pronouns in different conditions (i.e., simple and complex/embedded sentences)?
3. Do the Turkish-speaking AD patients and the non-AD subjects process the 3rd person pronouns in different conditions (i.e., short and long sentence fragments)?

1.2.4. Limitations of the Research

There are several limitations of the study. The primary limitation of the study could be the number of subjects. On the basis of sample size calculator results, the representative sample included twenty participants per group. Thus, a comprehensive survey involving more subjects is needed to be conducted so that the study would be generalizable to all fields of dementia. The study was limited to only mildly impaired AD patients due to the convenience of working with them. Although not so convenient, the other categories of the AD, namely moderate and severe are not analyzed in the study. Another limitation of the study is that the control group is limited to the comprehension and processing of the healthy old aged people. The other limitation of the study is that reflexive and reciprocal pronouns are examined in terms of comprehension. Therefore, their processing is not analyzed in the study. In addition, the study has revealed only processing-related findings about the 3rd person pronouns without any finding on their comprehension. In short, the conclusions of the study should be taken into consideration with these limitations.

1.2.5. Outline of the Study

This study is organized as follows: Chapter 1 describes the background information of the study. Also, the statement of the problem and the research questions are presented in this chapter. In Chapter 2, theoretical framework of the thesis is given. The previous studies in related field and the explanations on the language disorders of both healthy elders and AD patients are presented in the same chapter. In this chapter, some

psycholinguistic theories on language comprehension and language processing are described and then, the relevant background on pronouns is provided. Chapter 3 covers the research methods, selection of the participants, data collection tools– validity and reliability, data collection procedures and a brief summary of the data analysis. In Chapter 4, the basic findings of the experiments on the sentence comprehension and sentence processing of Turkish-speaking AD patients are discussed based on the analysis of the data. In the final chapter, conclusions based on the data analysis are presented and the answers to the research questions are given. In addition, future directions in the field of language impairments of AD patients are discussed together with the views on the future studies.



CHAPTER 2 : BACKGROUND TO THE STUDY

2.1. OLD AGE AND LANGUAGE

This section provides background information about old age and language in aging.

2.2. Defining Old Age

Aging could be defined as a natural and inevitable process of human life which is marked by time related deterioration of the physical and mental functions (Bronikowski and Flat, 2010). As Rose (1994) suggests, it refers to a progressive decline which causes age specific decline in rates of endurance and proliferation.

The World Health Organization (WHO) report that individuals across the world are increasingly getting older (Prince et al., 2015). Therefore, it could be said that defining older person and making age classification may show variation among the countries as well as in different time periods. Before 1875, the old age definition was enunciated as "any age after 50", but retirement account system specifically employed age 60 or 65 years for acceptability (Roebuck, 1979). Although there is no common understanding on the numeric scale for the old age, the United Nations roughly employ 60+ years to make reference to the elderly (Weinberger, 2001). In parallel with Roebuck's arguments, Gorman (1999: 6) states "the age of 60 or 65, roughly equivalent to retirement ages in most developed countries, is said to be the beginning of old age".

According to the categorization made by the WHO (2002 as cited in Devlet Planlama Teşkilatı, 2007: 2), the aging is grouped as follows: 45-59 middle age, 60-74 old age, 75-89 elderly, 90+ oldest old. On the basis of this classification, 60+ years which are the participants of the study could be considered as the old aged people.

2.2.1. Language in Aging

There have been many experimental investigations suggesting that some of the language skills may change considerably whereas the others may show less alternation or high preservation in aging. In this sense, language of older people has become a potential field for research since the primary empirical investigations (i.e., Craik and Broadbent,

1983; Burke et al., 2000 and Wingfield and Stine-Morrow, 2000; Kemper and Sumner, 2001; Burke and Shafto, 2004; Kemper and Herman, 2006; Thornton and Light, 2006; Burke and Shafto, 2008). It was generally observed that the comprehension of the elderly was impaired in regard to word retrieval (Stine et al., 1986).

More specifically, Borella (2006) states that language and communication patterns of older adults show variations with the increasing age. Evidences have been about the preservation or loss in the linguistic skills of healthy older population. Taking comprehension and production processes into account, phonological, morphological, semantic, syntactic, discorsal and pragmatic dimensions of language have been specifically investigated in experimental studies in regard to comprehension or production. At this point, there are some arguments on the investigation of these specific domains.

As suggested by Shafto and Tyler (2014), phonological processing mechanisms declined with the increase of age. Phonological difficulties encountered by elders were revealed in the tip-of-the-tongue state (TOT) examinations. Also, several studies demonstrated that phonological encoding of similar phonemes (i.e., tap vs. tip) and phonological activation of more syllables were impaired among this population (Burke et al., 2000; Burke and Shafto, 2004).

On the other hand, words that contain single or complex morphemes were experimentally studied. Morphological studies suggested that despite the longer reaction times, morphological parsing of older adults were not much influenced (Kave' and Levy, 2004). In addition, Shadden (1997) claimed that automatic language processes seemed to be uninfluenced by aging. Kemtes and Kemper (1997) and Clark-Cotton et al., (2007) supported this notion by arguing that basic lexico-semantic abilities remained unimpaired. Despite the word finding difficulties, it has been largely confirmed by the results of lexical decision and sentence comprehension tasks that older adults have intact knowledge of word meanings.

Regarding syntactic skills of older adults, Burke and Shafto (2008: 421) state that underlying syntactic mechanisms were highly influenced by the decreased working

memory levels of older adults. In addition, Kemper (1986, 1987) claimed that since older adults became slower and less accurate in making judgments about syntactically complex sentences, they experienced difficulty in both reading and listening tasks that include long sentences. Clark- Cotton et al. (2007) agreed with this fact by claiming that dependent clauses including relative clauses and noun clauses forced listeners to use their working memory to repeat sentences as they listen. It was reported that older adults comprehended shorter sentences with fewer clauses easily, which may be resulted from age-related linguistic declines (Burke and Shafto, 2008).

On the other hand, Burke and Shafto (2008) suggested that discourse comprehension was significant to the evaluation of age-related comprehension impairments as well as the age-dependent growth in linguistic experience. Burke and Shafto (2008) further argued that discourse comprehension placed demand on working memory to integrate images with particular information on several sentences when it is used in a comprehension test. In agreement with these facts, there were many studies referring to older adults' discourse comprehension by laying emphasis on situation models¹⁰ and surface-text base models.¹¹ According to Morrow et al., (1997) and Radvansky et al., (2001 and 2003 as cited in Guendouzi et al., 2011: 54- 55), "older adults demonstrate an intact ability to construct mental representations of discourse and update situation models as necessary during reading, despite impaired memory and comprehension for surface and text-base information". It has been observed that old aged people can rely on more self- constructed situation models in discourse related tasks as they can apply their pre-existing knowledge while constructing representations. However, they might not remember much detail and they might omit essential elements which lead to less fluent discourse. Worrall and Hickson (2003) also noted that declines in the comprehension or processing of spoken or written discourse became evident when tasks

¹⁰ Situation model is attributed to reader's real world knowledge, which is represented in the text.

¹¹ Surface and text-base model is that surface based representations including the specific meanings of words and the syntactic structure of sentences.

place stress on the linguistic systems by removing or reducing linguistic information. Longer reaction times, more pauses and replacing the word classes such as pronouns instead of a noun could be observed in the processing performances of the older adults in consistent with the age-related general mental slowing. Some evidences demonstrate that older adults have poorer processing and organization of story recognition or inferential recall tasks. Specifically, Clark- Cotton et al., (2007) asserted that the use of referring expressions (e.g. pronouns) might show variations. Clark- Cotton et al. (2007) also reported that older adults tried to be less specific in using pronouns.

In addition, Kent and Luszcz (2002) suggested if older adults (people aged 60+) and who were much older (people aged 80+) had low levels of education, they experienced increasing difficulty with word retrieval and recognition. On the basis of these assumptions, Crossley, D'Arcy, and Rawson (1997) asserted that verbal fluency task performance of older adults showed declines in accordance with the age and low level of formal education. Most studies in regard to syntactic complexity and discourse also indicated that older adults with advancing age and low education level experienced some delays and limitations in comprehending or processing the spoken and written sentences and texts. Therefore, it can be said that older adults with low education levels encounter more language related problems as they get older.

All in all, when comprehension of older adults are considered, it has been proposed that elder people may be insufficient not only in the comprehension or processing of the words, but also in the retainment of longer sentences and texts (Johnson, 2003; Kemper and Sumner, 2001; Burke and Shafto, 2008; Kemper and Herman, 2006; Thornton and Light, 2006; Wingfield and Stine-Morrow, 2000). Age-related impairments can be resulted from “listening to language when it is speeded or even slowed when it is presented in an unfamiliar accent, or when the syntax is complex (Burke and Shafto, 2008)” (Bergman, 1980; Wingfield et al., 2003; Shah et al., 2005 as cited in Stemmer., 2008: 352).

2.3. ALZHEIMER'S DISEASE AND LANGUAGE OF THE ALZHEIMER'S DISEASE PATIENTS

This section presents information about the Alzheimer's disease and the linguistic characteristics of the AD patients with a focus on their phonological, morphological, syntactic, semantic, discoursal and pragmatic performances.

2.3.1. Introducing the Alzheimer's Disease

Alzheimer's disease (AD), first described by Alois Alzheimer (1907), is defined as a degenerative disorder resulting from a number of changes observed in the brain. In line with the World Alzheimer Report 2016 (Prince et al., 2016), it is pointed out that as people get older, some brain cells shrink and die, leading to decline in learning, memory, planning, and other complex mental functions in AD patients (Turkington and Mitchell, 2010). The AD is mostly seen after sixties; the frequency of the disease in 65 years is 5%, while it is reaching almost 20% in eighties (Fleming et al., 2003). The reports in the Diagnostic and Statistical Manual (American Psychiatric Association, 1994) indicate that there are some criteria applied for the diagnosis of the AD. The criteria were specified as:

A decline in intellectual abilities (sufficient to interfere with social or occupational functions); Memory impairment; and at least one of either impaired abstract thinking, impaired judgment, personality change or other disturbance of higher cortical function (e.g. aphasia, apraxia, agnosia or constructional difficulty) (Smith et al., 1987: 50).

As for the classification of the AD, it is separated into early (mild), mid (moderate) and late stage categories. According to the Alzheimer's Association (2014: 26-28), the categories can be summarized as the following:

1. The AD patients, who are in their early-stages may experience such difficulties as word retrieval; declines in remembering the names of newly introduced people; social relations with others; when reading a text, keeping little information in mind; losing valuable things; decrease in making plans.

2. Individuals with mid- or moderate stage of the AD may be unable to remember their address, phone number, or name of the school that they have graduated; be puzzled with the place, the date, the days or seasons; confused about less difficult mental arithmetic (for instance, counting backward from 40 by 4s and the like); need assistance for selecting appropriate clothing for the season or the event.
3. In the later-stage of the AD may lose knowledge of new experiences and events in addition to their environments; recall their personal history weakly; need assistance when getting dressed; experience sleeping, toileting disruptions, personality changes like suspiciousness, delusions and hallucinations; attempt to stray and get lost; lose such abilities as walking, smiling, swallowing and speaking properly.

In consideration of the statements by the Alzheimer's association, it is safe to argue that alterations in the brain lead to psychological disorders and certain declines in such cognitive processes as communicating, learning, attention, memory and thinking as long as the disease progresses.

2.3.2. Language Changes in the Alzheimer's Disease

A review of literature demonstrates that there has been an increasing curiosity regarding language impairments of the AD patients in the past few decades. This interest may be a result of the increase of the population of older adults, some of whom suffer from losing some of their language abilities.

From a historical perspective, Alzheimer (1907) begins with the premise that language deterioration is an essential indication for the AD. In his original paper, he investigated a woman who repeatedly uttering complicated explanations and some explanatory phrases (e. g. *milk –pouurer* instead of *cup*) and then he proved that she broke out with important language comprehension impairment. Sjogren et al. (1952) and Allison (1962), among those who first studied it, argue that non-language features like memory disruption and spatial disorientation dominate the language abilities in the earlier stages of the disease. Besides, Sjogren et al. (1952) claim that noticeable language

deteriorations appear just in one to three years from early onset, and deficiencies in speech progress observably after four years. However, Allison (1962) reports that deficits in linguistic communication signify the general cognitive problems and such an instance is further supported by Wechsler (1977). The observations of Hagberg and Ingvar (1976) demonstrate that there is no connection between the age and language of AD patients. It seems that language impairment can be seen in any AD patient regardless of his age. On the other hand, it appears that there is an agreement on the word finding difficulties in the early onset of the illness (Constantinidis et al., 1978). Appell et al. (1982) also argue that circumlocutions (indirect speech), echolalias (repeating the words), paraphasias (choosing incorrect words), syntactical difficulties and mutism (inability to speak) might be seen towards the later stages of the disease. As enunciated by Constantinidis et al. (1978), semantic word confusions in place of phonemic ones are more prevalent; when the disorder progresses to the late stages, AD patients may not produce unknown sound sets, meaningless words or long complex sentences.

In recent years, a number of studies (i.e., Irigaray, 1973; Obler and Albert, 1981; Appell, Kertesz and Fisman, 1982; Bayles, 1982; Shore, Overman and Wyatt, 1983; Bayles, 1985; Cummings et al., 1985; Murdoch, et al., 1987; Smith et al., 1987) demonstrated the underdeveloped language abilities of the AD patients. In parallel to these studies, Bayles, Tomoeda and Caffrey (1982) focused on the inclusion of linguistic detachment and morphological alterations in order to identify problems of patients precisely. Considered as a practical way for the evaluation of individuals' cognitive states, the Mini- Mental State Examination (MMSE) is basically used. As mentioned before, Folstein et al. (1975) promoted the MMSE, which is the most commonly used cognitive device including 30-item survey to measure the cognitive impairments. According to Cummings et al. (1985), there is a correlation between the low performance in the MSSE and increasing language loss, which is regarded as a good indicator of the AD. On the other hand, Bayles and Boone (1982) used some other neuropsychological tests in the designation of the AD and they examined the patients' skills to correct semantic mistakes. Their findings strengthened the Irigaray (1973)'s view that semantic errors are more likely to appear than the phonological and

syntactical ones. In addition, semantic sentence correction tasks, verbal expression tasks and sentence disambiguation tasks were found to be symptomatically functional as well (Smith et al., 1987). On the other hand, Bayles and Boone (1982) claimed that using only naming tasks is insufficient to differentiate normal participants from the mildly impaired AD patients. Furthermore, Seltzer and Sherwin (1983), who investigated five dimensions of language, namely “spontaneous speech, comprehension, object naming, repetition and writing” identified important differences in those language skills of the AD patients. According to Smith et al. (1987), picture description tasks can also be utilized for measuring the lexical and syntactic knowledge of the patients. In addition, Bayles (1982) and Critchley (1970) diagnosed that the mildly impaired AD patients tried to hide their inadequacies, specifically in such tasks as repetition of the same ideas, subject changes and picture description. Furthermore, Hier, Hagenlocker and Shindler (1985 as cited in Smith et al., 1987:52) reported “patients used fewer total words and fewer unique words, that is, the greatest impairment was found in lexical diversity, while only a mildly abnormal performance was observed with respect to the number of prepositional phrases or subordinate clauses”. It was further argued that the AD patients used empty words and pronouns in addition to the reduced speech rate.

On the other hand, Marková et al. (2016) argued that the sentence comprehension impairments were mostly on the patients with aphasia, however similar impairments could be seen in the AD patients as well. In addition, Kempler et al. (1987) and Bates et al. (1993) suggested that the lexico-grammatical problems of the AD patients might demonstrate similarity with the Wernicke’s aphasic patients’ problems. Earlier studies on the sentence comprehension of the AD patients (i.e., Kempler et al., 1987; MacWhinney and Bates 1989; Rochon et al., 1994; Waters et al., 1995; Small et al., 1997; Croot et al., 2000; Bickel et al., 2000; Bates et al., 2001; Kave’ and Levy 2004 and Marková et al., 2016) were conducted on the following languages such as English, Italian, German, Spanish, French, Dutch, Hebrew, Hungarian, Serbo- Croatian, Turkish, Chinese, Japanese, and Warlpiri. Kave’ and Levy (2004) suggested that AD subjects speaking Hebrew demonstrated preservation in the morphological, syntactic aspects, however declines in semantic-conceptual aspects. They further argued that since the Hebrew was one of the morphologically complex and rich languages, structural

impairments were not observed. In addition, Kave' and Levy (2003) argued that the AD patients could show intact ability in comprehension of syntactically simple and complex sentences. Although the morphological components could be slightly influenced in the mild AD patients due to the word retrieval problems, the striking deteriorations in morphology and syntax could be seen in later stages of the disease (Kave' and Levy, 2003). If the language of a mild AD patient is morphologically rich, the comprehension of the lexical items appears to be unimpaired as illustrated in the earlier studies by Kave' and Levy, (2003, 2004).

In short, various scholars have pointed out “a language deficit, in a more or less severe form, can be observed at all stages of the disorder” (Appell, Kertesz, and Fisman, 1982; Bayles, 1982; Cummings, Benson, Hill, and Read, 1985; Irigaray, 1973; Obler and Albert, 1981; Shore, Overman, and Wyatt, 1983). However, significant deteriorations may lead to changes in the language profile of the patients in the later stages of the disease and the impairments might differ according to the language of the AD patients.

2.3.2.1. Phonological Impairment in the Alzheimer's Disease

Some researchers analyzed the AD patients' language in terms of their phonological knowledge. Phonological knowledge refers to being acquainted with the rules for the combination of sounds and placing stress or accent accordingly (Bayles et al., 1987).

Whitaker (1976) is the first person to describe phonological preservation in a woman who is in the later stages of the disease and unable to compose meaningful utterances. Whitaker further (1976) claimed that even her blended new word compositions apply to the rules of English phonology. In addition, Bayles and Kaszniak (1987) and Patel and Satz (1994) found out that patients with the mild onset AD can employ phonological knowledge and there were almost no impairments in their sound combination, stress and rhythm patterns. In agreement with Bayles et al. (1987), Oxman et al. (1994) examined whether or not the AD patients keep the skills of processing, reproducing and using normal speech sounds. Oxman et al. (1994) found almost identical findings. However, Kempler (1991) claimed that later in the course of the illness, verbal production turned out to be uninterpretable due to paraphasia “word or sound substitution”, incoherent speech, echolalia “the uncontrollable repetition of words spoken by others”, palilalia

“repetition of the self” and muteness. Similarly, Moss and Albert (1988) denoted “phonemic paraphasia” (e.g., “harmonita” for “harmonica”) was one of the frequently observed phonological disorders.

On the other hand, there are several studies indicating that AD patients retain phonological intactness despite the demanding word finding difficulties. In the works of Emery (1983, 1985, 1986, 1988, 1996, 1999 and 2000), it appears that AD patients became successful in phonological tasks by the later stages in comparison to other linguistic tasks. The existing studies also support this notion by arguing that patients keep their ability to produce the sounds of their language efficiently until the later stages of the disease (Kertesz, 1994; Emery, 1982, 1993; Collette et al., 1999 as cited in Emery, 2000:150). Overall, it could be said that sound components seem to be less impaired.

2.3.2.2. Morphological Impairment in the Alzheimer’s Disease

Regarded as the study of the smallest meaningful units in a given language, morphology includes the analysis of morphemes (words and their parts as well as word production ways). In order to evaluate the lexical knowledge of the AD patients, morphological tasks (e.g., naming, declension and conjugation tasks) were used (Darden, 1974; Lederer, 1980 as cited in Emery, 2000: 151).

As one of the first attempts to carry out a morphological analysis of the AD patients, Irigaray (1967) noted that the parts of speech were influenced distinctively; nouns were affected more than adjectives, and adjectives were affected more than verbs. Besides, Barker and Lawson (1968) and Hart (1988) reported that commonly used words were more difficult to put together than the low frequency words for the AD patients. According to Miller and Pearce (1973:57), the most important language deterioration seemed to be “a poverty of speech due to inaccessibility of the different vocabularies which are normally used in speech, writing, and reading”. Furthermore, impoverishment in their vocabulary, circumlocutions and repetitions in their speech led to problems in their conversations (Miller and Hague, 1975). In order to identify mild to moderate naming impairments, Kaszniak and Wilson (1985) and Bayles et al. (1985) employed

two longitudinal studies in which all the participants were asked to name the object or picture. Despite the problems with semantically or functionally related words (e.g. “lock” for “key”), some expressions (e.g., learnt before, cliché and stereotype) resulted in good performance (Emery, 1985, 1986, 1993, 1996).

Consistent with the numerous studies, Kertesz (1994) concluded that the common finding was naming difficulty (anomia), which leads to circumlocutions in speech. Therefore, regarding morphological problems in AD patients, word knowledge (lexicon) appears to be significantly impaired even in the earlier stages of the AD.

2.3.2.3. Syntactic Impairment in the Alzheimer’s Disease

In consideration of the syntactic impairments of the AD patients, there are several experimental studies. Based on these studies, it seems that there are conflicting ideas about whether syntax is preserved or shortened through the course of the disease.

Irigaray (1973)’s large-scale investigations, possibly the first empirical study of syntax in AD and normal aging, demonstrated that syntactic skills remain intact in comparison to lexico-semantic skills. Another major comprehensive analysis of this concern was conducted by Whitaker (1976), in which he described one severely impaired AD patient. He found that the severely demented patient immediately marked agrammatic sentences rather than semantically inconsistent ones (e.g., “There are two books on the table” was repeated as “There are few books on the table” whereas “The book is very happy” was reproduced accurately). The result pointed out that there was preservation in the grammatical competence of the AD patient. Similarly, Schwartz et al. (1979) suggested that the AD patients could turn the active sentence into passive correctly. They further argued that comprehension of syntactic forms including active and passive sentences was unblemished. In addition, Kempler and colleagues (1987) noted that despite the few syntactic errors, there were no significant difference between both groups in regard to the frequency of relative clauses, questions and adverbial clauses. In a further study comprising a dictation task (i.e., short phrases with ambiguous semantic and syntactic cues), they confirmed that syntax remained preserved. The data from a later study by Smith et al. (1989) were about the evaluation of a patient and control

group in terms of their syntactic knowledge and general processing requirements. To this end, a picture-pointing task was applied to measure reflexive and reciprocal comprehension “e.g., two- versus four choice response arrays and different position of the reflexive in the sentence” (Kempler, 1991: 103). Results of Smith et al. (1989)’s study indicated that as the task became difficult, both AD patients and normal controls demonstrated nearly the same mistakes. Therefore, it was clarified that comprehension deficits could stem from general knowledge limitations. In agreement, Kemper et al. (1993) claimed that although the severity of the disease influenced written linguistic output, it was, nevertheless, grammatical and coherent. Further evidence for the syntactic preservation comes from the analysis of the mild AD patients speaking Slovak (Marková et al., 2016) or Serbo-Croatian (Lukatela et al., 1995) languages. Marková et al. (2016: 11-12) claimed “the average performance of our patients with mild AD, however, was not significantly worse than in the control group”. Lukatela et al. (1995) also had a similar view on this issue. They asserted that the sentence comprehension of the mild AD patients in Serbo-Croatian language was not impaired totally. On the other hand, Bickel et al. (2000: 445) carried out a study on the AD patients speaking German to examine their comprehension of the different sentence types (i.e., SVO, OVS, SOV word orders, active and passive structures, relative clauses etc.). Bickel et al. (2000) found that the German-speaking mild AD patients only significantly differed in sentences with active, transitive, and OVS word order, however, they further argued that AD patients showed parallel performances to their healthy peers in sentences with active, transitive and SOV word order.

On the other hand, there are some opposing views on this issue claiming that syntactic skills were highly impaired in the AD patients. As one of the important figures, Emery (1986) applied Test of Syntactic Complexity and the Chomsky Test of Syntax (Chomsky, 1979) to twenty patients. Both tests were used to identify patients’ syntactic processing by extracting their verbal reaction to grammatically complex stimuli (e.g., “The dog was bitten by the cat; which animal bit the other and which was bitten?”) or non-verbal responses to this auditory stimuli such as “Mickey tells Donald to hop up and down; make him hop” (Kempler, 1991: 98-114). As opposed to the observations of Schwarz et al. (1979), Emery (1986) suggested that the AD patients experienced great

difficulty in comprehension and processing of the complex syntactic items. To be more specific, it was reported that the AD patients not only gave wrong answers to passive voice subject-object discrimination questions but also had difficulties in interpreting the active voice complex sentences. Furthermore, Emery (1988) cited that the AD patients could repeat the stimuli correctly although they were not able to comprehend the given tasks and this was not because of the memory deficit but due to the declension of the complex syntactic processing. Put another way, Rochon and associates (1994) found that AD patients contrasted with normal group only when there were two or more propositions instead of one. Another source of support for this point of view comes from three experiments involving sentence-picture matching, grammatical sentence judgments, and sentence completion tasks conducted by Grossman et al. (1995). By applying familiar words and brief sentences, Grossman et al. (1995) pointed out that AD patients had troubles in judging whether the sentence was grammatical or not; and they couldn't complete the sentences with one word. Results of these studies demonstrated grammatical (syntactic) impairment in AD patients. In other words, Emery (1996) claimed "it is the simple syntax that remains intact". Another study conducted on Italian AD patients by DeVreese et al. (1996) demonstrated that results were compatible with the forenamed studies that arguing that there was impairment in the syntactic abilities of the AD patients. A recent study by Emery (2000) concluded that it was only the mildly impaired patients who experience the least degeneration in syntactic processing. To summarize the syntactic debate among the scholars, it appears that there may be either preservation or deterioration in the syntactic abilities of the AD patients. Therefore, in line with the previous studies, the interpretation of the complicated language materials used in the sentence picture-matching test could be impaired or preserved in this study.

2.3.2.4. Semantic Impairment in the Alzheimer's Disease

The essence of semantics is related to integrating and systematizing the meaning with sounds. Some semantic topics were also studied on the AD patients. According to Ferris and Farlow, (2013: 1008) "semantic processing comprises language content, such as words and their meaning, and the associated impairments include difficulties with word finding, naming, and word comprehension, as well as semantic paraphasia (choosing incorrect words), empty speech (using ambiguous referents), inventing words, and loss

of verbal fluency”. It seems that there is a consistency at a certain level among scholars in regard to the highly impaired semantic processing of AD patients (i.e., Schwartz et al., 1979; Kempler, 1984, 1991; Kirshner et al., 1984; Emery, 1985; Bayles et al., 1987; Kempler et al., 1987; Kertesz, 1994; Kirshner, 1994; Emery, 1994; Rochon et al., 1994; DeVreese et al., 1996; Sabat 1999; Emery 2000 and Grossman et al., 2008).

More specifically, Schwartz et al. (1979) carried out a case study in which participants were presented seventy familiar household items (e.g., comb, flower, zipper etc.). The observations demonstrated that the AD patients could identify the objects, yet they could have difficulty in labeling objects correctly. Furthermore, Schwartz et al. (1979) proposed that such declines in lexical naming might be due to the loss of patients’ semantic knowledge that expand on the referent. Therefore, the words carrying specified meanings could be forgotten before the most familiar ones. Similarly, Bayles and Tomoeda (1983) claimed that the more abstract semantic category the word belonged to, the more intellect was possible to degenerate. Due to this degeneration, the dissemblance of signal to the referred object might result in a cognitive and linguistic decline. This means that the selection of the proper word is interrupted in the AD patients. As a contribution to studies of Bayles and Tomoeda (1983), Martin et al. (1985) put forth that the AD patients demonstrated loss in distinguishing between the semantically related words. In agreement, Grober et al. (1985) argued that the AD patients might place less attention to the reorganized semantic information (ordered in regard to importance). Since alteration in semantic arrangement process could influence the novel information encoding to the semantic and episodic memory, they might not comprehend or process the lexical meaning. This situation would lead to complications in the retrieval process, thereby, leading to naming problems even in the early phase of the disease (Grober et al., 1985; Kempler et al., 1989 and Emery, 2000). In short, it seems that semantic filtering is highly associated with the simple and concrete structures. On the grounds of previous researches, it could be asserted that due to some problems with attention and memory, the AD patients may have difficulty in interpreting the basic symbolic representations and naming them accurately.

2.3.2.5. Discourse-level Impairment in the Alzheimer's Disease

Discourse is “a term employed to specify the arrangement of language beyond or across the level of the sentence and has been defined as the basic component of social communication” (Arkin and Mahendra, 2001). Compared to a number of investigations on linguistic problems faced by the AD patients, analysis of discourse related language problems seems to be given less attention. In fact, Stemmer (1999) pointed out that studying current issues in the discourse of brain-damaged people might provide us to uncover impairments or preservations in their comprehension or processing mechanisms.

To date, specific studies about the AD patients' discourse-level (dis) abilities have mostly depended on the test situations, in which patients were given various experimental tasks (i.e., picture descriptions, naming objects in photographs or drawings, performing transformations on sentences, and disambiguating spoken homophones) (Hamilton, 2005:17). By employing these tasks, investigators pointed out that patients with the AD seemed to be more inflected than their normal counterparts in terms of nonsensical ideas, jargon and repetitive responses to the directed questions (i.e., Nicholas et al., 1985; Bayles et al., 1992; Ska and Guenard, 1993; Giles et al., 1996; Tomoeda et al., 1996; Vuorinen et al., 2000).

In Irigaray's (1973) study, seven participants were requested to talk about the progress of their disease, their occupation, and their families. In parallel to her study, Ripich and Terrell (1988) examined discourse cohesion and coherence in the AD by designing topic-directed conversations such as open-ended questions about family, health and daily activities of the patients. Findings from their studies indicated the topic shifts, incoherent discourse and lack of cohesive devices. In support of these observations, Obler (1981:380 as cited in Hamilton, 2005: 18)) claimed "indeed the abilities to initiate speech, to maintain speech, and to appropriately stop speech, taken for granted in normals, might all be impaired in the language of dementing individuals". In response to Irigaray (1973) and Obler (1981)'s remarks, Appell et al. (1982) and Kempler (1984) suggested that it is possible to observe some breakdowns in discourse-level skills such as conveying or getting information, directing actions, evaluating the truth of

propositions and making inferences, problems in auditory-spoken language comprehension or processing, repetition of the ideas, empty words in addition to paraphasias, lack of coherence and irrelevant pronoun choices.

Furthermore, Nicholas et al. (1985), Almor et al. (2001) and Leitão (2005) measured the referential and non-referential discourse, which resulted in empty phrases, circumlocutions and incorrect cohesive device choices. In support of this view, it was generally agreed that in the middle or moderate stage of the disease, conversation appeared to be lack of meaning, mostly being inappropriate, and slightly less interactive in nature (Caramelli, Mansur and Nitrini, 1998).

Based on the previous studies, it could be proper to claim that discourse represents the knowledge of specific linguistic and contextual features, which are related to the individuals' executive functions such as planning and judging. As observed from the literature, it is generally agreed that the individuals suffering from the AD lack of such discourse features as declines in verbal expressing, gist-level processing, narrating, picture describing, conveying information and being coherent. Referential discourse processing of AD patients was reported their unsuitable selections and excessive use of the pronouns. For instance, Nicholas et al. (1985), Kempler, (1995), Ripich and Terrell (1988), Almor et al. (2001) and Leitão (2005) considered all these impairments as the source of discourse, lexico-semantic and working memory deficits of the AD patients.

2.3.2.6. Pragmatic Impairment in the Alzheimer's Disease

Pragmatics is generally clarified as the study of utterances, which have communicative meaning according to the use of a speaker within a certain context (Trask, 1999). In its broadest sense, Levinson (1983:21) stated "given a linguistic form uttered in a context, a pragmatic theory must account for the inference of presuppositions, implicatures, illocutionary force and other pragmatic implications". For instance, "Let's call the dog Felix" could mean make a suggestion or the act of naming a new dog (Asp and Villiers, 2010). Therefore, pragmatics deals with the speakers' skills of interpreting utterances properly in regard to the existent contextual information.

In the last decades not only discourse but also pragmatic abilities of AD patients were

investigated by means of “picture description tasks” or “spontaneous conversations” (Perkins et al., 1998; Berrewaerts et al., 2003 as cited in Feyereisen et al., 2007: 2). As enunciated by Golper and Binder (1981), conversational turn-taking was preserved in the mild to moderate AD patients. However, Ripich and Terrell (1988) observed the ten severely impaired AD patients and they found that turns made by AD patients were shorter than the normal elders. Furthermore, Irigaray (1967), Obler and Albert (1981) documented, AD patients had troubles with sentence structure and narrative description of the given tasks. For example, paucity of request, direct and indirect questions, second person pronouns and the truth-value of the utterances were found to be impaired. In addition, Appell et al. (1982) explained pragmatic declines in communication as difficulties with information transference, generating action and initiating propositions.

As for the current studies on pragmatics, Carlomagno et al. (2005) found that “empty speech” was because of a specific problem faced in pragmatic explanation of contextual information (e.g., difficulty in generating preverbal representations of discourse content). As Perry and Hodges (1999) and Almieva et al. (2004) suggested this problem could stem from a decrement in attention and self-management. Furthermore, Papagno (2001) noted that deteriorations in metaphor and idiom comprehension were not seen in the earlier stages of the AD. However, another survey by Rapp and Wild (2011) confirmed the declines of the AD in pragmatic researches. In addition, Maki et al. (2013) identified some declines in the processing of sarcasm and metaphor in both AD patients and healthy older adults. Most of the recent observations concluded that the pragmatic level language deteriorations could be seen in almost every stage of the AD. As Cummings (2014a: 10) stated “when pragmatics fails to develop along normal lines or is disrupted by illness, injury or disease, the consequences for everyday communication can be very serious indeed”. Cummings (2014a) further emphasized that future studies carried out with great populations are possible to enhance the existent pragmatic knowledge.

2.3.2.7. A Brief Summary of the Linguistic Changes in Alzheimer’s Disease

The following Table summarizes the major findings of the studies on the changes occurred in the language characteristics of AD patients based on different levels of the

disease.

Table 1. Linguistic changes of the AD patients

Changes in Language Characteristics	Mild AD	Moderate AD	Severe AD	Reference
Phonetics-phonology Temporal changes in spontaneous speech (increasing hesitation number and time)	+	++	+++	Forbes and Venneri (2005); Hoffmann et al. (2010); Roark et al. (2011); Meilán et al. (2012); Satt et al. (2014); Jarrold et al. (2014); Laske et al. (2015)
Phonemic paraphasla	++	++	+++	Croot et al. (2000); Forbes et al. (2002); Hoffmann et al. (2010); Wutzler et al. (2013); Roark et al. (2011); Satt et al. (2014); Jarrold et al. (2014)
Lexical-semantics Word-finding and word retrieval difficulties	+	++	+++	Smith et al. (1989); Bayles (1993); Light (1993); Kempler and Zelinski (1994); Kempler et al. (2001); Garrard et al. (2005); Taler and Phillips (2008);
Verbal fluency difficulties	+	++	+++	Barth et al. (2005); Juncos-Rabadán et al. (2010); Hoffmann et al. (2010);
Phonemic (letter) Semantic	+	++	+++	Dos Santos et al. (2011); Fraser et al. (2014); Laske et al. (2015); Garrard et al. (2014)
Semantic paraphasla	+	++	+++	Juncos-Rabadán et al. (2010); Hoffmann et al. (2010); Roark et al. (2011); Satt et al. (2014); Jarrold et al. (2014)
Syntax Reduced syntactic complexity	-	+	+++	Caramelli et al. (1998); Small et al. (1997); Kempler (1995); Bickel et al. (2000); Ullman (2001); Juncos-Rabadán et al. (2010)
Agrammatisms	-	-	+++	Small et al. (1997); Kempler (1995); Ullman (2001)
Discourse-Pragmatics Reduction in productive and receptive discourse-level processing	+	++	+++	Hodges et al. (1992); Ripich (1994); Taler and Phillips (2008); Weiner et al. (2008); Hoffmann et al. (2010); Juncos-Rabadán et al. (2010); Rapp and Wild (2011)

Notes: *Alzheimer's disease (AD) proportion of MMSE scores is as follows: mild AD: 24–20 points, moderate AD: 19–10 points, and severe AD: 9–0 points (Vertesi et al., 2001). Degree of involvement: (-) impaired, (+) intact.*

(adopted from Szatloczki et al., 2015: 4)

2.3.2.8. Sentence Comprehension and Sentence Processing in Alzheimer's Disease

Sentence comprehension and sentence processing are regarded as complex processes, in which the meanings of the lexical words and the grammatical features are drawn together to reflect a propositional meaning (Leikin et al., 2012). Sentence comprehension includes the assignment of the linguistic properties such as semantic roles and grammatical features. It has been argued that the WM also plays a significant role in the sentence comprehension since the hearer needs to recall the detailed information in order to integrate the meanings of the words in a given sentence after the interpretation. On the other hand, sentence processing is regarded as an immediate-automatic interpretation of the words' meanings, and their morpho-syntactic, discoursal and conceptual functions in a given sentence (Caplan and Waters, 1999).

The controversial ideas on the sentence comprehension and sentence processing of the AD patients are mostly dependent on the interpretive and post-interpretive processes. Therefore, it could be argued that multiple processes are involved in the sentence comprehension and sentence processing. Some of the researchers claim that the impairments may result from linguistic factors such as semantic and morpho-syntactic complexities, while some others attribute them to the propositional, non-linguistic conceptual mechanism depending on the WM. As Marková et al. (2016) suggested despite a number of studies on the word level comprehension and processing, the sentence comprehension and processing of the AD patients seem to be the subject of less study.

Earlier studies on the sentence comprehension and sentence processing of the AD patients (i.e., Kempler et al., 1987; MacWhinney and Bates 1989; Rochon et al., 1994; Grossman et al., 1995; Waters et al., 1995; Small et al., 1997; Kemper, 1997; Kempler et al., 1998; Croot et al., 1999; Emery, 2000; Bickel et al., 2000; Bates et al., 2001; Kavé and Levy 2004 and Marková et al., 2016) were conducted on various languages such as English, Italian, German, Spanish, French, Dutch, Hebrew, Hungarian, Serbo-Croatian, Turkish, Chinese, Japanese, and Warlpiri. The above- mentioned languages were some of the languages that were tested in order to see whether or not the AD

patients have impairments in regard to their sentence comprehension and sentence processing performances.

The sentence comprehension abilities of the AD patients are tested by the use of different off-line tests, namely picture selection, grammaticality judgment, naming, reading and object description. Bayles (2003: 214) suggested that the use of these tests require “storing, retrieving and manipulating linguistic information” and these tests would provide some information about the language comprehension skills of the AD patients. There seem to be various assumptions on the sentence comprehension abilities of the AD patients. Some of the scholars found significant impairments (i.e., Grober and Bang, 1995; Tomoeda et al., 1990; Emery and Breslau, 1987 and Bayles, 1982) while the others did not find significant impairments (i.e., Kempler et al., 1987 and Kemper et al., 1993). More specifically, Grossman and White-Devine (1998) argued that some of the semantic properties and syntactic properties might lead to a difficult sentence comprehension. On the other hand, Waters et al. (1998) and Rochon et al. (1994) claimed that the number of propositions affect the sentence comprehension rather than the complexity of the sentences. In addition, Marková et al. (2016) argued that the earlier studies on the sentence comprehension impairments were mostly on the patients with aphasia, however such impairments could be seen in the studies carried out with the AD patients as well. In support of this argument, Kempler et al. (1987) and Bates et al. (1993) suggested that the lexico-grammatical problems observed in the sentence comprehension of the AD patients might have similarity with the Wernicke’s aphasic patients’ problems. On the other hand, Bickel et al. (2000: 445) carried out a study on the German speaking AD patients in order to examine their comprehension of the different sentence types (i.e., SVO, OVS, SOV word orders, active and passive structures, relative clauses etc.). Bickel et al. (2000) found that the German-speaking mild AD patients only significantly differed in sentences with active, transitive, and OVS word order. However, Bickel et al. (2000) further argued that AD patients showed parallel performances to their healthy peers in sentences with active, transitive and SOV word order. Further evidence for the syntactic preservation in regard to sentence comprehension comes from the analysis of the mild AD patients speaking Slovak (Marková et al., 2016) or Serbo-Croatian (Lukatela et al., 1995) languages. Marková et

al. (2016: 11-12) claim “the average performance of our patients with mild AD, however, was not significantly worse than in the control group”. Lukatela et al. (1995) also has a similar view on this issue. They assert that the sentence comprehension of the mild AD patients in Serbo-Croatian language was not totally impaired.

On the other hand, the sentence processing abilities of the AD patients are tested by the use of on-line tests such as cross-modal naming, eye-tracking and self-paced reading. Kempler et al. (1998: 304) suggested the use of these tests shows “the automatic interpretation of the language input and minimizes metalinguistic memory demands (WM effect)”. Due to the decreased memory requirements, it was argued that the on-line sentence processing could be better compared to the off-line sentence comprehension. As noted in the earlier studies, there are also controversial ideas on the sentence processing of the AD patients. To this end, Kempler et al. (1998) and Small et al. (1997) indicated that the AD patients could process sentences with less difficulty in terms of morpho-syntactic, semantic and discoursal aspects. Waters and Caplan (1997) argued that the syntactically simple and complex sentences were processed by the AD patients and they could identify the antecedents of the reflexive pronouns as good as their healthy peers. In addition, the findings of Rochon (1992) also supported this notion in that the sentence processing could have minimal influence on the structure of the sentences (i.e., active vs. passive, conjoined items, word order etc.). However, Tomoeda et al. (1990) and Almor (2000) found some impairment in the grammatical processing tests that contain pronoun number agreement and the subject-verb agreement. Similarly, Small (1994) who studied on the co-referential sentence processing, argued that the target naming was influenced by the AD patients’ longer reaction times and inaccurate responses.

In short, the sentence comprehension and the sentence processing are necessary for the language understanding and there seems to be conflicting views in this regard. One possible explanation for these conflicting views could be that sentence impairment or preservation of the sentence comprehension and processing may depend on the nature of the tasks, structure of the languages, or the subjects.

2.4. THEORETICAL BACKGROUND

This section presents the major language processing theories and related topics.

2.4.1. Linguistic Processing and Cognitive Processing

Some of the researchers suggested that there could be both differences and possible relations between linguistic and cognitive processing mechanisms (Fodor, 1983; Frazier, 1990 and Caplan and Waters, 1996). Linguistic processing, which is defined as an unconscious resource for deriving meaning from a linguistic signal, involves lexico-semantic, syntactic and discourse aspects, and Caplan and Waters (1996) name this process ‘interpretive processing’. On the other hand, cognitive processing includes the activation of the linguistic signal, which is later used in storing, planning and reasoning processes. This conscious process is called ‘post-interpretive processing’ by Caplan and Waters (1996).

2.4.2. The Working Memory and the Syntactic Processing

The working memory (WM) is described as “the ability to simultaneously store and process information” (Baddeley, 2003). Several studies (i.e., King and Just, 1991; MacDonald, Just, and Carpenter, 1992; Kluender and Kutas, 1993; Pearlmutter and MacDonald, 1995) demonstrated that there is a relationship between the WM and the performance in language processing, however the syntactic processing evidences do not seem to be convincing enough.

There are two opposing views on the WM and language processing mechanisms. Just and Carpenter (1992) claimed that the single resource (SR) theory, which is based on the general WM, clarifies all interpretive (unconscious immediate comprehension) aspects of language. On the other hand, Waters and her colleagues (1995) argued that the separate language interpretation resource (SLIR) theory accounts for the post-interpretive (conscious processing after comprehension) mechanisms.

According to the SLIR theory, the syntactic processing mechanism uses different resources from the WM. In contrast, the SR theory claims that the WM contributes to the syntactic processing. Therefore, Just and Carpenter (1992) argue that if the WM

declines, the impairments in syntactic processing can be observed in relation to the SR theory. It seems that individual differences in effective language processing depend on the WM resource pool. However, in support of the SLIR theory, studies carried out with the older adults and early staged AD patients demonstrated that they could comprehend the meaning of a sentence and form syntactically correct sentences, although they have limitations in their WM (Caplan et al., 1996; Caplan and Waters, 1999 and Rochon et al., 2000). As indicated by the studies of Caplan and Waters (1999) and Rochon et al. (2000), there is no significant relation between the WM and the syntactic processing.

2.4.3. An Overview on the Off-line Sentence Comprehension and On-line Sentence Processing Methods

In psycholinguistics, the experiments are designed to test the comprehension and the processing of linguistic items by employing some techniques. Therefore, experiments might involve the use of off-line and on-line methods in gathering data. These methods are frequently used to measure response accuracy and reaction times (reported in milliseconds) of the collected data. In this section, the off-line and on-line methods are briefly explained.

2.4.3.1. Off-line Sentence Comprehension

One of the major methods used to prove one's hypothesis is the off-line method. In the off-line method, the outcome of the sentence comprehension is measured. Thus, Caplan and Waters (1999) consider off-line sentence comprehension as the post-interpretive procedure, which is related to the subsequent use of obtained meanings to fulfill another test. Off-line methods involve such tasks as "close tests, question-answering tasks, paraphrase tasks, sentence-picture matching tasks, and recognition and recall tasks" (Baddeley and Bernsen 1989:105; Newman et al., 2009:2500). Following these methods, the SMMSE task (a recognition and recall task) and the SPM task are used in this study as off-line sentence comprehension methods.

2.4.3.2. On-line Sentence Processing

As another method, on-line sentence processing is used to investigate real-time processes. Caplan and Waters (1999) view this method as the interpretive procedure in

which word recognitions, accomplishment of semantic and syntactic requirements, attribution of prosodic information, theta role assignments and other linguistic features are attained. In on-line methods, not only results but also reaction times are observed. Some of the on-line methods involve measures of priming or naming, eye-movements, ERPs and fMRIs (Carreiras and Clifton, 2004). As of the on-line sentence processing methods, the CMN is used in this study.

2.4.4. Predictions

This section presents the relevant hypotheses concerning the comprehension and processing performances of the AD patients compared to their healthy peers.

2.4.4.1. The Syntactic Deficit Hypothesis (SDH) on the Basis of Interpretive Processing Theory (IP)

Disruptions in the syntactic processing mechanism could stem from the comprehension impairments of “function words (i.e., prepositions, determiners, and auxiliaries), phrase structures and transformations” (Berndt and Caramaza, 1980 as cited in Martin, 2006: 6). The SDH attempts to account for such impairments in individuals with language disorders. On the basis of the SDH, several scholars assume that the comprehension deficits of AD patients actually stem from disruption in syntax (Emery, 1985; Grober and Bang, 1995; Small, Kemper and Lyons, 1997; Small, Andersen and Kempler, 1997 and Bickel et al., 2000). In addition, Caplan, Waters and associates (e.g., Waters, Caplan and Hildebrandt, 1991; Rochon, Waters and Caplan, 1994; Waters, Caplan and Rochon, 1995; Caplan and Waters, 1996) argue that the AD patients are expected to be more impaired in the processing of syntactically complex structures than the simple ones. Furthermore, Bickel et al. (2000: 433) support these views by claiming that “comprehension is a function of syntactic complexity”. The specific concern seems to be the sentence length and picture complexity in the SPM task. Therefore, it is predicted by this hypothesis that the syntactic structure might affect the accuracy results of subjects. Rochon et al. (1994) attribute such impairments as “interpretive processing deficit”. In addition, according to the SDH, the AD group is expected to show significant differences compared to the control group (Waters et al., 1991 and Small, 1994).

2.4.4.2. The Working Memory Deficit Hypothesis (WMDH) on the Basis of Post-Interpretive Processing Theory (PIP)

In the post-interpretive process, the meaning extracted from the linguistic signals is used to perform other cognitive abilities such as “storing information, reasoning, planning actions, and doing other tasks” (Waters and Caplan, 1997 as cited in Obler, Loraine 2000: 62). Waters and Caplan (1997) argue that there must be some kind of “metalinguistic judgment” when the AD patients attempt to match the pictures that best fit the meaning of a sentence. Thus, this process necessitates holding the sentence meaning in the working memory till choosing the appropriate picture in the off-line SPM task. Therefore, it is assumed that impairments in the post-interpretive processing rely on the WMDH. According to this hypothesis, it is postulated that subjects could perform almost equal on both the syntactically simple and complex sentences or they could make mistakes even in simple sentences.

In addition, the discourse contexts are also assumed to indicate the restrictions in the working memory. Kempler et al. (2002) proposes that if the deficiencies in the long conditioned structures are higher than the short ones, there must be “post-interpretive” working memory impairments stemming from the discourse related performance of the AD patients. By this prediction, a pronoun (i.e., he, they, we etc.) used as a lexical target in a context needs to be matched with its antecedent. Therefore, it needs to be strongly marked by the speaker and the hearer within the specific discourse. In this case, it is asserted that the AD patients have difficulties in the processing of long-distance sentence fragments, which involve pronouns or it is also claimed that there could be almost equal responses by both AD and control subjects. Furthermore, according to the WMDH, regarding memory as the major reason behind the impairment, the AD patients are expected to do better on the on-line CMN task that limits the memory requirements in comparison to the off-line SPM task that put higher demands on memory (Kempler et al., 1999 as cited in Kemper and Kliegl, 2007: 235).

2.4.4.3. The Informational Load Hypothesis (ILH) on the Basis of Reference Processing Theory (RPT)

The selection of referential forms reflects the coherence in discourse. For this reason, “a proper name (e.g., Bill), a definite description (e.g., the waiter) and a pronoun (e.g., he)” could point out a person given in a particular discourse (Almor and Nair, 2007: 84). Such a repetition realized in the same sentence is controlled by the Binding Principles¹² of Chomsky (1981). In addition to such syntactic constraints as the binding principles, which can be employed to the same clause boundaries, there seems to be conceptual representations, which account for the processing of pronominal and anaphoric expressions across the sentences. In this respect, whether the processing of referential forms demonstrate regular patterns; how these forms are used to indicate people, events or objects in certain discourse and the role of working memory in this process are investigated by many scholars (i.e., Chafe 1976; Clark and Wilkes 1986; Kintsch 1988; Gernsbacher 1989; Ariel 1990; Gordon, Grosz and Gilliom 1993; Gundel, Hedberg and Zacharski 1993; Garrod and Sanford 1994; Gordon and Hendrick 1998; Almor, 1999; Almor 2000; Cowles and Garnham 2005; Almor and Nair 2007).

In the light of discourse and reference processing studies, the ILH is designed to reveal some specific features of the participants when they process the referential forms (Almor, 1999; Almor et al., 1999; Almor, 2000; Almor et al., 2007 and Almor and Eimas, 2008). The ILH is regarded as “a theory of anaphor processing that is based on both conceptual and linguistic-pragmatic principles” (Almor, 1996 as cited in Almor, 2000:3). The proposed hypothesis attributes the referential processing to the Gricean maxim of quantity (Grice, 1975)¹³. In line with this pragmatic principle, the ILH

¹² The Binding Principles refer to the referential relations, which involve reflexive, reciprocal and personal pronouns (Chomsky, 1981).

¹³ As one of the pragmatic principles, the Gricean maxim of quantity is used by Almor (1999) to describe anaphors. In this sense, the informational load of the anaphoric expression is expected to include no more information than the necessary one.

explains the informational load of the anaphor and the function of its associated antecedent via “identifying the referent and/or adding new information” (Almor, 1999 as cited in Almor et al., 1999: 217).

As the name for this hypothesis suggests, the “informational load” indicates the information that is carried by the referring expression. In this sense, Almor and Nair (2007) assert that pronouns carry certain amount of information about their referent and each pronoun has “a processing cost” which refers to the informational load of it. For instance, the pronouns carry a little cost in terms of their conceptual images, whereas the NP anaphors include high cost in identification of their referents. As the pronouns include little cost, they are utilized for the representation of salient¹⁴ referents. Therefore, the ILH predicts that the identification of the referring expression depends on the salience of the referent, which means the less explicit referents (i.e., pronouns *they*, *it* *he* etc.) are easy to process as they contain less information (Almor, 1999).

The least complex linguistic forms, namely pronouns, activate information existing in the WM. It seems that pronoun comprehension benefit from the WM recourses. Therefore, the decreases in the WM of the AD patients lead them to make violations in the CMN task, which includes the selection of the suitable pronoun. Almor (2000) argues that the AD patients seem to understand better and faster when the NP anaphor is utilized.

On the basis of these assumptions, Almor (2005) further claims that semantic overlapping could increase the matching of referential forms, but when extra information is used in the discourse, it might restrain the integrated representation of the referential form in the WM. On the other hand, it is also stated that since the activation of semantic information is impaired in the AD patients, the relation between “the processing cost” and “the discourse function” changes (ILH; Almor, 1999, 2000, 2004,

¹⁴ The term salience is used in this study to refer to the easy accessible information and it also refers to “the givenness, syntactic prominence, semantic prominence and recency or immediacy of referents” (Lashley, 2010: 1).

2005). Therefore, when the limited number of words in the AD patients' WM starts to compete, high cost resulted from the high activation may even lead to the slow and misuse of a common and less demanding word particularly, a pronoun.

On the other hand, Sanford and Garrod (1981 as cited in Almor, 1999: 750) propose that as the distance between the pronoun and its antecedent is increased, establishing the co-referentiality with the antecedent becomes hard. The limited WM capacity of the AD patients seems to be affected by the involvement of the linguistic items between the antecedents and anaphors. It could be noted that the reactivation of the words, specifically of the pronouns, depends on the given information in prior discourse. The proper names (Nps) used in prior sentence refer to the given information. Therefore, pronouns are mostly utilized to refer back to these proper names. The problem lay behind the processing seems to be that when the referent is not mentioned for some time, the activation in the WM needed for the back referring could be lost. It is assumed by the ILH that the prior knowledge about the referent is interrupted by the extra information, thereby leading to an overall decline in the comprehension of pronouns (Almor and Nair, 2007).

All in all, in addition to the WM deficit by Waters, Caplan and Rochon (1995), the ILH (Almor, 2000: 9) accounts for the referential processing problems in AD as it follows: the processing cost of anaphor is equalized by the discourse function; if cost or function differs, the referential processing shows alteration as well; the processing of anaphor necessitates semantic information to be activated; the decreased WM causes the loss of semantic representations in the AD, thereby leading to a decline in the discourse salience of referring expressions and thus, causing the impairments in comprehension, specifically in the long-distance referential processing. Therefore, according to the ILH by Almor (1999, 2000, 2004), the AD patients are expected to select the pronouns slower and less correct than the controls.

2.5. RELEVANT BACKGROUND ON PRONOUNS

This section presents background information about pronouns in general and pronouns in Turkish.

2.5.1. Pronouns

Bhat (2004) defines pronouns as the words that substitute for the noun phrases. Bhat (2004) further adds that pronouns are the expressions used for making reference to the things, people or places and the low semantic content of pronouns exist in the shared background knowledge of their users. In addition, pronouns are considered as “the words that function primarily as shorthand referring expressions that are alternatives either to ostensibly more explicit or descriptive forms” (Wales 1996, as cited in Bhat, 2004: 3).

Pronouns are also regarded as the expressions mostly used for avoiding repetitions of the noun phrases and they can be used as free or attached to the adjectives, adverbs and verbs. They can be inflected for person, number, gender and case in accordance with the morpho-syntactic, morpho-semantic and discourse-pragmatic features of a language. The aforementioned features indicate how pronouns are represented and linked to their referents (antecedents) in a sentence or discourse. More specifically, morpho-syntactic features contribute to the linking of a pronoun to the referent either by person, number, or gender agreement or by identifying its position in a sentence; morpho-semantic features provide the interpretation of the pronouns by using the aforementioned categories; on the other hand, the discourse pragmatic features contribute to see the conceptual differences when identifying the object of a referent in a certain context. To this end, it could be stated that pronouns may get different meanings in regard to the grammatical information and the contextual information of a sentence or discourse. The Figure 1 below illustrates how pronouns are linked to their antecedents in terms of morpho-syntactic, morpho-semantic and discourse-pragmatic features:

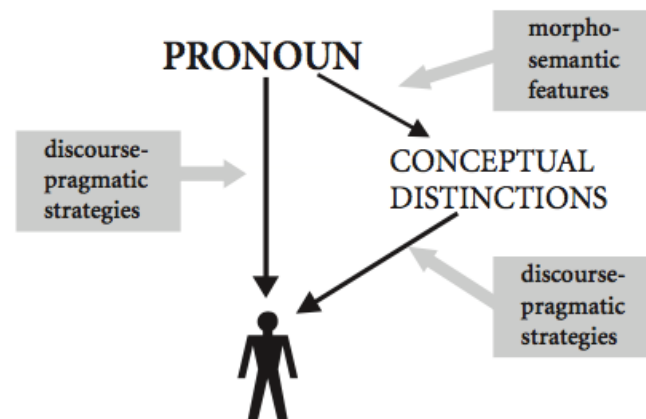


Figure 1. Linking of pronouns to their antecedents

(Simon and Wiese, 2002: 5)

As illustrated above, pronouns have sensitivity for syntax, semantics, discourse and pragmatics in order to get their interpretation (Fromkin et al., 2010). Being one of the parts of speech elements, pronouns are classified into different categories. Evans (1980: 337- 362) accounts for the categories of pronouns as follows: “personal, reflexive, reciprocal, relative, indefinite, possessive, demonstrative and interrogative pronouns”. Specifically, personal pronouns are used to represent person or people or things (i.e., *he, him, she they, we, them, it, its etc.*). Reflexive pronouns are used to refer back (i.e., *She cut herself with a knife*). Reciprocal pronouns are used if two or more subjects act upon interchangeably (i.e., *each other and one another*). Indefinite pronouns are used to refer to the people and things in general (i.e., *somebody, anybody, anything etc.*). Possessive pronouns are used to show possession (i.e., *my, her, your etc.*). Relative pronouns are used to connect sentences (i.e., *who, whose, which etc.*). Demonstrative pronouns used to refer to a specific person, group, and things (i.e., *this, that, these and those*). Interrogative pronouns are used to make questions (i.e., *who, whom, what etc.*) (Büring, 2011).

In addition, pronouns can be seen in 1st person, 2nd person and 3rd person forms and they may be inflected for number, (singular, plural or dual). In addition, they may be inflected for the case markers (i.e., accusative, nominative, dative etc.) and gender markers (masculine, feminine and neuter, animate or inanimate) (Simon and Wiese,

2002). The following examples from English, German and Kannada (Dravidian) illustrate the person, number, case and gender markers on pronouns:

- 1) *Steve's aunt married last Tuesday. She is Italian.* — (English)

[PRON.3. SG. FEM.]

- 2) [Ø] *Hab ich aufgegessen* — (German)

[PRON.1.SG.] have I up.eaten

"I have eaten it up."

(Simon and Wiese, 2002: 4)

- 3) *ra:ju tanna pustakav-annu hari-ge to:risida* — (Kannada (Dravidian))

Raju selfs book-ACC Hari-DAT. showed

"Raju showed his book to Hari"

- 4) *ra:ju hariy-annu mane-ge kaluhisida* — (Kannada (Dravidian))

Raju Hari-ACC. house-DAT. sent

"Raju sent Hari to (his) house"

(Bhat, 2004: 21)

As can be seen from the examples, the use of pronouns may vary in languages in regard to their markings and they mostly stand for the referring expressions, namely, noun phrases and determiner phrases. Burkhardt (2005) summarizes the general features of pronouns as follows:

Pronominal entities (e.g. *she, you, her, our, himself, themselves*) are referentially dependent elements, as their interpretation is not sufficiently determined by their lexical content (i.e. their morphological feature specifications), and as a consequence, pronominals must rely on a dependency with another entity (i.e. antecedent) to obtain referential content (e.g. Evans 1980; Gernsbacher 1989), or as is the case of indexicals (e.g. *I, you*), they select a discourse referent from the context of utterance (Burkhardt, 2005: 1).

Burkhardt (2005) implicates that pronouns may demonstrate co-referential relations with other entities in sentences or discourse fragments. More specifically, personal pronouns demonstrate these dependency relations. They are regarded as the basic component of the pronouns since they can be seen in almost all languages. In addition, they can be seen in free or bound forms (clitics/affixes). It is asserted that languages with free pronoun are consistent compared to the languages with bound pronouns. On the other hand, bound pronouns obligatorily demonstrate agreement in regard to person, number, gender and case markers in order to show personal differences. For instance, in Jacaltec, which is one of the bound languages, the prefix *ha-* is used to indicate 1st and 2nd person pronouns (Bhat, 2004). However, the agreement makers may or may not be seen in languages with free pronouns. For instance, Bhat (2004) suggest that personal pronouns show differences for gender and number but not for person in Indo-Aryan languages.

On the other hand, the referential content of the pronouns may not be overtly seen in all languages. For instance, such languages as Italian, Spanish, Turkish, French, Arabic, Berber, Hausa, Basque, Chinese, Japanese, Korean, Thai and Vietnamese allow for the optional use of personal pronouns (i.e., I, you, he, she, we, they), while such a use can be seen as ungrammatical in English. These languages are also known as “pro-drop/null subject languages” since they can omit the use of a subject pronoun (Chomsky, 1981; Rizzi, 1982 as cited in Bencini et al., 2011). Examples for the pro-drop languages can be seen as follows:

5) [Ø] *Sono belle!* — [Italian]

are-3.PL. beautiful

“They are beautiful!”

6) *Penso che [Ø] non sappiano parlare* — [Italian]

think-1.SG that not can-3.PL speak

“I think they can’t speak”.

(D'Alessandro, 2014: 1)

7) *(Sinä) puhut englantia* — [Finnish]

You speak-2.SG English

"You speak English".

(Holmberg, 2005:539)

8) *wo cai [e kanjian e le]* — [Chinese]

I guess see LE

"I guess [he] saw [him]".

(Huang, 1984: 533)

9) *Ram mhanala ki ghar ghetla* — [Marathi]

Ram say-PST.3.SG.MASC. that house buy-PST.3.SG.N.

"Ram said that he bought a house".

(Holmberg and Sheehan, 2010:125)

Bencini et al. (2011) state the examples given above show that the pro-drop/ null subject languages utilize pronouns in a phonologically silent way. In addition, Cyrstal (2008: 389) summarizes the features of pro-drop/null-subject languages as follows: they are the languages with "a rich system of verb-agreement, and free inversion of subject and verb".

Considering the interpretation of pronouns, Chomsky (1981) claims that co-referential relations between the referring expressions (NPs) and the antecedents (pronouns) are affected by the morpho-syntactic features, namely person, number gender and the structural relations. To account for these co-referential relations, Badecker and Straub (2002: 748) suggest "linguists distinguish two major classes of referentially dependent expressions: pronominals (*I* or *me*, *you*, *he* or *him*, *she* or *her*, etc.) and anaphors (reflexives [*myself*, *yourself*, *himself*, *herself*, etc.] and reciprocals [*each other*])". These

referentially dependent expressions were governed by the Binding Theory, which explains the syntactic constraints of the NPs and pronouns in sentences (Chomsky, 1981). According to the Binding Theory, the distribution of personal pronouns seem to be different from other pronouns, namely, reflexive and reciprocal pronouns, in that personal pronouns cannot be locally bound (Principle B), on the other hand, reflexive and reciprocal pronouns are bound by an antecedent in their local domains (Principle A). The distribution of the pronouns in regard to the Binding Theory was illustrated in the following sentences:

- 10) “**Anna_i recognized her_i in the picture*”. (Fischer, 2010: 4)

In this sentence, ‘*her*’ cannot refer back to the word ‘*Anna*’, as it leads to ungrammaticality of the sentence by violating the Principle B.

- 11) “*[*Heidi_i said that herself_j discoed with Art*”. (Carnie, 2002: 138)

In this sentence, ‘*herself*’ cannot refer back to ‘*Heidi*’, since it is not locally bound within the same clause. This ungrammaticality results from the violation of the Principle A.

However, the above-mentioned Binding Principles may not account for the discourse-focus restrictions. Badecker and Straub (2002: 750) exemplify this factor as the following:

- 12) “*Tomorrow is Jeff’s birthday. Jeff and Cindy asked the bakery to make a cake for him*”.

- 13) “*John went to visit his girlfriend yesterday and still hasn’t returned. His brother thinks that John eloped*”.

(Badecker and Straub, 2002: 750)

Badecker and Straub (200) claim that the pronouns in the examples above may not be explained clearly by the Binding Principles and there could be different constraints which identify their interpretation. To this end, Lasnik (1976) the pronouns may not be referred back to the NPs in a sentence-internal case, however, their interpretation may

be based on the discourse-pragmatic situations. Therefore, as Kornfilt (1997) suggests, the pronouns could be explained in a broader sense than focusing on sentence-internal rules of the Binding Theory. In this regard, the term anaphora has arisen. Anaphora is a syntactic term that refers to the co-referential relations in at least two constituents within a certain discourse context (Gardelle, 2012). The anaphoric relations of the pronouns (i.e., reflexive, reciprocal and personal pronouns) can be seen in the same sentence or in the preceding sentences. Therefore, the theoretical approaches to the anaphor processing could be assessed in the frames of “syntactic”, “discoursal” and “cognitive-pragmatic” notions.

The grammatical constraints (i.e., the Binding Theory) are employed to the syntactic anaphora. Syntactic anaphora covers the relations of reflexive (i.e., himself) and reciprocal (i.e., each other) pronouns, which are bound in their local domains and the relations of pronominals (i.e., he), which could be bound outside the local domain (Reinhart, 1983 and Zribi-Hertz, 1996 as cited in Gardelle, 2012: 26-28). Carnie (2002) states that a pronoun and an anaphor get their meaning from another nominal expression (antecedent) in the sentence. However, the discourse and cognitive-pragmatic approaches might represent the interpretation of pronouns and anaphors differently. Not only being limited to the same sentence but also going beyond the sentences, discourse anaphora brings a textual approach to the anaphoric elements which derive their meaning from other elements namely, antecedents, in a text. In this view, the antecedent doesn't have to be in the same sentence; however, the antecedent needs to be a part of certain text (Huddleston and Pullum, 2002).

In addition, the cognitive-pragmatic view on the anaphora lays emphasis on the mental representation of the antecedent (Cornish, 1999). The textual method is not totally rejected, however the idea is that the antecedent gives the interpretive meaning to the anaphor either directly or indirectly deriving from the mental presentation of the current discourse. According to Gardelle (2012), both “situational context” and “previous salience” are the key terms in explanation of the antecedent-anaphor relations regarding cognitive-pragmatic views. In other words, it seems to be as a memory related issue to get the mental presentation of the previous salient word.

2.5.1.1. Pronouns in Turkish

Göksel and Kerslake (2005: 230) define pronouns as “the expressions that are used when referring to persons, things or states of affairs that have previously been mentioned, whose referents are obvious from the context or whose content is only partially specified”. They (2005) also state that pronouns are the expressions that substitute for the nouns when there is no need to express the referents clearly. On the other hand, Kornfilt (1997: 209) suggests “any word that belongs to any of the closed set of words (i.e., personal, reflexive, reciprocal, demonstrative, locative and possessive) and exhibits appropriate syntactic and morphological behavior is a pronoun”. The major pronoun categories in Turkish are summarized as follows:

The personal pronouns in Turkish are as follows: “*ben (I)*, *sen (you)*, *o (he/she/it)*, *biz (we)*, *siz (you-plural)* and *onlar (they)*”; the reflexive pronouns in Turkish are given as follows: *kendi (self)* and its inflected forms for person and number. Reciprocal pronouns in Turkish are *birbir- (each other)* and its possessive suffix inflected forms to show the plural person. Demonstrative pronouns in Turkish are: “*bu (this)*, *şu (that)*, *o (it)*, *bunlar (these)*, *şunlar (those)*”. Locative pronouns in Turkish are: “*bura- (here)*, *şura- (here, over there)* and *ora- (there)* and the *wh*-phrase *nere- (where)*” and possessive pronouns in Turkish are: “*benim (my)*, *senin (your)*, *onun (his/her/its)*, *bizim (our)*, *sizin (your)* and *onların (their)*” (Underhill, 1976; Kornfilt, 1997 and Göksel and Kerslake, 2005).

Göksel and Kerslake (2005) argue that pronouns in Turkish demonstrate inflections for number, person and case (i.e., *şunlar (these)* and *orada (there)*). In addition, Erguvanlı-Taylan (1986) claims that the agreement markers of the subject are attached to the verb with the suffix and the free subjects pronouns can be used covertly, as pro-drop if there is no emphatic meaning. The example for the pro-drop use can be seen as follows:

14) a. *Ben iş-e gecik- ti- m..*

I work-DAT late-PST-1.SG.

“I’m late to work”.

b. *Ø İş-e gecik- ti- m*

I work-DAT late-PST-1.SG.

“I’m late to work”.

(Erguvanlı-Taylan, 1986: 210)

As for the anaphoric relations in Turkish, they are defined with reference to zero or pronominal expressions. The example for zero anaphora is given below:

15) *Erol* çalış-ır-ken *Ø* müzik dinle-r.

Erol work-PRES-PROG he music listen-PRES to

“While Erol works, he listens to music”.

(Erguvanlı-Taylan, 1986: 216)

The zero anaphora refers to the omitted part of the sentence. As can be seen in the example above, Turkish allows for zero anaphora.

16) *Ben* [*Erol-u* iyice tanı-yınca]-ya kadar *on-u* başka türlü bir insan zannet-miş-ti-m.

I Erol-ACC. [Ø well get to know-DAT until well] him another type of person think-PERF-PST-1.SG.

“I thought Erol was another type of person until I got to know him well”.

(Erguvanlı-Taylan, 1986: 217)

The co-referential relation is provided with the pronoun in the example above. This means that the zero anaphora cannot be used in all sentences. The ungrammatical sentence given below accounts for the reason for this:

17) **Erol* Nazan'la iki sene çıktıktan sonra nihayet Ø

Erol Nazan-COMIT two year go out-NOM ABLafter finally she-ABL

hoşlandığını itiraf etti.

be fond of-NOM3.SG. POSS. ACC confession

“Erol finally confessed that he likes Nazan after going out with her for two years”.

(Erguvanlı-Taylan, 1986: 218)

On the other hand, taking anaphoric relations into account, the pronouns in Turkish are not always constrained by the Binding Theory and the interpretation of the referential relations may find their antecedents either in or outside the local domain. In this regard, Kornfilt, (1997) claims that reflexive pronouns, reciprocal pronouns and personal pronouns could represent co-referential (anaphoric) relations within and across the sentences. The following examples show the anaphoric relations that can be interpreted in a sentence and in a discourse context, respectively:

18) *(biz) çocuk-lar-a_i [Ø_i birbir -lerln -i_i öp -me -me -lerin -i] söyle-di -k.*

we child -PL.-DAT. Ø E.O. -3.PL.-ACC. kiss-NEG.ANOM.3.PL.ACC. say-PST.1.PL.

“We told the children_i that they_i shouldn't kiss each other_i”.

(Kornfilt, 1997: 160)

19) *Erol_i yemeğ-e gel-ecek mi-ydi?*

Erol dinner-DAT come FUT. Q PST.

“Was Erol_i going to come to dinner”?

20) *Nazan ban-a (on-un) yedi-de gel-eceğ-in]-i söyle-miş-ti.*

Nazan I-DAT he-GEN seven-LOC come-NOM.FUT.3SL.POSS.ACC tell-PERF.PST.

“Nazan had told me that he would come at seven”.

(Erguvanlı-Taylan, 1986: 223)

2.5.1.1.1. Personal Pronouns in Turkish

Personal pronouns are mostly used for assigning animate things. As Underhill (1976) suggests, there is no gender distinction in Turkish personal pronouns. In addition, they can be inflected for case markers such as “ben-i-ACC.” (me), “ona”(him/her) and “onlar-ı-DAT.” (them). The personal pronouns in Turkish are as follows:

‘ben’ (I)	‘biz’ (we)
‘sen’ (you-familiar)	‘siz’ (you-plural/ formal singular)
‘o’ (he/she/it)	‘onlar’ (they)

(Göksel and Kerslake, 2005: 230)

The 1st person plural “we” and “they” could be used in Turkish as honorifics and they are illustrated below:

21) *Efendim, biz sizin kadar bilemeyiz bu konuları tabii ki.*

“Naturally, I cannot know these subjects as well as you [do]”.

22) *Siz şu sıralarda sinemaya gittiniz mi?*

“Have you (both/all) been to the cinema lately?”

“Have you (=formal, singular) been to the cinema lately?”

(Göksel and Kerslake, 2005: 230)

On the other hand, Enç (1986) states that pronouns are free forms and they can be seen in subject position either overtly or covertly. Therefore, they can be used optionally in subject position because the agreement markers attached to the verbs could compensate for the omissions in subject positions. The pro-drop/null subject feature of Turkish pronouns can be seen in the example below:

23) a. *Ben çarşı-ya gid-iyor-um*”.

I market-DAT. go PROG.1.SG.

“I’m going to the market.”

b. *[Ø] çarşıya gidiyorum.*

[I] market- DAT go PROG.1.SG.

“I’m going to the market”.

(Enç, 1986:195-196)

As can be seen from the example, Turkish employs subject-verb agreement in terms of person and number. Therefore, Enç (1986) further adds that although the use of pro-drop subject is frequent in Turkish, the use of subject pronoun differs in regard to the discourse. When the topic changes in a discourse and it does not refer to the previous topic, subject pronouns are overtly used. For instance, the following sentence fragments are considered as a short discourse:

24) *Ali yarın Ankara’ya gidiyor. O bu günlerde çok dalgın.*

“Ali is going to Ankara tomorrow. He has been very absent-minded lately”.

(Enç, 1986: 199)

25) *Kitabı Zerrin’e verdim. O ne zamandır onu okumak istiyordu.*

“I gave the book to Zerrin. She had been wanting to read it for age”.

26) *Bugün Zeliha ve Hakan’la karşılaştım. Onlar taşıyorlarmış.*

“Today I ran into Zeliha and Hakan. It seems they’re moving”.

(Göksel and Kerslake, 2005: 242)

As illustrated above the antecedents of the personal pronouns may not be in the same sentence, however, they can find their antecedents in previous sentences. When these sentences are considered, the 3rd person singular pronoun ‘o’ (*she or he*) and 3rd person

plural pronoun ‘*onlar*’ (*they*) keep the topic function and refer to the previous sentence. To this end, Göksel and Kerslake (2005: 242-254) specifically notes that the referents of personal pronouns could be co-referential with an explicit noun phrase given in the previous sentence since it is identified with the same referent.

2.5.1.1.2. Reflexive Pronouns in Turkish

The reflexive pronoun is defined as a linguistic unit in which the lexical devices, namely, ‘agent’ and the ‘patient’ are related with reference to the referring expression (Faltz, 1977). The relations between subject and object could be expressed with reflexive pronouns. In some languages reflexive meaning could be provided with the affixes, case markers and word order (Cyrstal, 2008). The reflexive pronoun in Turkish is seen as a free form. The reflexive pronouns in Turkish are the following:

kendi (self), the inflected forms *kendi-m* (myself) *kendi-n* (yourself), *kendi-Ø* / *kendi-si* (himself, herself, itself), *kendi-miz* (ourselves), *kendi-niz* (yourself/yourself-politeness), *kendi-leri* (themselves) (Underhill, 1976; Kornfilt, 1997; Özsoy, 1999; Gürel, 2002 and Göksel and Kerslake, 2005).

According to Göksel and Kerslake (2005), the Turkish reflexive pronoun “*kendi*” means self and it may or may not get a person or case marker to refer back to the antecedent. Göksel and Kerslake (2005) further add that “*kendisi*”, which is the inflected form of “*kendi*”, may have genitive-possessive case marker and it seems to be in agreement with the number and person in order to be bound by its antecedent. In addition, Underhill (1976) and Kornfilt (1997) state that third person singular “*kendi*” and “*kendisi*” that refer to the subject may be used in simple sentences without meaning difference. This feature of the 3rd person reflexive pronoun is illustrated as follows:

27) *Ahmet kendin-i/ kendi-sin-i çok beğeniyormuş.*

“(They say that) Ahmet admires himself very much”.

(Kornfilt, 1997: 198)

On the other hand, there is a distinction between the use of “*kendi*” and “*kendisi*” when

they are used in complex sentences. Underhill (1976) and Kornfilt (1997) argue that “*kendi*” is used to refer to the subject of the embedded clause, whereas “*kendisi*” could be used to indicate either the subject of the embedded clause or the subject of the main clause as shown in the following examples:

28) *Orhan, Mehmet'in kendin-e palto almasına sevindi.*

“Orhan was pleased that Mehmet bought a coat for himself–Mehmet”.

29) *Orhan, Mehmet'in kendi-sin-e palto almasına sevindi.*

“Orhan was pleased that Mehmet bought a coat for himself–Orhan or Mehmet”.

(Underhill, 1976: 356).

Therefore, the inflected form “*kendisi*” may not be preferred in complex sentences so as not to lead to ambiguity. On the other hand, “*kendisi*” could be used with the emphatic function to emphasize the subject such as “*ben kendim, onlar kendileri*” (*I myself and they themselves*) (Göksel and Kerslake, 2005: 233).

Similar to the personal pronouns, the reflexive pronoun “*kendi*” and its inflected forms may refer to the subject of its clause or to the subject of the previously mentioned sentence. An example for this situation can be seen as follows:

30) *Ninem çok yaşlı. Artık kendine bakamıyor”.*

“My granny’s very old. She can’t take care of herself any longer”.

(Göksel and Kerslake, 2005: 235)

In addition, the reflexive pronoun could substitute for the subject of the main clause as indicated below:

31) *[Kendimize araba almak] istiyoruz.*

“We want to buy a car for ourselves”.

(Göksel and Kerslake, 2005: 236)

If the reflexive pronoun “*kendisi*” is seen in the embedded clause and refers to the subject of the main clause, it could be replaced by “*o*” as illustrated below:

32) *Ahmet [kendisine/ona hediye vermeyenler]-i sevmiyor.*

“*Ahmet doesn’t like people who don’t give him gifts*”. (*him = Ahmet/someone else*)

(Göksel and Kerslake, 2005: 237)

In addition, the reduplicated use of “*kendi*” may mean that the action is performed alone. An example for the reduplication of “*kendi*” is as follows:

33) *Ahmet kendi kendi-sin-e/kendin-e yurt dışına çıkamaz.*

“*Ahmet cannot go abroad on his own*”.

(Göksel and Kerslake, 2005: 238)

2.5.1.1.3. Reciprocal Pronouns in Turkish

The reciprocal pronoun is defined as the expression used for the mutual action that occur between at least two participants (Lichtenberk, 1999). Kornfilt (1997) puts forth the statement that the Turkish reciprocal pronoun is seen in a reduplicated numeral form *bir* ‘one’, which is inflected with the appropriate possessive suffix. The reciprocal pronouns in Turkish consist of the following elements: *birbirimiz* (1st person plural) “*our each other*”, *birbiriniz* (2nd person plural) “*your each other*” and *birbiri/birbirleri* (3rd person plural) “*their each other*” (Kornfilt, 1997: 158).

As indicated above, the reciprocal pronouns are used in plural forms in order to convey the meaning of the mutual action. The 3rd person plural reciprocal pronouns could be used interchangeably in Turkish without any meaning difference as illustrated below:

34) *Ayşe’yle Semra birbir-in-den/birbir-lerin-den hiç hoşlanmıyor (lar).*

“*Ayşe and Semra don’t like each other at all*”.

(Göksel and Kerslake, 2005: 238)

Kornfilt (1997) states that the scope of reciprocal relations in Turkish is said to be restricted to the clause and there seems to be no limitation or ambiguity on its use in simple and complex sentence structures. Kornfilt (1997) further adds that reciprocal pronoun in the embedded infinitival clause may reach its antecedent in the main clause, which is illustrated below:

35) *Hastalar birbirlerini daha fazla sevmeye çalışıyorlar.*

“The patients are trying to like each other more”.

(Kornfilt, 1997: 160)

On the other hand, Göksel and Kerslake (2005) suggest that rather than being restricted to the clause, the reciprocal pronouns may also refer to the previous sentences. An example can be seen as follows:

36) *Amaç birbirimizi görmektir.*

“The (=our) aim was to see each other”.

(Göksel and Kerslake, 2005: 239)

If the antecedent of the reciprocal pronoun is in the subject position, the NP in subject position may be used as pro-dropped. An example for pro-dropped use as follows:

37) *(Siz) birbir -iniz -i tenkit et -me -yin.*

“Don't criticize each other”.

(Kornfilt, 1997: 158)

In addition, the reciprocal pronouns could be used as the subject of relative and noun clauses as indicated below:

38) *(Siz) [birbirinizin yarışmayı kazanmasını] -ı mı istiyorsunuz?*

“Do you want each other to win the competition”?

39) *(Biz) [birbir-imiz-in sev-diğ-i] renkleri sev-mi-yor-uz.*

“We each don’t like the colours that the other(s) like(s)”

(Göksel and Kerslake, 2005: 239)

2.5.2.Comprehension and Processing of Reflexive, Reciprocal and Third Person Pronouns

There are various studies concerning the comprehension and processing of reflexive pronouns, reciprocal pronouns and personal pronouns (Ehrlich, 1980; Sidner, 1981; Kjellmer, 1982; Gernsbacher, 1989; Nicol and Swinney, 1989; Gernsbacher, 1990; Choy and Thompson, 2010; Stavrakaki and Lely, 2010; Grimm et al., 2011 and Dillon, 2014). This section presents the findings of the related studies.

It is stated that pronouns are encoded in regard to the meaning that they carry in a sentence and that interpretations of the pronouns mostly depend on their salience (Evans, 1980). This means that since pronouns have less semantic information, their meanings could be inferred from the syntactic and semantic features of the sentences in which they are used. However, they could also find their referents sentence externally depending on the discoursal and cognitive demands of the comprehension and processing (Stavrakaki and Lely, 2010). Sidner (1981:217) argues that the interpretation of the pronouns occurs as “determining to which word or phrase an anaphoric expression refers or points”.

There are several researches indicating that antecedents of the pronouns need to be retrieved from the memory to fully comprehend the sentence (Gernsbacher, 1989; Badecker and Straub, 2002 and Thornton and Light, 2006). The earlier studies on the children and adults indicate that the comprehension and processing of the pronouns might be similarly influenced when assigning their referents (Badecker and Straub, 2002 and Runner, Sussman and Tanenhaus, 2003). Grimm et al. (2011) support these studies in that the on-line and off-line performances of the children and adults demonstrated that they had difficulties in both comprehension and processing of reflexive and non-reflexive pronouns. This finding seems to be consistent with the study by Choy and Thompson (2010) who conducted a research on the on-line processing and

off-line comprehension of the pronouns by the Aphasic patients. They (2010) found that the Broca patients had difficulty in comprehension and processing of the aforementioned pronouns. However, the studies on the AD patients demonstrate different results. It is argued that the on-line processing of the pronouns by the AD patients may not show impairments as much as the off-line comprehension of them (Kempler et al., 1999). In addition, Kemper and Sumner (2001) also argue that due to the decreased cognitive demands on the WM when performing an on-line test, both older adults and the AD patients are expected to be better on the on-line tests compared to the off-line tests, which increase the memory demands.

The reflexive pronouns refer to the 'self', and their referents are found in the same domain. More specifically, the studies on the reflexive pronouns indicate that reflexive pronoun is limited by the syntactic and discoursal functions (Kaiser et al. 2009; Kuno 1972; Pollard and Sag 1992; Reinhart and Reuland 1993; Runner et al. 2003, 2006; Sells 1987 as cited in Dillon, 2014). In addition, King et al. (2012) claim that when the reflexive pronouns are close to the subject, their processing or comprehension are not sensitive to the interference effects. This means when reflexive pronouns are separated from their antecedents they may be hard to comprehended and processed. However, if all the linguistic resources are active in the retrieval process, morpho-syntactic and discoursal features support the matching of the reflexive pronouns. In addition, Nicol and Swinney (1989) argue that the facilitative effect of the potential antecedent of a reflexive pronoun depends on the semantic associations as well. This indicates that such agreements as gender-number, syntactic domain, the contextual information and semantic relatedness are all influential factors in the comprehension and processing of reflexive pronouns.

Concerning reciprocal pronouns, it is assumed that reciprocals demonstrate two-way reflexive relationship (Potter, 1953 as cited in Kjellmer, 2015). In other words, such structures may refer to double or multiple antecedents within the same clause. As a result, these double or multiple readings of the reciprocals lead to a difficulty in their interpretation. Dillon (2014) claims that reciprocal pronouns are inaccessible antecedents in that the double match conditions affect the comprehension or processing

of the reciprocal pronouns. In short, the multiple potential readings of reciprocals make it difficult to comprehend or process them. Phillips et al. (2011 as cited in Dillon et al., 2013: 179) account for this as an “illusion of grammaticality”, which arises when the assignment of the reciprocal pronouns is interrupted. Dillon et al. (2013) also state that the similar representation of the reflexive and reciprocal pronouns in the WM may lead to this encoding interference. However, Badecker and Straub (2002) argue that such problems in processing or comprehension could show variation across the languages and the individual processing mechanisms could also affect this process. Furthermore, the illusion of grammaticality could be due to “the flexible semantic value of the reciprocal pronoun” (Philip, 2000: 1). Philip (2000) argues that the reciprocal pronouns are comprehended with difficulty by the children and adults. Philip (2000) also accounts for this situation with the multiple meanings and vagueness of the reciprocal pronouns. In addition, Badecker and Straub (2002) claim that even gender and number agreements do not seem to facilitate the accessibility of the reciprocal pronouns. They (2002) further state that the reciprocal pronouns have weaker relations with their antecedents while the reflexive and personal pronouns have relatively more transparent referential relations with their antecedents. This indicates that multiple plural meanings of the reciprocal pronouns may be assigned differently according to the contextual information given in a sentence or a discourse.

On the other hand, the 3rd person pronouns refer to the other referring expressions that may or may not be seen in the local domains. As Nicol and Swinney (1989) suggested, the personal pronouns have potential antecedents, but their antecedents are understood through interactions with the syntactic or discoursal constraints. Their referents could be clearly seen in regard to referential dependencies. Sidner (1981) claims that if the focus of the pronoun is in the end of the sentence, the comprehension or processing might take longer times and might be difficult until the semantic and syntactic interpretation is encoded. Sidner (1981: 221) further argues that mid- sentence interpretation might be easier due to the simplification and closeness of the 3rd person pronoun to the subject. This indicates that the comprehension or processing of the proper antecedent may be influenced by various linguistic constructions, including the complexity of the sentence, the length of discourse and the focus of the 3rd person pronoun. On the other hand, the

number, gender and case attached to the 3rd person pronouns may lead to different readings on the specification of their referring expression. In addition, the comprehension or processing of personal pronouns could also be affected by the discourse and pragmatic factors. Sidner (1981) suggests that if the interpreter does not know the contextual information, there might be a semantic ambiguity in identifying their referents.

Overall, during the comprehension and processing process, individuals employ a discursal or sentential description, which includes encoding the syntactic, semantic, cognitive and pragmatic relations in a sentence or in a preceding sentence. Therefore, the pronoun comprehension and processing depend on encoding the meaning of them in a given context by making an inference. On the basis of the comprehension and processing of the above mentioned pronouns, it could be stated that the reflexive and 3rd person pronouns could be better comprehended or processed compared to the reciprocal pronouns since they demonstrate differential retrieval representations.

CHAPTER 3 : METHODOLOGY

This section presents information about the participants, data collection tools, data collection procedures and data analysis.

3.1. PARTICIPANTS

The sample distribution is an important fact as the selected participants to represent the profile of the sample used in the research. In line with this, Cresswell (1994 as cited in Wang, X. Q., 2013: 97) established sampling criteria as in the following: “(1) To identify the study population; (2) to identify whether the sampling is single or clustered; (3) To identify the selection process for individuals; (4) To identify whether the study requires particular representative samples; (5) To discuss the procedures for sample selection; and (6) To confirm the number of people in the sample”.

Following this procedure, the sampling population was restricted to Turkish native speakers in Ankara. Fraenkel and Wallen (2003: 124) listed the succeeding minimum sample size as a guidance: “100 for descriptive studies, 50 for correlational studies, and 15 to 30 per group in experimental studies depending on how tightly controlled they are”. On the other hand, according to the numbers gathered from Alzheimer Europe¹⁵ (2014), the prevalence of the AD between the age group 70 to 89 in Turkey was found to be 240.889 in total. In order to determine the representative number of participants to be used in the study, the software named Creative Research Systems (2003) was used. It was designed to calculate the sample size for a demanded confidence interval. In accordance with the sample size calculator results, it was found that at least twelve mildly impaired Turkish-speaking AD patients and twelve matched healthy subjects should participate in the study. The experimental and healthy control groups were matched in terms of age, gender and education. Ages of both groups were limited to 70-89 years according to the prevalence studies by United Nations and World Health

¹⁵ Detailed information for the Alzheimer’s population in Turkey can be accessed at <http://www.alzheimer-europe.org/Policy-in-Practice2/Country-comparisons/The-prevalence-of-dementia-in-Europe/Turkey>.

Organization.¹⁶ Another point taken into consideration regarding the prevalence of the disease is that the ratio of the AD incidence seems to be high among women compared to men. According to the calculations of the Aging, Demographics, and Memory Study (ADAMS), “16% of women and 11% of men over the age of 71 years” suffer from the Alzheimer’s disease (Prince et al., 2016).

The AD subjects were recruited from the Psychiatry Health Service Geriatric and Aged Care units of Hacettepe University. Patients were born in Turkey and they were native speakers of Turkish. Turkish was their primary language. Those AD- patients were excluded from the research if they were diagnosed as experiencing some other disorders such as severe depression, diabetes and other psychiatric disorder. In addition, the participants were required to have sufficient hearing, vision and be native speakers of Turkish language and collaborative. The AD subjects taking more than five years formal education was selected for the study. Written informed consent to get involved in the study was received either from participants or their primary caregivers.

On the other hand, the control group was selected among those from Turkey retirement association, community centers and neighbors. The controls were also born in Turkey and they were native speakers of Turkish. Turkish was their primary language. The control group did not significantly differ from the AD patients in terms of age or educational background. The participants who have more than five years of formal education were included in the control group. They were also required to have sufficient hearing and vision, to be native speakers of Turkish language and to be collaborative. They were excluded from the study if they had any psychological or other neurological

¹⁶ The percentage of prevalence studies in Turkey indicates that the AD has been frequently observed over 60 years, as well as appearing in 40’s and 50’s. On the basis of the clinical findings, the participants of this study comprised of 60+ years Turkish Alzheimer’s patients. According to the criterion put forth by United Nations (Weinberger, 2001) and World Health Organization (2002) for Turkey, healthy older adult participants were also chosen from 60+ years older adults (as cited in Devlet Planlama Teşkilatı, 2007: 2).

disorders, and if they had scored less than 23 on the Standardized Mini Mental State Examination (Güngen et al., 2002).

On the basis of the above-mentioned criteria for participant selection, a total of forty-two participants took part in the study. Of them, twenty formed the experimental group (the AD patients) and twenty- two the control group. The demographic information about the subjects is presented in Table 2 below.

Table 2. Demographic information about subjects

		Experimental Subjects (AD)		Control Subjects	
		N	%	N	%
Gender	Female	11	55	13	59.1
	Male	9	45	9	40.9
	Total	N=20	100	N=22	100
Education	Secondary	4	20	7	31.8
	High	5	25	5	22.7
	University	11	55	10	45.5
	Total	N=20	100	N=22	100
		%	47.6	%	100
			$\chi^2=0.772$	p = 0.680	df = 2
Age	Median	72.00(min.)		70.00(min.)	
		87.00(max.)		88.00(max.)	
	Mean Age	79.5		77.2	

Notes: * N; Number; Min; Minimum, Max; Maximum, AD; Alzheimer's disease

** Chi – square – p >0.05

As can be seen in Table 2, the total number of experimental subjects is twenty mildly diagnosed DAT patients (nine male, eleven female). The number of experimental subjects with secondary school, high school and university education levels are as follows: four (20%), five (25%) and eleven (55%), respectively. The mean age of experimental subjects is 79.5 (range 72; - 87).

Table 2 indicates that the total number of control subjects is twenty- two (nine male, thirteen female). As stated before, their age, gender and education were matched with the experimental subjects. The number of control subjects with secondary school, high school and university education levels are seven (31.8 %), five (22.7 %) and ten (45.5 %), respectively. The mean age of control subjects is 77.2 (range 70; - 88).

Overall, there is no statistically significant difference between the experimental and control subjects in terms of their gender (AD female = 55%; Control female = 59% vs. AD male = 45%; Control male = 40.9%) and education levels (AD = 47.6%; Control = 52.4%, $\chi^2=0.772$, $p = 0.68$). In terms of their age, the control group is slightly younger than the experimental group (Control M= 79,5, AD M= 77,2, respectively). However, the results of Mann-Whitney U test show that this difference is not statistically significant ($U=164.00$, $p = 0.158$).

The use of these data for research purposes was approved by the Non-invasive Clinical Research Ethics Committee of the University of Hacettepe (NO GO15/698-10). The participant information sheet and the consent form are given in Appendix 1.

3.2. DATA COLLECTION

This section introduces the tools used in the study to gather data and the procedures followed in the experiments. It also provides information about how the data collected from the experiments are analyzed.

3.2.1. Data Collection Tools

The data of the study were gathered through the administration of three data collection tools: the Standardized Mini- Mental State Examination, the Sentence-Picture Matching and the Cross-Modal Naming. Two different measurements on the sentence comprehension and the sentence processing, namely, off-line and on-line tests were used in the study since the data collected through these tools complemented each other (Tyler, 1992 a, b). Each data collection tool is described as follows:

3.2.1.1. Standardized Mini-Mental State Examination

The Mini-Mental State Examination (MMSE) was developed by Folstein et al. (1975). It was adapted by Güngen et al. (2002) into Turkish and was renamed as the Standardized Mini-Mental State Examination (SMMSE). The goal of this test is to measure the mental state of subjects by deciding upon the memory levels of people. It consists of eleven simple items in order to evaluate such cognitive aspects of the mind as “orientation, registration, attention-calculation, recall and language” (Folstein et al., 1975: 189). The orientation dimension, which consists of time and place items, requires subjects to tell the year, season, month, date and day through the time item and the country, city, town, hospital/building and floor through the place item, respectively (Folstein et al., 1975: 196). In the registration dimension, the expert names the three objects namely, blue, hawk and tulip, and asks the subject to repeat the name of those objects (Folstein et al., 1975: 196-197). The attention-calculation dimension requires the subjects to do certain activities such as either subtracting 7 from 100 to 65 or spelling the “WORLD” backward (Folstein et al., 1975: 197). The recall dimension involves the renaming of the three objects learned in the registration dimension. The language dimension involves the following activities: Naming of the two objects (pencil, watch), repetition of the following sentence: “no ifs, ands or buts”, reading and following command “close your eyes”, three step command “take paper in right hand, fold in half and put on the table”, write a sentence and copy of the design (Folstein et al., 1975: 197-198).

The maximum score of the SMMSE test is 30. According to Tombaugh and McIntyre (1992), those taking above 23 or 24 out of 30 are regarded as normal. However, those taking 18-23 and 0-17 are classified as mildly and severely impaired, respectively. It was administered to both experiment and control groups in the study. The SMMSE used in the study is given in Appendix 2.

3.2.1.2. Sentence-Picture Matching

The second data collection tool is the Sentence-Picture Matching (SPM). This tool was developed and adopted by the author. It is an off-line comprehension test requiring participants to select the picture compatible with the marked sentence. Pictures and

sentences are composed of the sentence-picture matching and co-indexation of reflexives tests, which are developed by Rochon, Waters and Caplan, (1994) and Waters and Caplan, (1997). The goal of the tool is to assess particular linguistic knowledge as well as visual memory demands. Therefore, this test was designed to determine both interpretation skills of participants and the syntactic complexity effects on the processing of reflexive and reciprocal pronouns.

A pilot study of the SPM test was carried out with 78 subjects (35 female and 43 male) who had no medical problems. Their ages were between 40- 70 and their education levels were matched. On the basis of the results from this pilot testing, the pictures and sentences were revised and finalized. Then, the validity and reliability analyses of the tool were done. For the validity and reliability of the analyses, the SPM test was employed to 60 age, gender and education matched elderly participants with two weeks interval. The results demonstrated that the validity and reliability of the tool are sufficiently high: two-stage evaluation of experts was .73 and .96, respectively. The coefficient of Cronbach, Alpha was .69, test-retest reliability was .78 and the Pearson's rho correlation between the SPM and SMMSE tests is positive and significant ($r=0.410$, $p = 0.001$). In addition, a norming study was carried out with 4 mild AD patients (1 male and 3 female) and 1 moderate AD patient (male). The norming study showed the convenience of studying with the mild AD patients. The SPM is given in Appendix 3.

Mackey and Gass (2005) suggest that when the number of sentences is increased, the subjects might be disrupted and their judgments could be suspicious. They further argue that less than 50 sentences should be included in experimental studies. On the basis of these assumptions, the stimulus material is consisted of 24 sentences matched for complexity and anaphora variables -twelve reflexive (six simple, six complex) and twelve reciprocal (six simple, six complex). All sentences include just one antecedent for both reflexive and reciprocal pronouns. As the mild AD patients might have trouble in comprehension of the SPM test, the filler sentences were not used in this test. The Sample sentences are as follows:

40) *Ayşe ve Fatma kendi-ler-ine bakı-yor-lar.*

Ayşe and Fatma self- 3.PL.DAT look-PROG.3.PL.

“Ayşe and Fatma are looking at themselves”.

41) *Ayşe ve Fatma birbir-leri-ne bakı-yor-lar.*

Ayşe and Fatma E.O.-3.PL.DAT. look- PROG.3.PL.

“Ayşe and Fatma are looking at each other”.

42) *Öğretmen, Ayşe ve Fatma’nın kendilerine bakma-lar-ını isti-yor.*

Teacher Ayşe and Fatma-GEN. self- 3.PL.DAT to look at-3.PL.ACC want-
PROG.1.SL.

“The teacher wants Ayşe and Fatma to look at themselves”.

43) *Öğretmen, Ayşe ve Fatma’nın birbir-ler-ine bakma-lar-ını isti-yor.*

Teacher Ayşe and Fatma-GEN. E.O.-3.PL.DAT. to look at-3.PL.ACC want-
PROG.1.SL.

“The teacher wants Ayşe ve Fatma to look at each other”.

The following Turkish anaphors were used in the study: *kendileri* “themselves”, *kendi/kendisi* (bare or inflected forms) “himself/herself” which are reflexive pronouns and *birbirleri* “each other”, which is a reciprocal pronoun. It is argued that the sentence length could affect the comprehension; thus, sentences were restricted to five to ten words in order to control the effects of syntactic complexity (see Caplan and Waters, 1999; Leikin and Bouskila, 2004 for details). In the study, this tool was used in Experiment 2 and administered to the both experimental and control groups.

3.2.1.3. The Cross-Modal Naming

The third data collection tool is the Cross-modal Naming (CMN), which is an on-line method used to scrutinize the participants’ processing without imposing certain memory

demands. The CMN involves the pronoun-antecedent agreement test. It was developed by Almor et al. (2001) and was adapted into Turkish by the author. Each sentence in the original tool was translated into Turkish and reviewed by six field specialists. Based on their feedback, the items were reviewed and finalized. A norming study of this test was carried out with the same 4 mild AD patients (1 male and 3 female) and 1 moderate AD patient (male) who participated in the previous experiment. The results demonstrated that the mild AD patients could complete the test with less difficulty, however the moderate AD patient could not complete this test. This test also showed the convenience of studying with mild AD patients.

Total number of items in the tool is 40. The stimuli are comprised of twenty short and twenty long conditioned auditory discourse fragments followed by two visual target pronouns, one of which was proper for the co-referential maintenance while the other one was not. Since the mild AD patients could have difficulty in the processing of discourse, filler sentences were not used in this test as in the original format. The discourse fragments involved an introductory sentence that presented one singular, and one plural entity. The 3rd person pronouns constituting singular pronoun “*ona-onu*” (him/her) “lacking gender distinctive marker in Turkish” and plural pronoun “*onlara-onları*” (them) were presented as visual targets on the computer. In short conditioned discourse fragments, only introductory and concluding sentences were used. However, the target pronouns are detached from their antecedents with a middle sentence in the long conditions. The 3rd person pronouns were not presented at the end of the sentence fragments as in English. Related examples are given as follows: the first sentence “*The football players took the lucky boy to the big game*” interpreted as “*Futbolcular şanslı çocuğu kendi derbi maçına götürdü*”. The second statement maintained a uniform topic. However, it did not refer to the entities regarding the first fragment. Thus, the sentence “*The stadium was completely packed*” was presented as “*Stadyum tamamen doluydu*”. The final sentence fragment including suitable and unsuitable continuation pronouns “*At half time the boy waved to _ (him/them)*” was given as “*Devre arasında çocuk _ (ona/onlara) el salladı*” (adapted from Almor, 2001). The gap in the paragraph “*Futbolcular şanslı çocuğu kendi derbi maçına götürdü. (Stadyum tamamen doluydu.) Devre arasında çocuk _ (ona/onlara) el salladı*” would be filled with the 3rd person

pronoun “*onlara*” (them), rather than the pronoun “*ona*” (him). In developing the CMN, the steps below were followed: (1) software package was designed by a computer expert in C Sharp,¹⁷ (2) the auditory stimuli were digitally recorded using Sony recorder and high sensitive stereo microphone. In the recording, the person on the tape, who was a professional speaker, read the sentences without laying particular emphasis on any of the pronouns so as not to lead participants to a specific interpretation, (3) the discourse-pronoun items were digitally transferred to the Lenovo classic computer. This tool was used in Experiment 3 and was administered to both groups. The discourse-pronoun items covered in the tool are given in Appendix 3.

The correlation coefficient relations of the data collection tools, namely, the SMMSE, the SPM and the CMN tests, were analyzed using the Spearman’s rank correlation coefficient. It appears that the SPM test and the SMMSE test and the SPM test and the CMN test are correlated ($r=0.270$, $p>0.05$ and $r=0.557$, $p<0.05$, respectively). Therefore, it is safe to state that the data obtained from the SPM test and the SMMSE test are consistent and those from the SPM test and the CMN test complement each other. In short, the data obtained from the SPM are correlated with the data from the SMMSE, and with those from the CMN test.

3.2.2. Data Collection Procedures

As stated earlier, the data of the study were collected using three different tools, which were administered to the participants in three experiments. The procedures followed in each experiment are explained as follows:

3.2.2.1. Procedure of Experiment 1

In the first experiment, participants were tested using the SMMSE task (Güngen et al., 2002). The mildly impaired Turkish-speaking AD patients were diagnosed by the experts’ administration of this test at the Psychiatry Department of Hacettepe

¹⁷ C-sharp (C#) is “a simple, modern, object oriented, and type-safe programming language” (Hejlsberg et al., 2006:15).

University. In the same vein, the author administered it to the healthy older adults under the guidance of a field expert. Both the mild AD patients and the healthy control group were tested in an available room. The experiment was conducted as follows:

First, the participants were informed that their personal information would be kept confidential. After a warm-up session, each question was read and the participants were asked to follow the commands. They were asked to write a meaningful sentence and copy the presented graphic. Their responses were evaluated according to the points given per category (Tombaugh and McIntyre, 1992). The application of the test took nearly ten minutes per participant.

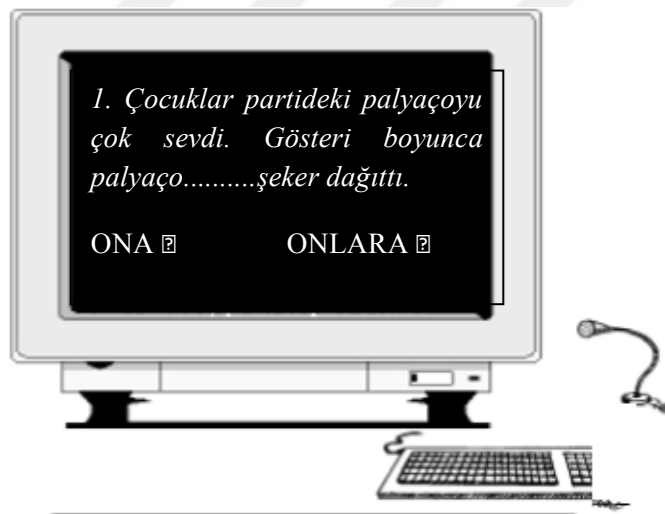
3.2.2.2. Procedure of Experiment 2

In the second, the SPM test was administered to the participants individually. This process began with a brief explanation of instructions. Both experimental and control subjects were asked to select one of the two pictures corresponding to the sentence that they heard. Each picture was drawn on A3 format so that they were clearly visible to the elderly adults. The stimuli consisting of twenty-four sentences were read by the author. Two pictures were presented for each sentence in order to allow the participants to see only two pictures at a time. Therefore, they were not influenced by the previous or next pictures. In this task, the participants were expected to keep the sentence meaning in their memory while matching them with the pictures. There was no time limitation on the task and sentences were reiterated if necessary. The entire session was recorded. The responses by the participants were recorded by the author using a paper-pencil instrument. The experiment lasted approximately twenty minutes per participant.

3.2.2.3. Procedure of Experiment 3

In the third experiment, the CMN task, which was conducted by the software program was carried out. In the process, both experiment and control groups were tested individually. Each participant was first instructed and then, assessed in a quiet office, holding a seat in front of a Lenovo classic computer. The 40 stimuli were presented on a portable PC. The auditory stimuli were given by means of a high quality loudspeaker, which was adjusted so that the participants could hear the stimuli appropriately.

Participants heard discourse fragments in short and long conditions and they tried to choose the appropriate personal pronoun, which was co-referential with their antecedents (e.g., ‘*onlar*’ for ‘*plural entities*’). A Latin Square design was employed to control the testing conditions (i.e., long, short, singular, plural). This design allowed us to make valid inferences from the responses. All participants were asked to read out the visual targets, namely 3rd person singular or plural pronouns, as soon as possible. In case of forgetting or confusing, the experimenter pressed the button when the participants read aloud the target words. All participants were measured in terms of choosing pronouns (appropriate, inappropriate), and reaction times in this experiment. The responses were recorded by a software package used in Lenovo classic computer and the data were transferred onto the Excel programme by the author. The administration of the test took almost twenty minutes per participant and a short break was given after twenty auditory stimuli. The following figures exemplify the procedure of the short and long conditioned sentence fragments and the proper answers tested in Experiment 3:



“The children loved the silly clown at the party. During the performance the clown threw candy to..... (HIM ✗/ THEM ✓)”

Figure 2. Short conditioned sentence fragment



“The children loved the silly clown at the party. The show was very funny. During the performance the clown threw candy to..... (HIM ✗/ THEM ✓)”

Figure 3. Long conditioned sentence fragment



“The young boy took the seniors through the garden. (The air was cool and crisp.) After the tour, the seniors tipped..... (HIM ✓/ THEM ✗)”

Figure 4. Short conditioned sentence fragment



“The young boy took the seniors through the garden. After the tour, the seniors tipped..... (HIM✓/ THEM✗)”

Figure 5. Long conditioned sentence fragment

3.2.3. Data Analysis

In the study, several statistical analyses were employed to test the data obtained in the experiments given above. The descriptive statistics including the minimum, maximum and means scores and standard deviation, the Mann-Whitney U test and the Wilcoxon Signed Rank test were used in the study. Field (2000: 15, 49, 54) suggests that descriptive statistics is used for “general data exploration” and if the standard deviation of the data is not normally distributed in two groups and the number of subjects are less than 30 per group, the significance relation could be analyzed with the use of non-parametric tests (i.e., the Chi-square, the Mann-Whitney U test and Wilcoxon’s Signed Rank test). Field (2000) further argues that the non-parametric Mann-Whitney U test is employed to examine the significant differences when different participant groups are compared. On the other hand, the Wilcoxon Signed Rank test is used to compare the individual scores of the same subjects when repeated measures are employed and the Chi-square is used in determining the differences between the categorical variables such as “education, gender, pregnancy and voting in an election” (Field, 2000: 54, 59). The non- parametric tests employed in the participant selection, as well as in all three experiments.

For the selection of the participants, age, education and gender distribution of the subjects were first analyzed using the descriptive statistics, providing the minimum, maximum and mean scores and standard deviation. When the descriptive statistics did not show normal distribution, given that the number of subjects is less than $N=30$, the Mann-Whitney U or the Chi-square non-parametric tests were to be employed to compare and reveal whether there were any significant differences between the AD group and control group regarding the aforementioned variables.

Concerning the analysis of the data collected in Experiment 1 (the SMMSE test), both the descriptive statistics and the Mann-Whitney U test were employed. To determine the memory levels of the AD group and control group, the correct scores of the SMMSE test were calculated by using descriptive statistics. In addition, the Mann-Whitney U test was employed in order to reveal whether or not the SMMSE test scores of the AD group significantly differed from those of the control group.

The data obtained in Experiment 2 (the SPM test) were also analyzed using the descriptive statistics. In addition to the descriptive statistics, the Mann-Whitney U test was used to compare and uncover whether there were any significant difference between the performance of the AD group and the control group. The data obtained in Experiment 2 were also analyzed using the Wilcoxon Signed Rank test in order to investigate whether or not the individual scores of the AD group and control group differed in regard to the comprehension of different structures namely, simple reflexive and simple reciprocal, complex reflexive and complex reciprocal; complex reflexive and simple reflexive, complex reciprocal and simple reciprocal. Based on the difficulty of the items, the answers by the both groups were given the points ranging from one to five. Table 3 below shows the scores assigned to the SPM items.

Table 3. Scores for the SPM test items

Answers to the items	Scores
Incorrect answers	1
Correct answers for simple sentences with reciprocal pronouns	2
Correct answers for complex sentences with reciprocal pronouns	3

Correct answers for simple sentences with reflexive pronouns	4
Correct answers for complex sentences with reflexive pronouns	5

The data obtained in Experiment 3 were also analyzed using descriptive statistics. The reaction times and accuracy scores of the AD group and the control group were calculated under the discursal conditions tested. Inaccurate responses were given zero and accurate ones were given one point. When the descriptive statistics did not show normal distribution in either the AD group or the control group, the data of Experiment 3 were examined using the Mann-Whitney U test in order to reveal whether or not the differences between the AD group and control group were statistically significant or not. In order to see how the 3rd person pronouns were processed by the AD group and the control group, their appropriate naming of the 3rd person pronouns, the effect of the number agreement (singular vs. plural) and the length values consisting of short and long conditioned sentence fragments were analyzed through the Mann-Whitney U test. Furthermore, in order to uncover whether or not there are any significant difference between the individual performances of the AD group and the control group, their accuracy results on the short and long sentence fragments and their reaction times were analyzed using the Wilcoxon Signed Rank test.

The whole analysis was done using the SPSS 21.0 for Windows Operating System.

CHAPTER 4 : FINDINGS AND DISCUSSION

As stated earlier, the aims of this study are to reveal the mental status and the nature of the sentence processing and comprehension of the mildly impaired Turkish- speaking Alzheimer Disease (AD) patients in terms of reflexive, reciprocal and 3rd person pronouns. The study also aims at identifying the differences between the mild AD patients and the healthy control subjects in terms of sentence comprehension and processing. In order to reach these aims, three experiments were designed and carried out. This section presents an analysis of the findings obtained through these experiments. First, the data on the differences between the mental status of Turkish-speaking AD subjects and the mental status of healthy control subjects were presented by means of the SMMSE scores. Then, the data on the comprehension of reflexive and reciprocal pronouns were discussed. As a final step, the data about the processing of the 3rd person pronouns was examined and discussed. The findings obtained from the last two experiments were also discussed on the basis of the predictions of the following hypotheses: (Interpretive) Syntactic Deficit Hypothesis or the (Post-Interpretive) Working Memory Deficit Hypothesis or Informational Load Hypothesis.

4.1. DISCUSSION OF THE FINDINGS

The following section presents the discussion of the findings. It is organized based on the three research questions of the study.

4.1.1. Findings of Experiment 1 (SMMSE test)

As stated earlier, Experiment 1 was designed to see whether or not there were certain differences between the Turkish speaking-AD patients and that of the healthy control subjects in regard to SMMSE scores. Therefore, it serves for answering the first research question: Is there any significant difference between the SMMSE scores of the Turkish-speaking AD patients and non-AD subjects?

To this end, the SMMSE test was administered to the participants. On the basis of this test, patients with mild AD were supposed to demonstrate decreased word retrieval in the SMMSE test, which indicates the lower degree of their mental status. In the early stage of the disease, it is also assumed that the mild AD patients might have a slight

decrease in storing and rehearsing information because of the declines in attention (Baddeley et al., 1991).

Descriptive statistics on the total scores of the SMMSE test including the minimum, maximum and mean scores and standard deviation are given in Table 4.

Table 4. Descriptive statistics on the total scores of the SMMSE test

	N	Min.	Max.	Mean	Std. Deviation
AD	20	16.00	28.00	22.65	3.96
Control	22	25.00	30.00	27.64	1.43

Note: * Min; Minimum, Max; Maximum, Std; Standard Deviation, AD; Alzheimer's disease

As can be seen in Table 4, the minimum scores of the Turkish-speaking AD group is 16.00 and the minimum scores of the control group is 25.00, respectively. The maximum scores of the AD group are 28 and the maximum scores of control group are 30, respectively. The reason for this closeness in the maximum scores might be due to the higher education levels of the AD group. This view was supported by Weiss et al. (1995 as cited in De Silva and Gunatilake, 2002: 137) who suggest "as the instrument (SMMSE test) has several items that require literacy skills, performance at the MMSE is influenced by level of education and literacy". As for the mean scores and standard deviation, the scores of both groups are as follows: AD: $M = 22.65$, $SD = 3.96$ and control: $M = 27.64$, $SD = 1.43$, respectively. The standard deviation illustrates that the scores of the control group demonstrates normal distribution contrary to the Turkish-speaking AD group's scores.

The total SMMSE scores of both groups were analyzed using the Mann-Whitney U test since the SMMSE results showed different distribution between the Turkish-speaking AD group and the control group. The test was employed in order to see whether the results were statistically significant and to determine whether the heterogeneity in the

Turkish-speaking AD patients' scores affect the significance relation between the mean scores and total ranks in both groups. The results of the Mann-Whitney U test are given in Table 5.

Table 5. Results of the Mann- Whitney U test

Group	N	Mean Rank	Sum of Rank	U	p
AD	20	12.58	251.50	41.500	.000
Control	22	29.61	651.50		

Note: * Mann- Whitney U test - $p < 0.05$, AD; Alzheimer's disease

As can be seen in Table 5, there is a statistically significant difference between the SMMSE scores of the Turkish-speaking AD and control subjects ($U=41.50$, $p = 0.000$). The mean rank of the subjects in the control group is higher than the mean rank of Turkish-speaking AD patients (Control: mean rank = 29.61 and AD: mean rank= 12.58, respectively). In addition, the sum of rank value for the Turkish-speaking AD group is 251.50, while the healthy control group has the sum rank of 651.50. Both the mean ranks and sum of ranks values indicate that the Turkish-speaking AD group has significantly lower performance compared to the control group. As Lacy et al. (2015: 146) suggested “a cutoff of ≤ 25 is useful in screening cognitive impairment”. Consistent with the previous studies (i.e., Tombaugh and McIntyre, 1992; Werner et al., 1999; De Silva and Gunatilake, 2002 and Sevigny et al., 2010), almost all of the Turkish- speaking AD subjects have scores below the cutoff score and all the control subjects have scores above it (AD: mean rank = 12.58 and control: mean rank = 29.61, respectively). On the other hand, the findings of the related studies suggest that the loss in certain items indicates a decline in mental abilities of AD patients (Folstein et al., 1975; Folstein and Whitehouse, 1983; Heyman, 1984; Kaszniak and Wilson, 1985; Molloy and Standish, 1997; Ismail et al., 2010; Lacy et al., 2015).

According to Folstein et al. (1975: 189), the SMMSE test items are categorized into six groups, namely “orientation, registration, attention-calculation, recall, language, visual

construction". However, the current studies appear to have concentrated on the total scores taken from some of the items such as working memory, in which registration and attention-calculation points are calculated together (Jefferson et al., 2002; Lacy et al., 2015). Based on the earlier findings, the SMMSE performances are examined by focusing on both individual and associated items in this study. The scores taken from individual and associated items were analyzed through the use of the minimum, maximum and mean scores as well as the standard deviation, and the results of the descriptive statistics are given in Table 6.

Table 6. Results of the descriptive statistics of the scores on the individual and associated items of the SMMSE test

Group	Test item	N	Min.	Max.	Mean	Std. Deviation
AD	Orientation (time and place)	20	3	10	7.20	2.29
Control	Orientation (time and place)	22	10	10	10	.00
AD	Working memory (registration+attention- calculation)	20	3	10	7.30	2.00
Control	Working memory (registration+attention- calculation)	22	6	11	9.10	1.27
AD	Language (naming, repetition, three command,	20	4	9	8.15	1.23

	reading, writing)				
	Language				
Control	(naming, repetition, 22 8 9 8.55 .51 three command, reading, writing)				
AD	Recall	20 0	2	.60	.82
Control	Recall	22 0	3	1.60	1.05

Note: * Min; Minimum, Max; Maximum, Std; Standard Deviation, AD; Alzheimer's disease

Table 6 presents the descriptive statistics results. These scores describe the general performances of both the Turkish-speaking AD and control groups in regard to the sub-dimensions of the SMMSE test, namely orientation, working memory, language and recall.

Concerning the orientation dimension of the SMMSE test, which covers both time and place, the minimum scores of the Turkish-speaking AD subjects are as follows: the AD: min.= 3 and control: min.= 10, respectively. On the other hand, the maximum scores are found to be the same for both groups (max. = 10 in each group). It is also seen that there are some AD patients who obtained full score on this dimension. When the mean scores and standard deviation in relation to the orientation sub-dimension are considered, the scores of the both group are the following: Control: M = 10, SD =0.000 and AD: M = 7.20, SD = 2.29, respectively. Another remarkable finding is that the standard deviation of the control group is 0.000. It means that each control subject has the same score in regard to orientation. In addition, the minimum, maximum and mean scores are also the same for the control group.

Concerning the second dimension of the SMMSE test, namely, the working memory (WM) dimension, which consists of the registration (immediate memory) and attention-calculation items of the SMMSE test, the minimum scores of the control group are 6

while the minimum scores of the AD group are 3. However, the maximum scores of both groups seem to be closer (AD: max. =10 and control: max. =11, respectively). The mean scores and standard deviation of the Turkish speaking AD patients and the control group are as follows: AD: $M = 7.30$, $SD = 2.00$ and control $M = 9.10$, $SD = 1.27$, respectively. The standard deviation of the AD patients does not demonstrate a normal distribution in the working memory dimension, while the standard deviation of the control group demonstrates a normal distribution in the working memory dimension.

There is an interesting situation in regard to the answers given to the registration (immediate memory) item of the SMMSE test. More specifically, each subject in both groups has three points, which is the highest score in this part. This means that all participants answered this item correctly. The standard deviation about the registration item is normally distributed in both groups ($SD = 0.000$). As for the attention-calculation item, the minimum scores of the control group are 3, whereas the minimum scores of the AD group are 0, respectively. In addition, maximum scores of both groups are the same in attention-calculation item (max. = 5 in each group). The mean scores and standard deviation regarding attention-calculation performances of the both groups are as the following: Control: $M = 4.5$, $SD = 0.67$ and AD: $M = 3.7$, $SD = 1.60$ respectively. The standard deviation of the AD group does not demonstrate a normal distribution, whereas the control group demonstrates a homogeneous distribution in regard to the attention-calculation dimension.

Concerning the language dimension, which involves the 'naming', 'repetition', 'three command', 'reading' and 'writing', it is seen that the minimum scores of the control group is 8 while the minimum scores of the AD group is 4. Despite the differences in minimum scores, the maximum scores are the same (max. = 9 in both groups). The mean scores and standard deviation of both groups in terms of the language dimension are as follows: AD: $M = 8.15$, $SD = 1.23$ and control: $M = 8.55$, $SD = 0.51$, respectively. Standard deviation of the AD group does not show a normal distribution compared to the control group regarding this dimension.

Concerning the last dimension of the SMMSE test, the recall (short-term memory) item, the minimum scores are the same in both AD and control groups (min. = 0 in each). It

seems that there are subjects in both group who cannot respond correctly to this item. However, it is seen that the maximum scores of the AD group are 2 while the maximum scores of the control group are 3. The mean scores and standard deviation are as follows: AD: $M = 0.60$, $SD = 0.82$ and control $M = 1.60$, $SD = 1.05$, respectively. Standard deviation illustrates that the responses given to the recall item are normally distributed in both AD group and control group.

In order to reveal whether or not the SMMSE test scores of the AD and control subjects statistically differ, the Mann-Whitney U test was employed. The reason for using it was the fact that the scores of both groups did not normally distribute. Table 7 below presents the results of the Mann-Whitney U test.

Table 7. Results of the Mann-Whitney U test

Sub-dimensions	Group	N	Mean Rank	Sum of Ranks	U	p
Orientation	AD	20	13.25	265.00	55.00	.000
	Control	22	29.00	638.00		
Working memory	AD	20	18.85	377.00	100.50	.002
	Control	22	23.91	526.00		
Language	AD	20	17.10	342.00	132.000	.001
	Control	22	25.50	561.00		
Recall	AD	20	15.80	316.00	106.00	.003
	Control	22	26.68	587.00		

Note: * Mann-Whitney U test - $p < 0.05$, AD; Alzheimer's disease

Table 7 shows that the SMMSE test scores are significantly higher for the control group compared to the Turkish-speaking AD patients. The Mann-Whitney U test results for each dimension are given as follows:

As can be seen in Table 7, there is a statistically significant difference between the AD and control groups in relation to the orientation dimension of the SMMSE test ($U=55.00$, $p = 0.000$). It can be inferred from the results that orientation scores show a great difference between both AD and control groups in time ($U = 55.000$, $p = 0.000$) and place ($U = 143.00$, $p = 0.003$) dimensions. As the findings of the previous studies suggest (Jarvik, 1975; Müller et al., 1975; Teng et al., 1987; Ashford et al., 1989 and Jefferson et al., 2002), this significant difference indicates an important deterioration in the AD subjects' orientation performance.

As for the WM dimension of the SMMSE test, Table 7 illustrates that there is no statistically significant difference between the AD and control subjects in relation to the total scores on the WM dimension (registration, attention-calculation) ($U=167.00$, $p = 0.143$). Similarly, Baddeley et al. (1991) state that the WM is considered as a mechanism for shortly keeping information in mind and integrating its meaning with the coming information. Despite the fact that memory decline seems to be the primary complication for the AD patients, such a problem can be seen in the general elderly population as well. Therefore, in the early stages of the AD, the high loss in registration and attention-calculation parts is not expected (Teng et al., 1987). In support of these assumptions, findings obtained from registration ($U=220.00$, $p = 1.00$) and attention-calculation (167.00 , $p = 0.143$) items did not demonstrate a significant difference between the AD and control groups despite a slight decline in the AD group.

When language dimension of the SMMSE test is taken into consideration, Table 5 indicates that there is a statistically significant difference between the scores of the AD and control groups ($U=132.00$, $p = 0.001$). Sevigny et al. (2010: 120) claims "the spoken language ability and comprehension items were the least impaired across the MMSE score groups and showed evidence of a ceiling effect". In addition, Ashford et al. (1989) state that the high incidence of language deficit is mostly seen in later stages of the disease. Therefore, it is safe to argue that the slightly impaired performance is common in the early stages of the AD. In other words, the language performance of the AD patients participated in the study is mildly influenced. In addition, it can be

understood from Table 7 that the control group performed better than the AD group in language dimension.

Finally, the scores on the recall dimension of the SMMSE test are found to significantly differ in the AD and control groups. As can be seen in Table 7, the scores of the control subjects are higher than those of the AD subjects regarding this dimension ($U=106.00$, $p = 0.03$). This finding is consistent with the findings of the previous studies (Teng et al., 1987; Moss et al., 1986 and Ashford et al., 1989), which assume that the recall item is supposed to be impaired in AD patients.

Overall, these findings make it possible to answer the first research question. “Is there any significant difference between the SMMSE scores of the Turkish-speaking AD patients and non-AD subjects?” It appears that the mildly impaired Turkish-speaking AD patients significantly differ from the healthy control subjects regarding the general SMMSE test performance as well as regarding some of the sub-dimension of the SMMSE test, namely orientation, language and recall. In other words, the mental status of the control subjects was much better than of the AD patients sampled. It also showed that the controls had much better performance concerning orientation, language and recall dimensions.

4.1.2. Findings of Experiment 2 (SPM test)

Experiment 2 was designed to analyze how the Turkish-speaking AD patients and the control subjects comprehend reflexive pronouns and reciprocal pronouns in different sentence structures (simple vs. complex). Whether or not the syntactic complexity or the use of anaphoric expressions affect the comprehension procedure was also examined in a sentence picture- matching (SPM) test. In addition, the data obtained from the SPM test was used to test the predictions of the interpretive based Syntactic Deficit Hypothesis (SDH) and the post-interpretive based Working Memory Deficit Hypothesis (WMDH) regarding their sentence comprehension performances. The findings collected in this experiment was analyzed to answer the research question 2, which is as follows:

Do the Turkish-speaking AD patients and the non-AD subjects comprehend reflexive pronouns, reciprocal pronouns in different conditions (i.e., simple and complex/embedded sentences)?

The findings of the SPM test were first analyzed to reveal how the AD and control subjects comprehend the reflexive and reciprocal pronouns under two syntactic conditions: simple and complex conditions. The following examples show each sentence type read to the participants as follows:

44) *Kızlar kendilerine bakıyorlar.* (simple sentence with a reflexive pronoun)

“Girls are looking at themselves”.

45) *Öğretmen, kızların kendilerine bakmalarını istiyor.* (complex sentence with a reciprocal pronoun)

“Teacher asks girls to look at themselves.”

46) *Ahmet ve Ayşe birbirlerini çiziyorlar.* (simple sentence with a reciprocal pronoun)

“Ahmet and Ayşe are drawing each other.”

47) *Öğretmen, Ahmet ve Ayşe'nin birbirlerinin resimlerini çizmelerini istiyor.* (complex sentence with a reciprocal pronoun)

“Teacher asks Ahmet and Ayşe to draw themselves.”

In Experiment 2, both the AD and control subjects were asked to select the suitable picture that corresponded to the sentence read by the author. If the participant could not understand the sentence, it was read again. There was no time limitation on this test. All the sentences and the pictures used in Experiment 2 are given in Appendix 3. The answers by the participants were scored on a five point likert scale, which is given as follows:

Table 8. Scores for the SPM test items

Answers to the items	Scores
Incorrect answers	1
Correct answers for simple sentences with reciprocal pronouns	2

Correct answers for complex sentences with reciprocal pronouns	3
Correct answers for simple sentences with reflexive pronouns	4
Correct answers for complex sentences with reflexive pronouns	5

The findings of the experiment were analyzed using a descriptive statistical method to describe the comprehension of both groups concerning the reflexive and reciprocal pronouns under the aforementioned syntactic conditions. The results of the analysis are given in Table 9.

Table 9. Results of the descriptive statistics of the SPM test scores

Group	Scores	N	Min.	Max.	Mean	Std. Deviation
AD	simple_reflexive_total	20	9	23	20.40	3.93
Control	simple_reflexive_total	22	10	23	20.64	3.38
AD	simple_reciprocal_total	20	8	10	9.60	.68
Control	simple_reciprocal_total	22	9	10	9.9	.29
AD	complex_reflexive_total	20	20	38	28.60	4.55
Control	complex_reflexive_total	22	16	38	31	7.63
AD	complex_reciprocal_total	20	9	15	13.90	1.77
Control	complex_reciprocal_total	22	11	15	14.63	1.00
AD	spm_total	20	53	86	72.50	8.31
Control	spm_total	22	51	86	76.18	10.38

Note: * Min; Minimum, Max; Maximum, Std; Standard Deviation, AD; Alzheimer's disease

Table 9 above shows the descriptive statistics of the scores by the participants for the simple-reflexive, simple-reciprocal, complex-reflexive, complex-reciprocal sentences on the SPM test. It also gives their total score on the test.

When the total scores regarding the simple reflexive condition are compared, the minimum scores of the AD group are 9 while the minimum scores of the control group are 10. On the other hand, the maximum score is the same in both of the groups (max. = 23 in each group). The mean scores and standard deviation of the both groups in simple sentence with a reflexive pronoun are as follows: AD: $M = 20.40$, $SD = 3.93$ and control: $M = 20.64$, $SD = 3.38$. It appears that the responses to simple sentences with reflexive pronouns similarly distributed between the groups.

The results are also similar regarding the simple reciprocal condition. The minimum scores of the AD group are 8, while the minimum scores of the control group are 9. The maximum scores are the same for both groups (max. = 10 in each group). In addition, the mean scores and standard deviations of both AD and control groups in simple sentence with a reciprocal pronoun are as follows: AD: $M = 9.60$, $SD = 0.68$ and control: $M = 9.90$, $SD = 0.29$). In short, the responses to the simple sentences including reciprocal pronouns show normal distribution between both groups.

Regarding the complex reflexive items, it is found that the minimum scores of the AD group are 20 while the minimum scores of the control group are 16. However, the maximum scores of both groups are the same (max. = 38). The mean scores and standard deviation of both groups in complex sentence with a reflexive pronoun are as follows: AD: $M = 28.60$, $SD = 1.77$ and control: $M = 31$, $SD = 7.63$. The standard deviation indicates that the comprehension of complex sentences with reflexive pronouns is not normally distributed among the AD patients.

In regard to the reciprocal pronouns in a complex syntactic condition, the minimum scores of the AD group are 9 and minimum scores of the control group are 11. On the other hand, both group had same maximum scores (max. = 15 in each group). The mean scores and standard deviation of the both groups in the complex sentence with a reciprocal pronoun are as follows: Control: $M = 14.63$, $SD = 1.00$ and AD: $M = 13.90$,

SD = 1.77. It seems that the distribution of the complex sentences with reciprocal pronouns are homogenous in both groups.

Concerning the total scores on the SPM test, it is observed that the minimum scores of the AD group are 53 while the minimum scores of the control group are 51. On the other hand, the maximum total scores are the same for both groups (max. =86 in each group). The mean scores and standard deviation of the both groups are as follows: Control: M = 76.18, SD = 10.38 and AD: M = 72.50, SD = 8.31. This distribution means that the scores of control group show more variations in itself. The minimum and maximum scores and standard deviation indicate that there are several AD subjects, who are as successful as the control subjects. This result could be resulted from the high education levels of the AD subjects.

Since the scores of the both groups did not show a homogeneous distribution, these scores were analyzed with the Mann-Whitney U test to see whether the differences between the groups are statistically significant. The results of the Mann-Whitney U test are given in Table 10.

Table 10. Results of the Mann-Whitney U test

Scores	Group	N	Mean Rank	Sum of Ranks	U	p
simple_reflexive_total	AD	20	21.50	430.00	220.000	1.000
	Control	22	21.50	473.00		
simple_reciprocal_total	AD	20	19.10	382.00	172.000	.077
	Control	22	23.68	521.00		
complex_reflexive_total	AD	20	18.65	373.00	163.000	.146
	Control	22	24.09	530.00		
complex_reciprocal_total	AD	20	19.08	381.50	171.500	.101

	Control	22	23.70	521.50		
	AD	20	18.38	367.50		
SPM Total					157.50	.114
	Control	22	24.34	535.50		

Note: * Mann-Whitney U test - $p > 0.05$, AD; Alzheimer's disease

The results of the Mann-Whitney U test are analyzed based on the accuracy responses. The following section presents a discussion of these findings.

As can be seen in Table 10, there is no significant difference between the AD and control groups regarding the total scores about simple sentences with a reflexive pronoun ($U=220.00$, $p = 1.000$). When the mean ranks are taken into consideration, it is seen that both groups have the same mean rank for the reflexive pronoun in simple condition and therefore, the significance value is 1.00. Concerning the total scores on simple sentences with a reciprocal pronoun, it seems that there is no significant difference between the performances of the AD and control groups ($U=172.00$, $p = 0.77$). In a similar way, it is seen that the total scores on the complex sentences involving a reflexive pronoun do not show a significant difference between the performances of both groups ($U=163.00$, $p = 0.146$). There is also no significant difference between the AD and control groups regarding the total scores on the complex sentences including a reciprocal pronoun ($U=171.50$, $p = 0.101$). All in all, it is identified that the total scores taken from the SPM test do not demonstrate a statistically significant difference between the AD and control groups ($U=157.50$, $p = 0.114$).

These findings may occur due to several factors. The AD patients performed similarly as the control subjects almost in the comprehension of all sentence structures. The results of this experiment are consistent with those of Kemper and Kemtes (1999), who stated that even healthy aged people might be mildly impaired in the comprehension of complex sentences. They provide the related examples as finite or non-finite embedded clauses, ambiguous and left branching sentences. Kemper (1986) also claimed that comprehension problems in healthy subjects may be dependent on age-related declines in the WM capacity rather than the deprivation of linguistic awareness. In addition,

Kave' and Levy (2003) argued that the AD patients could show intact ability in comprehension of syntactically simple and complex sentences. Although the morphological components could be slightly influenced in the mild AD patients due to the word retrieval problems, the striking deteriorations in morphology and syntax could be seen in later stages of the disease (Kave' and Levy, 2003). If the language of the mild AD patients is morphologically rich, the comprehension of the lexical items appears to be unimpaired as illustrated in the earlier studies by Kave' and Levy (2003, 2004). Since the Turkish is one of the morphologically rich languages and the data collected from the mild AD patients, the findings seem to be consistent with those of Kave' and Levy, (2003; 2004) as well. Therefore, it can be argued that the AD patients performed well as much as their non-AD peers in sentence-picture matching task regardless of the linguistic structures tested. In addition, these results appear to be consistent with the following view "the decrement in performance is not greater for syntactically complex than for syntactically simple sentences when the AD patients are required to perform a sentence- picture matching task" (Waters and Caplan, 1997: 379-380).

Since the differences between the AD and control groups are not normally distributed, the findings were also analyzed to see whether or not the participants significantly differ on individual basis. To this end, the Wilcoxon Signed Rank test was used to analyze whether there is a significant difference in the individual scores of the participants in regard to their responses for the items related to the sentence structures involving the reflexive and reciprocal pronouns in a simple and a complex condition. The results of the Wilcoxon Signed Rank test on the AD group and the control group are presented in Tables 11 and 12, respectively.

Table 11. Results of the Wilcoxon Signed Rank test on the AD group scores

Scores		N	Mean Rank	Sum of Ranks	Z	p
simple_reciprocal_total	Negative	19	10.0	190.00	-3.871*	.000
simple_reflexive_total	Ranks					

	Positive Ranks	0	.00	.00		
	Ties	1				
complex_reciprocal_total	Negative	20	10.5	210.00		
complex_reflexive_total	Ranks					
	Positive Ranks	0	.00	.00	3.942*	.000
	Ties	0				
complex_reflexive_total	Negative	0	.00	.00		
simple_reflexive_total	Ranks					
	Positive Ranks	20	10.5	210.00	-3.932**	.000
	Ties	0				
complex_reciprocal_total	Negative	1	1.00	1.00		
simple_reciprocal_total	Ranks					
	Positive Ranks	19	11.0	209.00	-4.013**	.000
	Ties	0				

Notes: * Based on positive ranks

** Based on negative ranks

*** Wilcoxon Signed Rank test - $p < 0.05$, AD; Alzheimer's disease

Table 11 indicates that there seems to be a significant difference among the individual performances in the AD group based on the SPM test scores in regard to simple sentences with a reflexive pronoun and simple sentences with a reciprocal pronoun ($z = -3.871$, $p = 0.000$). The sum of negative ranks for the AD group is 190.00, whereas the sum of positive ranks is 0.00 regarding the scores about simple sentences in which reflexive and reciprocal pronouns are used. When the performances of the AD subjects concerning the complex sentences involving reflexive and reciprocal pronouns are examined, it is seen that the scores of the subjects in complex sentences with a reflexive

pronoun are higher than their scores in complex reciprocal sentences ($z=3.942$, $p = 0.000$). The sum of negative ranks for the AD group is 210.00, whereas the sum of positive ranks is 0.00 in terms of complex reflexive and complex reciprocal scores. From the sum of ranks, it appears that subjects in the AD group have higher scores in both simple and complex reflexive sentences compared to simple and complex reciprocal sentences. In short, the AD participants are much better in comprehending reflexive pronouns regardless of the syntactic condition.

This finding is consistent with the view that unlike reflexive pronouns, reciprocal pronouns have a flexible semantic value and more than one truth condition, which lead to distinct readings (Philip, 2000). It seems that due to this feature of reciprocal pronouns, the AD subjects could not perform well in comprehending these constructions. In other words, they cannot manage to accommodate the potential vagueness of reciprocal pronouns. This finding is also consistent with the findings of Dillon et al. (2013) who conclude that double meaning of the reciprocals may lead to confusions in the WM when selecting the appropriate antecedent.

On the other hand, when the AD subjects' scores on the SPM test concerning the complex sentences involving either a reflexive pronoun or a reciprocal pronoun are compared, their scores for sentences involving a reflexive pronoun are significantly higher ($z=-3.932$, $p = 0.000$). The negative sum of ranks for the AD group is 0.00, while positive sum of ranks is 210.00 in regard to complex sentences with a reflexive pronoun and simple sentences with a reflexive pronoun. Finally, when the subjects in the AD group are compared in regard to the complex sentences with a reciprocal pronoun and simple sentences with a reciprocal pronoun, the scores taken from complex sentences with a reciprocal pronoun are significantly higher than the simple sentences with a reciprocal pronoun ($z=-4.013$, $p = 0.000$). The negative sum of ranks for the AD group is 1.00, while the positive sum of ranks is 209.00 regarding complex reciprocal and simple reciprocal sentences. Given the sum of ranks for complexity effect, it was found that the complex sentences were better comprehended. Thus, it could be argued that the AD subjects have higher scores on complex sentences including reflexive and reciprocal pronouns in contrast with the simple sentences including reflexive and reciprocal

pronouns. This finding suggests that syntactic condition does not have an effect on the comprehension performance of the AD subjects. It also indicates that giving an embedded clause in the complex condition did not lead to cognitive load, making it difficult to comprehend the pronouns for the AD patients. Instead, this embedded clause allowed them to better understand and therefore, to better comprehend the pronouns tested.

As also seen in Table 11, the AD subjects have higher scores from reflexive pronoun involved sentences regardless of their complexity or simplicity. However, the complex sentences including reflexive and reciprocal pronouns were comprehended better than the simple sentences with the same pronouns. This finding also suggests that the AD patients employed the extra sentence, which was an embedded clause, given in the complex condition to have better understanding about the antecedent-pronoun relations.

The individual performances of the control subjects are also analyzed using the Wilcoxon Signed Rank test. The results of this test concerning the scores of the control group are given in Table 12.

Table 12. Results of the Wilcoxon Signed Rank test on the control group scores

Scores		N	Mean Rank	Sum of Ranks	Z	p
simple_reciprocal_total	Negative	21	11.00	231.00	-4.106*	.000
simple_reflexive_total	Ranks					
	Positive Ranks	0	.00	.00		
	Ties	1				
complex_reciprocal_total	Negative	22	11.50	253.00	-4.133*	.000
complex_reflexive_total	Ranks					
	Positive Ranks	0	.00	.00		

	Ties	0				
complex_reflexive_total	Negative	2	2.25	4.50		
simple_reflexive_total	Ranks					
	Positive Ranks	20	12.43	248.50	-3.978**	.000
	Ties	0				
complex_reciprocal_total	Negative	0	.00	.00		
simple_reciprocal_total	Ranks					
	Positive Ranks	22	11.50	253.00	-4.348**	.000
	Ties	0				

Notes: * Based on positive ranks

** Based on negative ranks

*** Wilcoxon Signed Rank test- $p < 0.05$, AD; Alzheimer's disease

Table 12 indicates that the scores of the control subjects significantly differ concerning the simple sentences involving either a reflexive or a reciprocal pronoun ($z = -4.106$, $p = 0.000$). It seems that the control subjects have higher scores in simple sentences with a reflexive pronoun in comparison to simple sentences with a reciprocal pronoun. The sum of negative ranks for the control group is 231.00, whereas the sum of positive ranks is 0.00 in regard to the simple sentences including either a reciprocal or a reflexive pronoun. When the comprehension of control subjects are examined concerning the complex sentences with either a reflexive or a reciprocal pronoun, it is seen that the scores from complex sentences with a reflexive pronoun are significantly higher than their scores on the complex sentences with a reciprocal pronoun ($z = -4.133$, $p = 0.000$). The sum of negative ranks for the control group is 253.00, whereas the sum of positive ranks is 0.00 in terms of complex sentences with a reflexive and a reciprocal pronoun. As revealed by the sum of ranks, it seems that subjects in the control group have higher scores in both simple and complex sentences comprising reflexive pronouns compared

to simple and complex sentences comprising reciprocal pronouns. In this regard, there is a similarity between the AD subjects and the control subjects.

Moreover, when the scores on complex sentences with a reflexive pronoun and simple sentences with a reflexive pronoun are compared, the scores on complex sentences with reflexive pronouns seem to be higher ($z=-3.978$, $p = 0.000$). The negative sum of ranks for the control group is 4.50, while positive sum of ranks is 248.00 in regard to complex and simple sentences consisting of a reflexive pronoun. It is also determined that the control subjects' performances on the complex sentences with a reciprocal pronoun are significantly higher than simple sentences with a reciprocal pronoun ($z=-4.348$, $p = 0.000$). The negative sum of ranks for the AD group is 0.00, while the positive sum of ranks is 253.00 regarding complex and simple sentences involving a reciprocal pronoun. As argued for the AD subjects, reciprocal pronouns are much harder to comprehend than reflexive pronouns. This difference results from the vagueness of reciprocal pronouns, (Philip, 2000), which is not observed in reflexive pronouns.

Given that both groups have much more difficulty in comprehending reciprocal pronouns, it is safe to argue that this difficulty has nothing to do with the comprehension deficits resulted from the AD. Rather, it is observed due to the fact that reciprocal pronouns are much more complicated to comprehend in contrast to reflexive pronouns. This finding seems to be consistent with the existing literature (Philip, 2000; Badecker and Straub, 2002; Dillon et al., 2013 and Kjellmer, 2015).

Similar to the findings of the AD subjects, the sum of ranks indicated that scores on complex sentences were significantly higher in control subjects as well. Therefore, it could be stated that there is a parallel performance by the participants on the SPM test.

Briefly stated, sentence comprehension does not demonstrate a significant impairment in Turkish-speaking mild AD patients. This finding seems to be compatible with the aforementioned studies based on the Hebrew-speaking mild AD patients, Slovak-speaking mild AD patients, Serbo-Croatian-speaking mild AD patients, the German-speaking mild AD patients and the English-speaking mild AD patients.

These findings contribute to answer the research question 2: “Do the Turkish-speaking AD patients and the non-AD subjects comprehend reflexive pronouns, reciprocal pronouns in different conditions (i.e., simple and complex/embedded sentences)?”

Both groups comprehend reflexive pronouns much more easily than reciprocal pronouns. In addition, this better comprehension of reflexive pronouns is not affected by the syntactic condition. However, there is very interesting finding that complex condition does not make it difficult for the participants to comprehend the reflexive pronouns. As stated earlier, this complexity, namely the use of an embedded clause, allowed the participants to comprehend the antecedent relations of reciprocal and reflexive pronouns much better. Finally, it can also be added that reciprocal pronouns are much more difficult to comprehend for both groups independent of the syntactic condition. Therefore, the AD group and the control group do not differ in this regard.

As stated earlier, Experiment 2 also helps us in evaluating the viability of the predictions of the following hypotheses, the Syntactic Deficit Hypothesis and the Working Memory Deficit Hypothesis.

The post-interpretive based WMDH is much more appropriate in accounting for the comprehension performance of the mild AD patients involved in the study. As can be seen in Table 7, the results of the SPM test confirm the earlier studies on appropriateness of the post-interpretive based WMDH to provide an explanation in this regard (Rochon et al., 1994; Waters et al., 1995 and Waters and Caplan, 1997 and Kempler et al., 1999). Considering the SPM test results, not only the total but also the individual performances revealed that the scores of the both the AD group and the control group showed parallelism. As opposed to the Interpretive based SDH (Grober and Bang 1995), which argues that the sentence comprehension impairments increase by the complexity of the sentences, all subjects performed better in complex sentence structures. The fact that the AD subjects’ responses to simple sentences with reflexive or reciprocal pronouns and complex sentences with reflexive or reciprocal pronouns are close to the control responses might indicate a syntactic preservation in the Turkish-speaking mild AD subjects.

It is important to stress the differences between the SDH and WMDH. If the results of the SPM test are compatible with the Interpretive Processing based SDH, AD patients' mistakes are expected to increase with the syntactic complexity of the sentences (Emery, 1985; Grober and Bang, 1995; Small, Kemper and Lyons, 1997; Small, Andersen and Kempler and Bickel et al., 2000). The SDH further assumes that AD patients show reduced understanding of the embedded clauses since the sentence length may affect the co-referential comprehension of the pronouns. Hence, the intervening words (i.e., reflexive/reciprocal pronouns) may lead to inaccurate answers in complex sentences.

If the impairments of the patients are accounted for by the Post-interpretive Processing based WMDH, they are expected to show either declines in both simple and complex structures or parallel performances. It means that no significant deterioration is expected in the comprehension of the mild AD patients in regard to the SPM test (Waters et al., 1995). If impaired performance is observed, not only the syntactically complex ones are to be impaired as expected in the SDH (Rochon et al., 1994; Waters et al., 1995; Waters and Caplan, 1997; Waters et al., 1997 and Kempler et al., 1999).

4.1.3. Findings of Experiment 3 (CMN test)

Experiment 3 was designed to analyze how the Turkish-speaking AD patients and the control subjects process the 3rd person pronouns involved short and long discursal conditions. It also examined whether the additional sentence fragments used in long discursal conditions and the number (singular or plural) of the pronouns have any effect on the referential processing of the both groups in the cross-modal naming (CMN) test. This experiment attempts to show whether or not the AD group and the control group differ in terms of the accuracy of their responses and reaction times. Furthermore, the CMN test was used to test the predictions of the post-interpretive based Working Memory Deficit Hypothesis (WMDH) and the referential processing based Informational Load Hypothesis (ILH) in regard to the processing performances of the participants. Specifically, this experiment was carried out to answer the research question 3, which is as follows: "Do the Turkish-speaking AD patients and the non-AD subjects process the 3rd person pronouns in different conditions (i.e., short and long

sentence fragments)?

The findings of the CMN test were first analyzed to uncover how the AD and the control subjects process the third person pronouns under the following discorsal conditions: short conditioned sentence fragments and long conditioned sentence fragments. In Experiment 3, twenty short and twenty long conditioned sentence fragments were presented audio-visually to the AD group and the control group. All the subjects were asked to select the suitable personal pronoun to complete the sentence fragments. The singular and plural personal pronouns were presented in capital letters on the computer screen. The subjects were also asked to choose the best answer as soon as possible since their reaction times were measured in this experiment. From zero to one scoring was employed in the analysis of the CMN test. Here zero refers to inaccurate and one refers to accurate response. All the items of the CMN test can be seen in Appendix 4.

The findings of Experiment 3 were analyzed using the descriptive statistics to uncover the processing performance of the AD group and control group under the aforementioned discorsal conditions. The results of the analysis are presented in Table 13.

Table 13. Results of the descriptive statistics on the CMN test scores

Group	Scores	N	Min.	Max.	Mean	Std. Deviation
AD	Accurate responses to short sentence fragments	20	13	20	16.60	2.53
Control	Accurate responses to short sentence fragments	22	11	20	17.55	2.22
AD	Accurate responses to long sentence fragments	20	10	20	15.10	3.24
Control	Accurate responses to long	22	12	20	16.37	2.79

sentence fragments									
AD	RT of short sentence fragments	20	171906	555662	299119.25	91855.16			
Control	RT of short sentence fragments	22	190985	372127	268621.14	52418.12			
AD	RT of long sentence fragments	20	236083	771450	363866.85	130858.4			
Control	RT of long sentence fragments	22	230545	473457	299785.05	60026.27			
AD	Total accuracy responses	20	23	40	31.70	4.93			
Control	Total accuracy responses	22	23	40	33.91	4.70			
AD	Total RTs	20	423376	1142250	662986.10	208750			
Control	Total RTs	22	421530	845584	568406.18	107089.3			

Note: * Min; Minimum, Max; Maximum, Std; Standard Deviation, RT; Reaction time, AD; Alzheimer's disease

Table 13 above shows the descriptive statistics of the scores of the participants (accuracy-short, accuracy-long, reaction time-short, reaction time-long) on the CMN test. It gives their total score on the test as well.

When the total accuracy scores on the CMN test are compared regardless of short or long conditions, it is seen that the minimum and maximum scores for both groups are the same (min. = 23; max. = 40 in each group). However, the mean scores and standard deviation of the both groups are as follows: Control: M = 33.91, SD = 4.70 and AD: M = 31.70, SD = 4.93. It is seen that the standard deviation has normal distributions in both groups.

When the accuracy scores of the short sentence fragments are compared, it is found that the minimum scores of the control group are 11, while the minimum scores of the AD group are 13. However, the maximum scores are observed to have similarity in both groups (max. = 20 in each group). In addition, the control group is more homogeneously processed the short sentence fragments when the mean scores and standard deviation are taken into consideration (Control: $M = 17.55$; $SD = 2.22$ and AD: $M = 16.60$, $SD = 2.53$).

On the other hand, the descriptive statistics of the responses given to the long sentence fragments are examined and it is observed that the minimum scores of the AD subjects are 10, whereas the minimum scores of the control subjects are 12. The maximum scores are the same for both groups (max. = 20 in each group). However, the mean scores and standard deviation of the both groups are as follows: Control: $M = 16.37$, $SD = 2.79$ and AD: $M = 15.10$, $SD = 3.24$. In addition, the standard deviations in relation to the long sentence fragments indicate that there is homogeneity in the total scores of the control subjects compared to the AD subjects.

In addition to the accuracy scores, the reaction times of all subjects are also analyzed. As for the total reaction times, the AD group seems to spend more time on the CMN test. Even though the minimum reaction times are close to one another (AD: min. = 423376ms. and control: min. = 421530ms.), the maximum reaction times show variation in both groups (AD max. = 1142250ms. and control max. = 845584ms.). The mean scores on the total reaction times are as follows: AD: $M = 662986.10$ ms. and control: 568406.18ms., respectively. Moreover, the standard deviation in regard to reaction times of the AD subjects is heterogeneously distributed (AD: $SD = 208750$ ms. and control: $SD = 107089.3$ ms.).

Considering the short sentence fragments in terms of reaction times, the minimum reaction time of the AD group is 171906ms while the minimum reaction time of the control group is 190985 ms. The maximum reaction times of the AD and control groups in regard to short sentence fragments are as follows: AD: max. = 555662 ms. and control: max. = 372127 ms.. In addition, the mean scores of the AD and control subjects in short sentence fragments are 299119.25 ms. and 268621.14 ms., respectively. On the

other hand, it could be seen from the standard deviation that the reaction times in the AD group is more heterogeneous, in other words, more variant. However, the reaction times of the control group demonstrate normal distributions (AD: SD = 91855.16ms. and control: SD = 52418.12ms.).

When it comes to the analysis of long sentence fragments composed of three sentences, it can be seen that both groups' minimum reaction times are as follows: AD min. = 236083 ms. and control min. = 230545 ms. The maximum reaction time of the AD group is 771450 ms., whereas the maximum reaction time of the control group is 473457ms. In addition, the mean scores regarding the long sentence fragments are 363866.85 ms. in AD group and 299785.05 ms. in control group. On the other hand, in accordance with the standard deviation on the long sentence fragments, the reaction times of the AD subjects show more in-group variations than the control subjects (AD: SD = 130858.4 and control: SD = 60026.27ms.).

In general, when the CMN test results of the AD subjects and the control subjects are analyzed, it is seen that the control subjects appear to be better than the AD subjects regarding both accuracy scores and short reaction times in selecting proper personal pronoun. However, the distribution of the scores was not normal in both groups as in Experiment 2. Therefore, the Mann-Whitney U test is used to examine whether or not these findings were statistically significant. In addition, this test was employed to analyze the accuracy and reaction times of the participants. The results of the Mann-Whitney U test are given in Table 14.

Table 14. Results of the Mann-Whitney U test

Sub-dimensions	Group	N	Mean Rank	Sum of Ranks	U	p
Accurate responses to short sentence fragments	AD	20	19.05	381.00	171.000	.212
	Control	22	23.73	522.00		
Accurate responses to	AD	20	18.95	379.00	169.000	.196

long sentence fragments	Control	22	23.82	524.00		
RT of short sentence fragments	AD	20	23.25	465.00	185.000	.378
	Control	22	19.91	438.00		
RT of long sentence fragments	AD	20	25.10	502.00	148.000	.070
	Control	22	18.23	401.00		
Total accuracy responses	AD	20	18.53	370.50	160.500	.132
	Control	22	24.20	532.50		
Total RT	AD	20	24.05	481.00	169.000	.199
	Control	22	19.18	422.00		

Note: * Mann- Whitney U test - $p > 0.0$, RT: Reaction time, AD; Alzheimer's disease

The results of the Mann- Whitney U test given in Table 14 are discussed in relation to both accuracy responses and reaction times as follows:

4.1.3.1. Accuracy

As can be seen in Table 14, there is no significant difference between the total scores of the AD and control subjects in regard to the correct responses given to the short sentence fragments in the CMN test ($U=171.00$, $p = 0.212$). Similarly, when the total scores obtained from the long sentence fragments are compared, there is also no statistically significant difference between the performances of the AD group and the control group ($U=169.00$, $p = 0.196$). When the total responses for accuracy are compared, it is again seen that there is no statistically significant difference between the total scores of the AD and control subjects ($U=160.50$, $p = 0.132$). The accuracy analysis of this experiment suggests that the AD patients do not seem to be affected by the length of discourse and that both groups have similar performance in the processing of the 3rd person pronouns.

4.1.3.2. Reaction time

As can be seen in Table 14, there is no significant difference between the reaction times of the AD and the control subjects regarding the short sentence fragments ($U=185.00$, $p = 0.378$). In addition, it can be seen that there is also no significant difference between the reaction times of the AD and control subjects regarding the long sentence fragments ($U=148.00$, $p = 0.070$). When the total scores of the AD subjects and the control subjects are compared, it is observed that there is no significant difference between the reaction times of both groups ($U=169.00$, $p = 0.199$). This finding seems to be consistent with the findings of previous studies (Almor et al., 2001 and Kempler et al., 1999) in that, despite the longer reaction times of the AD patients compared to the control group, there is no significant difference between both groups in terms of reaction time.

The findings given in Table 14 indicate that neither accuracy nor reaction time results demonstrate a statistically significant difference in both groups. Moreover, the length of discourse does not seem to have a significant influence on the processing of 3rd person pronouns by both groups as well.

Since the scores of the participants did not distributed normally, the Mann-Whitney U test was employed to see whether there is a significant difference concerning their sensitivity for the pronouns. The results of the analysis are given in Table 15.

Table 15. Results of the Mann- Whitney U test in regard to the sensitivity of the participants

	Group	N	Mean Rank	Sum of Ranks	U	p
plural_total	AD	20	19.10	382.00	172.000	.225
	Control	22	23.68	521.00		
singular_total	AD	20	18.80	376.00	166.000	.167
	Control	22	23.95	527.00		

RT_plural	AD	20	23.80	476.00	174.000	.247
	Control	22	19.41	427.00		
RT_singular	AD	20	24.95	499.00	151.000	.082
	Control	22	18.36	404.00		

Note: * Mann- Whitney U test - $p > 0.05$, RT: Reaction time, AD; Alzheimer's disease

The results of the Mann-Whitney U test are also analyzed based on the accuracy responses and reaction times. The following section presents a discussion of these results.

4.1.3.3. Accuracy

As can be seen in Table 15, the results of the Mann- Whitney U test about accuracy responses indicate no statistically significant difference between both groups in terms of their selection of either plural or singular 3rd pronouns ($U=172.00$, $p = 0.225$ and $U=166.00$, $p = 0.167$, respectively). Therefore, it is safe to argue that there is no difference between two groups in this regard.

4.1.3.4. Reaction time

Table 15 also indicates that there is no significant difference between the AD and control groups concerning the reaction times when responding to the stimuli ($U=174.000$, $p = 0.247$ and $U=151.00$, $p = 0.82$, respectively). Therefore, it could be stated that there is no significant difference between two groups in regard to their reaction times of the 3rd person pronouns.

In short, the reaction time analysis demonstrates that there is no significant difference between the AD subjects and the control subjects regarding singular and plural pronoun processing. Consistent with the previous finding by Small (1994), despite the slower response times and less accurate answers compared to the control group, the AD subjects do not have a significant deterioration in regard to appropriate pronoun selection. This finding is consistent with the claim that the AD patients could have

unimpaired or less impaired pronoun processing (Almor et al., 1999). On the other hand, in the related studies, it is commonly argued that on-line tasks are less demanding in terms of WM, leading to much higher success by the AD patients on the given task. The finding of the study also supports this common view.

Since the findings of the Mann-Whitney U test did not show a normal distribution between the groups by indicating no statistically significant difference, there was a need for the analysis of the participants individually. Therefore, the Wilcoxon Signed Rank test was used to analyze whether there is a significant difference in the individual performances of the AD subjects and those of the control subjects in regard to the accuracy scores and reaction times.

Table 16 shows the results of the CMN test on the individual scores of the AD subjects below:

Table 16. Results of the Wilcoxon Signed Rank test on the AD group's individual scores

		N	Mean Rank	Sum of Ranks	Z	p
Accurate responses to long sentence fragments	Negative Ranks	12	7.75	93.00	-1.897	.058
	Positive Ranks	3	9.00	27.00		
Accurate responses to short sentence fragments	Ties	5				
Long sentence fragment RT	Negative Ranks	1	3.00	3.00	-3.808*	.000
Short sentence fragment RT	Positive Ranks	19	10.89	207.00		
	Ties	0				

Notes: *Based on negative ranks

** Wilcoxon Signed Rank test- $p > 0.05$, AD; Alzheimer's disease

Table 16 indicates that there is no significant difference among the individual accuracy scores of the subjects in the AD group in terms of short and long sentence fragments ($z=-1.897$, $p=0.58$). It could be stated that the AD subjects' accuracy scores are not affected by the length of discourse. However, when the reaction times in the short and long sentence fragments are compared, it could be seen that there is a significant difference among the individual performances of AD subjects ($z=-3.808$, $p=0.00$). Therefore, the subjects in the AD group respond the long sentence fragments with longer reaction times, and the short sentence fragments with shorter reaction times. Accuracy results indicate that the length of discourse do not much affect the processing of the AD group. However, the reaction times of the AD subjects seem to be influenced by the length of discourse. Table 17 presents the results of the CMN test on the individual scores of the controls below:

Table 17. Results of the Wilcoxon Signed Rank test on the control group's individual scores

		N	Mean Rank	Sum of Ranks	Z	p
Accurate responses to long sentence fragments	Negative Ranks	11	8.64	95.00	-2.691*	.007
	Positive Ranks	3	3.33	10.00		
	Ties	8				
Accurate responses to short sentence fragments	Negative Ranks	4	7.75	31.00	-3.10**	.002
	Positive Ranks	18	12.33	222.00		
	Ties	0				

Notes: *Based on positive ranks

** Based on negative ranks

*** Wilcoxon Signed Rank test- $p < 0.05$, AD; Alzheimer's disease

As can be seen in Table 17, there is a statistically significant difference between the scores of the short and long sentence fragments performed by the control subjects ($z=-2.691$, $p=0.007$). Therefore, it can be said that the accuracy performance of the control group is better in short sentence fragments rather than the long sentence fragments. When the reaction times are examined, it is observed that there is a statistically significant difference among the reaction times of the control subjects ($z=-3.10$, $p=0.002$). It means that the control subjects respond the long sentence fragments in longer times. In contrast to the accuracy results of the AD subjects, the control subjects seems to be affected by the length of the discourse by giving better responses to the short sentence fragments. However, the reaction times of the control subjects show similarity with the reaction times of the AD subjects.

The Wilcoxon Signed Rank test results demonstrated the ranking of the individual performance of the subjects in regard to accuracy and reaction times on the CMN test. Table 16 and 17 indicated that in-group performances of the AD and control subjects showed parallelism regarding reaction times, but not regarding accuracy responses. In contrast to the accuracy responses of the AD subjects, a statistically significant difference was observed in the accuracy responses of the control subjects. Therefore, it could be safe to argue that the length of the sentence fragment affected the comprehension of the control group as opposed to the similar study carried by Almor et al., (2001). However, it seems that the results of the AD subjects are compatible with the aforementioned study of Almor et al. (2001).

These findings make it possible to answer the research question 3, which is repeated as follows: “Do the Turkish-speaking AD patients and the non-AD subjects process the 3rd person pronouns in different conditions (i.e., short and long sentence fragments)?”

The AD and control groups similarly process the 3rd person pronouns regardless of the length of discourse. In addition, using either the singular or the plural pronoun in short and long sentence fragments do not affect the processing in terms of accuracy responses. As for the reaction times, both groups have longer reaction times in long sentence fragments. Although the reaction times of the AD patients seem to be longer than the control group in general, it was found that this difference was not statistically

significant. Therefore, it could be argued that the Turkish-speaking AD patients' sentence processing is not much more influenced by accuracy responses and reaction times as opposed to the study by Almor et al. (2001). Overall, both accuracy and reaction time results demonstrated that there is a parallel performance between the processing of the Turkish-speaking mild AD patients and the control subjects.

In line with these previous findings, the findings of the study indicate that the Turkish-speaking mild AD subjects performed close to the control subjects in both short and long sentence fragments. Therefore, these findings seem to be contrary to the reports by Tyler and Marslen-Wilson, 1977; Tyler and Marslen-Wilson, (1982); Kempler (1995) and Almor et al. (2001) who claim that the AD patients use pronouns excessively and process them inaccurately in both short and long sentence fragments. This contradiction may occur due to the cross-linguistic differences. More specifically, given that there seems to be certain differences in the processing of some languages and that patients processing might differ regarding the word order and morphology (Bates, Wulfeck and MacWhinney, 1991), Turkish third person pronouns are not hard to be processed. This means that several facilitating characteristics of Turkish 3rd person pronouns could trigger the activation of the suitable antecedents in given discourses. For instance, the 3rd person pronouns in Turkish do not carry gender distinction, they are inflected for case markers and they show subject-verb agreement in regard to person and number (Göksel and Kerslake, 2005). To this end, Slobin (1982) suggests that due to one-to-one relation between the form and meaning and the agglutinative feature of Turkish, it could be regarded as one of the transparent languages. Hillert (1998) also argues that as a highly inflected language, the case morphemes in Turkish show regularities by being attached to nouns, pronouns and interrogatives. In addition to the marked SOV structure, almost all the word order combinations could be seen in Turkish and Erguvanlı (1984) suggests that subject and object could be scrambled easily with the help of case markers, which “convey discourse-pragmatic information”. On the other hand, Batman-Ratyosyan and Stromswold (2002) state that the morphosyntactic rules of Turkish contribute to the mastering of discursal abilities since they are automatically realized in one's linguistic knowledge. They (2002) also argue that the constituents are used in a sentential position to get a specific discursal role and the case markings could

provide definite readings of those constituents. Slobin (1982) claims that the interpretation of a sentence depends mostly on the case cues in Turkish. More specifically, the discourse-related referential comprehension or processing could be established easily through the case markings. In short, the regular patterns and richness of Turkish could facilitate the comprehension and processing mechanisms (Hilter, 1998).

Such differences are also observed in other languages. For instance, the English-speaking AD patients could demonstrate observable impairment concerning the processing of pronouns while the Italian-speaking patients may not show much impairment due to the flexibility of the word order of that language. In addition, the AD patients speaking morphologically rich languages such as German, Italian, Turkish, Korean, Hungarian and Slovak may not be affected compared to English language, which is morphologically simple compared to those languages. MacWinney and Bates (1989) assert that the cues (i.e., inflections, numbers and function words) might make the processing of lexical items in a given sentence easier. In common with these reports, Almor et al. (2001) found that the English-speaking AD patients showed declines in the personal pronoun processing in regard to short and long discourse conditions. Moreover, a recent study on Slovak-speaking AD subjects (Marková et al., 2016) supported the aforementioned assertions on the sentence processing of the AD patients in Slovak language. On the basis of what Bates et al. (1991) and MacWhinney and Bates suggested, it could be stated that the word order and the morphology of English structure could be the reason for high deteriorations in the earlier studies on the English-speaking mild AD patients (Kempler et al., 1999 and Almor et al., 2001).

On the other hand, as shown above the participants were provided all needed cues to process the third person pronouns in Experiment 3. It seems that these cues were successfully employed by the participants to fully recover the third person pronouns.

As mentioned before, Experiment 3 also makes it possible to test the predictions of the following hypotheses, the Working Memory Deficit Hypothesis or the Informational Load Hypothesis.

It is observed that the findings of Experiment 3 are in agreement with the post-interpretive based WMDH (Rochon et al., 1994; Waters et al., 1995 and Waters and Caplan, 1997 and Kempler et al., 1999). Because these findings do not demonstrate a statistically significant difference between the groups in regard to the reaction times of accurate and inaccurate pronoun selections and responses to the short and long conditioned sentences. In other words, the predictions of the ILH (Almor, 1999; Almor and Nair, 2007) are not valid for the findings of this study, since inaccurate answers of the both groups exist not only in the long-conditioned but also in the short conditioned sentence fragments. Furthermore, the distance between the pronoun and its antecedent as well as extra information given do not seem to significantly affect the processing of the 3rd person pronouns by the Turkish-speaking mild AD patients.

The support of the findings for the post-interpretive based WMDH could be further discussed. The CMN test reduces high demand on the WM since participants can both see and hear the sentences at the same time (Bickel, Pantel, Eysenbach, and Schröder, 2000). Due to the decreased memory burden, the performances of the AD patients are expected to perform as good as the control subjects in regard to reaction times and suitable pronoun selections.

Furthermore, given that there are almost equal correct responses by both groups, the findings are definitely compatible with the WMDH. In addition, it is found that the length of the sentence fragments does not affect the processing performance of the groups, which is also predicted by the WMDH, not by the ILH.

CHAPTER 5 : CONCLUSION

The aims of the study were to reveal the mental status and the comprehension and processing of the Turkish-speaking mild AD patients in regard to reflexive, reciprocal and the 3rd person pronouns. The study also dealt with the potential differences between the mild AD patients and the healthy older subjects in terms of their mental status, comprehension and processing of the mentioned three pronoun categories. In addition, the study tested the predictions of the following hypotheses, namely SDH (Berndt and Caramazza, 1980; Waters et al., 1991 and Grober and Bang, 1995), WMDH (Waters et al., 1995) and ILH (Almor, 1996), in relation to the pronoun comprehension and processing by the Turkish speaking mild AD-patients.

To fulfill these aims, two off-line tests, namely the SMMSE and SPM, and an on-line test, the CMN, were used in this study. The first aim was achieved by the administration of the SMMSE test to all participants. This test involved the assessment of the cognitive abilities by requiring participants to follow the commands. Specific aspects measured by the SMMSE test are the orientation, WM, language and recall abilities of the participants. The administration of the SPM test, which tested the sentence comprehension abilities of the participants in regard to the reflexive and reciprocal pronouns under complex and simple syntactic conditions, served for the second aim of the study. This test required participants to select the appropriate picture corresponding to the sentence that they heard. The third aim was achieved by the administration of the CMN test, which tested the sentence processing abilities of the participants in regard to the 3rd person pronouns under the short and long conditioned sentence fragments. This test required participants to complete the audio-visually presented sentence fragments with the appropriate 3rd person pronoun.

The results of the first experiment demonstrated that the Turkish-speaking AD patients had mild impairments concerning their mental status. The SMMSE performance of the control subjects was much better than that of the mild AD patients regarding the orientation, recall and language sub-dimensions. However, the results obtained from the WM sub-dimension were found to be close in both groups. Since the AD patients were mildly impaired, their memory declines were not remarkable in the early stages of the

disease, which is consistent with the existing literature (Teng et al., 1987; Ashford et al., 1989 and Sevigny et al., 2010). The findings obtained from the SMMSE test provided evidence for the cognitive abilities of the mild AD patients indicating certain declines compared to their healthy peers.

Having established that there were certain differences between the mild AD subjects and the control subjects in terms of their mental status, it was safe to test their comprehension and processing performances. Therefore, two experiments were designed to analyze their pronoun comprehension and pronoun processing performances. First the comprehension-related results and then the processing-related results are summarized as follows:

5.1. COMPREHENSION-RELATED RESULTS

The results of the experiment on the comprehension of reflexive and reciprocal pronouns indicated that overall performances of the Turkish-speaking mild AD patients were not statistically significantly different from those of the healthy control subjects. In other words, both the AD-patients and non-AD-patients equally comprehended the reflexive and reciprocal pronouns, which were presented in simple and complex syntactic conditions. In addition, the mild AD patients and the healthy controls could comprehend the sentences regardless of their syntactic complexity. This result indicates that there is no significant effect of syntactic complexity on the pronoun comprehension of the AD patients. Here it should also be added that although some of the sentences tested were syntactically complex (i.e., embedded sentences), such sentences seemed to provide the participants with the necessary contextual information, which are needed to identify the correct pronoun. Therefore, given that embedded sentences include more than one proposition, such constructions are useful in comprehending the reflexive and reciprocal pronouns due to their inclusion of the information required to understand the sentence and to find out which pronoun should be used.

On the other hand, the results concerning the individual performances of the mild AD patients and the control subjects indicated that all subjects had difficulty in the comprehension of the sentences with reciprocal pronouns. In other words, the

comprehension of reflexive pronouns is much easier than that of reciprocal pronouns. This difference between reflexive pronouns and reciprocal pronouns indicate that reflexive pronouns should be related to the structural properties of the constructions tested rather than the effects of the AD on their comprehension abilities. Therefore, it is safe to argue that reflexive pronouns have much more fixed semantic content compared to the reciprocal pronouns. Since the semantic content of the reciprocal pronouns are vague, the comprehension of them appears to be difficult. As mentioned in Chapter 4 the comprehension of the reciprocal pronouns is difficult in that they represent double meaning in the WM and this leads to a problem in selecting the proper antecedent in a given sentence. On the basis of these assumptions, it is possible to claim that these characteristics of the reciprocal pronouns make them much harder to comprehend.

In addition, the results obtained from this experiment were tested on the basis of the predictions of the hypotheses, namely the WMDH and the SDH. The results clearly supported for the predictions of the former. Because the results of the study indicate that the WMDH provides a sufficient explanation for the comprehension of simple and complex sentences involving reflexive and reciprocal pronouns. As stated earlier, the off-line SPM test increased the WM demands of the subjects, since they had to comprehend the spoken sentence and hold it in their memories to use it when selecting the appropriate picture. The propositional meaning of the sentences was encoded in the WM to accomplish this process and the post-interpretive mechanism was used in the sentence comprehension. Consistent with the predictions of the WMDH, it is found that the mild AD subjects could keep the sentence in their WMs and use it in choosing the correct pronoun. Given that WMs of the mild AD patients were not considerably deteriorated, they could pay more attention to the stimuli and show better performance in sentence comprehension. Therefore, they showed mild impairment in the sentence comprehension abilities in contrast to the predictions of the SDH (Grober and Bang 1995), which suggest that the AD patients show more sensitivity to the comprehension of complex sentences. However, the results demonstrated that the AD-patients sampled made mistakes not only in complex sentences but also in simple sentences. In addition, the control group also made similar mistakes independent of the syntactic conditions tested. One reason for this result may be that the SPM test is a demanding test and

subjects had to pay more attention to comprehend the stimuli presented on this test. As noted above, the WM abilities of the AD subjects were only mildly affected. Therefore, the mild AD patients could also comprehend the complex sentences since their WMs were more alerted and less deteriorated.

5.2. PROPROCESSING-RELATED RESULTS

The results of the experiment on the pronoun processing are concerned with the performance of the Turkish-speaking mild AD patients and the healthy control subjects regarding the processing of the 3rd person pronouns. The results demonstrated that the Turkish-speaking mild AD patients and the healthy control subjects could process the 3rd person pronouns in short and long sentence fragments with less difficulty. Therefore, they equally performed on the processing of these pronouns. In addition, the length of the sentence fragments and the singularity of plurality (number) of the 3rd person pronouns did not significantly influence their processing performance. The results also indicated that no significant differences existed between the groups in terms of the total accuracy and reaction time scores.

In addition, Kempler et al. (1999) and Bickel et al. (2000) suggested that the on-line CMN test was employed to minimize the effect of the WM by showing the stimuli audio-visually to the participants. Therefore, it is safe to argue that the results of the third experiment were not influenced by the WM demands. The successful processing of the mild AD patients provided a strong evidence for this view. This result also suggests that syntactic and morphological differences could influence the sentence processing of the AD patients. In other words, the syntactic flexibility and the morphologically rich structure of the Turkish also made the pronoun selections by the participants much easier. Since the Turkish sentence fragments were presented in SOV word order, the subjects could see the pronouns in the middle of the sentence fragments, rather than seeing them at the end of the sentence. Therefore, it could be argued that Turkish word order provides an opportunity for the subjects to select the appropriate pronoun. In addition, the inflections or the number cues attached to the other lexical items in the given sentence fragments seemed to support the sentence processing of the participants. As Turkish is one of the highly inflected languages, the plural or singular

inflections seen on the lexical items might give the participants some clue for their processing resources.

However, when the individual processing performances of the participants were analyzed, it is seen that the accuracy responses of the control subjects differed from that of the AD subjects. More specifically, the control subjects better processed the short sentence fragments compared to the long sentence fragments. However, the AD subjects were found to perform the same in short and long sentence fragments. In addition, the results obtained from the reaction times of the groups demonstrated that all subjects responded to the long sentence fragments in longer times, and the groups did not demonstrate a significant difference in this regard. Therefore, it can be stated that both healthy older subjects and the AD subjects process the linguistic stimuli in longer times. On the other hand, it is also found that the mildly impaired WMs did not lead to a decline in the processing mechanisms of the AD patients. Instead, differential effects were observed in the individual processing of the control subjects, which should be further investigated before making definitive remarks on their processing.

These results clearly support for the predictions of the WMDH. Consistent with the predictions of the WMDH, the results of this experiment indicated that neither the 3rd person pronoun selections nor the length of the sentence fragments significantly affected the processing performances of both groups in terms of accuracy and reaction times. Therefore, the result of this experiment is inconsistent with the predictions of the ILH, which argued that it would be difficult for the AD subjects to hold the prior information in mind and to select the appropriate 3rd person pronoun in the long sentences fragments. In addition the predictions of the ILH suggest that since the pronouns have less salient conceptual representations, processing and matching them with the referring expression would be difficult under the discousal conditions. It was further argued by the ILH that the use of additional sentence fragments increases the cost of processing, thereby leading to inappropriate pronoun selections. However, despite the less salient feature of the 3rd person pronouns, the mild AD patients processed them as successfully as their healthy counterparts did.

5.3. SUGGESTIONS FOR FURTHER STUDIES AND IMPLICATIONS

Based on the results of the study, it is possible to develop several suggestions for future studies on the topic. As noted before, this study focused on the comprehension and processing of the Turkish-speaking AD patients (and the healthy controls) concerning the reflexive, reciprocal and 3rd person pronouns. Further studies on other grammatical structures may produce different results. For instance, other pronoun categories such as demonstrative pronouns and other personal pronouns could be examined on an AD-sample to have much comprehensive understanding of their comprehension and processing performances.

In this study on the mild AD-patients the reflexive and reciprocal pronouns were analyzed in terms of comprehension and the 3rd person pronouns were analyzed in terms of processing. Therefore, future studies may look at their processing performances regarding the reflexive and reciprocal pronouns and their comprehension performances concerning the 3rd person pronouns. It is certain that such a study will provide further insight about both their comprehension and processing performances and about the comprehension and processing features of these pronoun categories.

As mentioned several times, the focus of this study is on the comprehension and processing performances of the AD patients. Therefore, to have much more comprehensive understanding of the linguistic capabilities of these patients, examining their production performances is needed. Thus, future studies could and should deal with the analysis of the sentence production by AD patients.

It should be also stated that the study was conducted on a sample including the Turkish-speaking mild AD patients and the healthy controls living in Ankara. As mentioned before, the mild AD patients were recruited from the Psychiatry Department of Hacettepe University and the control group was selected from Turkey retirement association, community centers and neighbors. Given the fact that the current results do not demonstrate a statistically significant difference among the groups tested, whether or not this finding is valid for all Turkish-speaking mild AD patients could be established in further studies. Such studies may be carried out with a sample from

different cities and different communities. In addition, further studies may be carried out on samples of AD patients, their age and education matched peers and healthy individuals who are much younger in order to understand if there is a statistically significant difference in terms of comprehension and processing.

It must be stated that the data of the study were collected from a sample including the mildly demented AD patients. Therefore, future studies may be carried out on a sample of the moderate and severe AD patients. Such studies will provide complementary information about the quality of their comprehension and processing mechanisms. Using the findings of these studies a comparison among the patients with mildly, moderately or severely impaired can be carried out and it is certain that such findings will provide detailed evidence to have a comprehensive understanding about whether or not their comprehension and processing abilities show declines over time.

Taking sociolinguistic variables into account, the ages of the subjects were limited to 70-89 in the present study, and their education levels and genders were matched. The comprehension and processing of the younger AD patients and those with lower educational attainment may also be analyzed. In addition, in order to see whether or not gender plays a significant role in the comprehension and processing performances of AD patients, a comparative study could be carried out on female and male AD patients.

On the basis of the results, similar studies could also be carried out in an explanatory manner concerning the basic theoretical background. It may be achieved by testing the various hypotheses on the topic. In this study, three major hypotheses were tested by means of off-line and on-line tests. In addition to these methods, computational and neurophysiological techniques will better uncover whether or not there were any impairments in the language comprehension, processing or production mechanisms of the AD patients. For instance, the use of eye-tracker and self-paced reading, repetition or other priming techniques on the pronoun comprehension, processing or production may provide different results.

In addition, the results of this study have also clinical implications. In the study, comprehension and processing of the Turkish-speaking mild AD patients were found to

be intact despite the impairments in their cognitive skills. However, this indicates that the relatively preserved linguistic abilities could be further analyzed and if any impairment is observed in terms of other linguistic structures, the necessary actions could be executed by the clinicians in the earlier stages of the disease. Therefore, it is safe to argue that identifying the psycho-cognitive abilities and the linguistic abilities of AD patients in Turkish speaking communities will be contributed to the clinical researches.

As a concluding remark, it can be claimed that the results of the current study may contribute to the comprehension and processing literature concerning the performances of the AD patients. Additionally, the present study is expected to open a new promising area for the linguistic studies on the Turkish- speaking AD patients. In short, as suggested by Wray (2015) linguistics should be the core of the Alzheimer's disease research by depicting the undermined language abilities of the patients.

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APPENDICES

APPENDIX 1: CONSENT FORM

ARAŞTIRMA AMAÇLI ÇALIŞMA İÇİN AYDINLATILMIŞ ONAM FORMU

(Hasta Yakını/ Vasisi Grubu)

(Hekimin Açıklaması)

“Türk Alzheimer Hastalarının Adıl Kavrama ve İşleme Özelliklerinin Psikodilbilimsel İncelenmesi” başlıklı bir araştırma yapmaktayız.

Araştırma Hacettepe Üniversitesi Edebiyat Fakültesi İngiliz Dilbilimi ve Tıp Fakültesi Ruh Sağlığı ve Hastalıkları Anabilim Dalları’nın ortak katılımı ile yürütülecektir.

Vasisi olduğunuz hasta bu araştırmaya katılıp katılmamakta serbesttir. Kararınızdan önce araştırma hakkında sizi bilgilendirmek istiyoruz. Bu bilgileri okuyup anladıktan sonra vasisi olduğunuz hastanın araştırmaya katılmasını isterseniz formu imzalayınız.

Eğer araştırmaya katılmayı kabul ederseniz Doç. Dr. Şahinde Özlem Erden Aki veya onun görevlendireceği bir hekim tarafından hastanız muayene edilecek ve bulgular kaydedilecektir. Muayene sonucunda hastanın doktoru uygun görürse bu çalışmaya alınacaktır. Yine izniniz doğrultusunda bu çalışmayı yapabilmek için hastaya resimler ve cümleler gösterilerek bir kağıt-kalem testi uygulanacaktır. Test sırasında ses kaydı alınacak ve bu kayıtlar sadece bilimsel yayınlarda ve öğrenci çalışmalarında hastanın kimliği kesinlikle gizli tutularak kullanılacaktır. Tüm testlerin uygulanması ve görüşme yaklaşık 60 dakika sürecektir.

Hastanın bu çalışmaya katılması için herhangi bir ücret talep edilmeyecektir.

Hasta ile ilgili tıbbi bilgiler gizli tutulacak, ancak çalışmanın kalitesini denetleyen görevliler ya da etik kurullarca gereği halinde incelenebilecektir.

Bu çalışmaya hastanızın katılmasını reddedebilirsiniz. Bu araştırmaya katılmak tamamen isteğe bağlıdır ve reddettiğiniz takdirde hastaya uygulanan tedavide herhangi bir değişiklik olmayacaktır. Yine çalışmanın herhangi bir aşamasında onayınızı çekmek hakkına da sahipsiniz.

(Hasta Yakını Beyanı /Vasisinin Beyanı)

Sayın Doç. Dr. Emine Yazar/ Doç. Dr. Şahinde Özlem Erden Aki/ Arş. Gör. Esra Küçüksakarya tarafından Hacettepe Üniversitesi Edebiyat Fakültesi İngiliz Dilbilimi ve Tıp Fakültesi Ruh Sağlığı ve Hastalıkları Anabilim Dalları'nda tıbbi bir araştırma yapılacağı belirtilerek bu araştırma ile ilgili yukarıdaki bilgiler bana aktarıldı.

Araştırma sonuçlarının eğitim ve bilimsel amaçlarla kullanımı sırasında vasisi olduğum hastanın kişisel bilgilerinin ihtimamla korunacağı konusunda bana yeterli güven verildi.

Uygulama sırasında, hastamız herhangi bir sebep göstermeden araştırmadan çekilebilir.

Araştırma için yapılacak harcamalarla ilgili herhangi bir parasal sorumluluk altına girmiyorum.

İster doğrudan, ister dolaylı olsun araştırma uygulamasından kaynaklanan nedenlerle meydana gelebilecek herhangi bir sağlık sorununun ortaya çıkması halinde, her türlü tıbbi müdahalenin sağlanacağı konusunda gerekli güvence verildi. Bu tıbbi müdahalelerle ilgili olarak da parasal bir yük altına girmeyeceğim.

Araştırma sırasında bir sorun ile karşılaşıldığında; herhangi bir saatte, Doç. .Dr. Özlem Erden Aki'yi 03123051873-74 nolu iş telefonundan ve HÜTF Ruh Sağlığı ve Hastalıkları Anabilim Dalı adresinden ve araştırma ile ilgili sorularım için Arş. Gör. Esra Küçüksakarya'yı 05312601326/03122958525 nolu telefonlardan veya Hacettepe Üniversitesi Edebiyat Fakültesi İngiliz Dilbilimi Anabilim Dalı adresinden arayabileceğimi biliyorum.

Vasisi olduğum hasta bu araştırmaya katılmak zorunda değildir ve katılmayabilir. Araştırmaya katılması konusunda zorlayıcı bir davranışla karşılaşmış değilim. Eğer katılmayı reddedersem, bu durumun hastamın tıbbi bakımına ve hekim ile olan ilişkisine herhangi bir zarar getirmeyeceğini de biliyorum.

Bana yapılan tüm açıklamaları ayrıntılarıyla anlamış bulunmaktayım. Kendi başıma belli bir düşünme süresi sonunda adı geçen bu araştırma projesinde vasisi olduğum hastanın “katılımcı” olarak yer alması kararını aldım. Bu konuda yapılan daveti memnuniyet ve gönüllülük içerisinde kabul ediyorum.

İmzalı bu form kağıdının bir kopyası bana verilecektir.

Katılımcı

Adı, soyadı:

Adres:

Tel.

İmza:

Görüşme tanığı

Adı, soyadı:

Adres:

Tel.

İmza:

Hastanın yasal temsilcisi; yoksa

1. derece yakını (veya bakım veren kişi)

Adı soyadı, unvanı:

Adres:

Tel.

İmza:

Katılımcı ile

görüşen hekim

Adı soyadı, unvanı:

Adres:

Tel.

İmza:

ARAŞTIRMA AMAÇLI ÇALIŞMA İÇİN AYDINLATILMIŞ ONAM FORMU

(Kontrol Grubu)

(Hekimin Açıklaması)

“Türk Alzheimer Hastalarının Adıl Kavrama ve İşleme Özelliklerinin Psikodilbilimsel İncelenmesi” başlıklı bir araştırma yapmaktayız.

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Bu araştırmaya katılıp katılmamakta serbestsiniz. Kararınızdan önce araştırma hakkında sizi bilgilendirmek istiyoruz. Bu bilgileri okuyup anladıktan sonra araştırmaya katılmak isterseniz formu imzalayınız.

Öncelikle çalışmamız erken evre Alzheimer hastalarında tümce düzeyinde belli yapıların algılanmasını ölçmeyi amaçlamaktadır. Sağlıklı sonuca ulaşabilmemiz için bu hastalığı taşımayan bireylere de ilgili testlerin yapılması gerekmektedir. Bu nedenle siz bu araştırmaya kontrol grubunda bulunmak üzere davet ediliyorsunuz. Size çalışmanın ilk aşamasında kağıt-kalem testi uygulanacak, sonraki aşamasında ise işitsel olarak verilen cümlelere yanıt vermeniz beklenecektir. Test sırasında ses kaydınız alınacak ve bu kayıtlar sadece bilimsel yayınlarda ve öğrenci çalışmalarında kimliğiniz kesinlikle gizli tutularak kullanılacaktır. Tüm testlerin uygulanması ve görüşme yaklaşık 60 dakika sürecektir.

Bu çalışmaya katılmanız için sizden herhangi bir ücret istenmeyecektir.

Sizinle ilgili tıbbi bilgiler gizli tutulacak, ancak çalışmanın kalitesini denetleyen görevliler ya da etik kurullarca gereği halinde incelenebilecektir.

Bu çalışmaya katılmayı reddedebilirsiniz. Bu araştırmaya katılmak tamamen isteğe bağlıdır ve reddettiğiniz takdirde size uygulanan tedavide herhangi bir değişiklik olmayacaktır. Yine çalışmanın herhangi bir aşamasında onayınızı çekmek hakkına da sahipsiniz.

(Katılımcının/Hastanın Beyanı)

Sayın Doç. Dr. Emine Yazar/ Doç. Dr. Şahinde Özlem Erden Aki/Arş. Gör. Esra Küçüksakarya tarafından Hacettepe Üniversitesi Edebiyat Fakültesi İngiliz Dilbilimi ve Tıp Fakültesi Ruh Sağlığı ve Hastalıkları Anabilim Dalları'nda tıbbi bir araştırma yapılacağı belirtilerek bu araştırma ile ilgili yukarıdaki bilgiler bana aktarıldı.

Araştırma sonuçlarının eğitim ve bilimsel amaçlarla kullanımı sırasında kişisel bilgilerimin ihtimamla korunacağı konusunda bana yeterli güven verildi.

Uygulama sırasında herhangi bir sebep göstermeden araştırmadan çekilebilirim.

Araştırma için yapılacak harcamalarla ilgili herhangi bir parasal sorumluluk altına girmiyorum.

İster doğrudan, ister dolaylı olsun araştırma uygulamasından kaynaklanan nedenlerle meydana gelebilecek herhangi bir sağlık sorununun ortaya çıkması halinde, her türlü tıbbi müdahalenin sağlanacağı konusunda gerekli güvence verildi. Bu tıbbi müdahalelerle ilgili olarak da parasal bir yük altına girmeyeceğim.

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Bu araştırmaya katılmak zorunda değilim ve katılmayabilirim. Araştırmaya katılmam konusunda zorlayıcı bir davranışla karşılaşmış değilim. Eğer katılmayı reddedersem, bu durumun tıbbi bakımına ve hekim ile olan ilişkiye herhangi bir zarar getirmeyeceğini de biliyorum.

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İmzalı bu form kağıdının bir kopyası bana verilecektir.

Katılımcı

Adı, soyadı:

Adres:

Tel.

İmza:

Görüşme tanığı

Adı, soyadı:

Adres:

Tel.

İmza:

Hastanın yasal temsilcisi; yoksa

1. derece yakını (veya bakım veren kişi)

Adı soyadı, unvanı:

Adres:

Tel.

İmza:

Katılımcı ile

görüşen hekim

Adı soyadı, unvanı:

Adres:

Tel.

İmza:



APPENDIX 2: STANDARDIZED MINI MENTAL EXAMINATION

TEST (SMMSE)

Hastanın Adı, Soyadı:	Tarih:
Hastanın Yaşı ve Cinsiyeti:	Değerlendirici:

1. Yönelim:

Puan		Puan	
1 ☐	Yıl?	1 ☐	Ülke?
1 ☐	Mevsim?	1 ☐	İl?
1 ☐	Ay?	1 ☐	İlçe?
1 ☐	Avın kaç?	1 ☐	Hastane?
1 ☐	Günlerden ne?	1 ☐	Kat?

2. Kayıt

Hastaya 3 ilgisiz nesne söylenecek, sonra yinelemesi istenecek. (Her doğru yanıt 1 puan)

Nesneler	Yanıtlar	Puan
1. MAVİ	1.	1 ☐
2. ŞAHİN	2.	1 ☐
3. LALE	3.	1 ☐
Deneme Sayısı :		

3. Dikkat ve Hesap (Aşağıdaki ilk işlemde hasta uyum sağlayamıyorsa, ikincisi denenecek)

1. 100'den başlayarak geriye doğru 7'şer eksilterek sayınız.

Puan	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------

2. DÜNYA sözcüğünün harflerini tersten söyleyiniz.

Puan	1 ☐	1 ☐	1 ☐	1 ☐	1 ☐
------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------

4. Çağırma (Hatırlama)

Kayıt bölümündeki üç nesne ismi yeniden sorulacak. Her nesne için 1 puan

Yanıtlar	Puan
1.	1 ☐
2.	1 ☐
3.	1 ☐

5. Dil

1. İsimlendirme:

Her doğru cevap 1 puan

- a) Kol saati gösterilecek sorulacak, bu ne? ☐
b) Kalem gösterilecek sorulacak, bu ne? ☐

2. Yineleme:

Hastaya şu cümleyi yinelemesini söyleyiniz.
"O gelmiş olsaydı, ben de giderdim."

Doğru cevap 1 puan ☐

3. Üç durum emri:

Üç emri uygulamasını hastadan isteyiniz.
"Sağ-Sol elinize bir kağıt alın, ikiye katlayın, yere koyun."
1 ☐ 1 ☐ 1 ☐

4. Okuma:

Hastaya aşağıdaki yazıyı okuyup, orada söylenen hareketi yapmasını isteyiniz.

GÖZLERİNİ KAPAT.

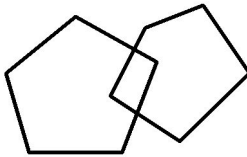
5. Yazma:

Doğru cevap 1 puan ☐
Hastaya bir cümle yazmasını söyleyiniz.

Doğru cevap 1 puan

6. Çizim:

☐ Aşağıdaki çizimi kopya etmesini isteyiniz.



1 puan için 10 açının hepsi de bulunmalı. Titreme ve kaymalar, eğrilikler gözönüne alınmamalı. 1 ☐

Bilinç Düzeyi: Uyanık Uyuklu Stupor Koma

APPENDIX 3: SENTENCE-PICTURE MATCHING TEST (SPM)

1) Kızlar kendilerine bakıyorlar.

“Girls are looking at themselves”.



a) ☐



b) ☐

2) Ahmet ve Ayşe birbirlerini çiziyorlar.

“Ahmet and Ayşe are drawing each other”.



a) ☐



b) ☐

3) Kızlar ve erkekler birbirlerinin fotoğraflarını çekiyorlar.

“Girls are taking photos of each other”.



a) ☐



b) ☐

4) Ayşe ve Fatma kendi saçlarını kendileri tarıyorlar.

“Ayşe and Fatma are combing themselves”.



a) ☐



b) ☐

5) Ahmet ve Mehmet birbirlerini bařlıyorlar.

“Ahmet and Mehmet are tying each other”.



a) ☐



b) ☐

6) Öğretmen, kızların kendilerine bakmalarını istiyor.

“Teacher asks girls to look at themselves”.



a) ☐



b) ☐

7) Öğretmen, Ahmet ve Ayşe'nin kendilerinin resimlerini çizmelerini istiyor.

“Teacher asks Ahmet and Ayşe to draw themselves”.



a) ☐



b) ☐

8) Öğretmen, Ahmet ve Ayşe'nin birbirlerinin fotoğraflarını çekmelerini istiyor.

“Teacher asks Ahmet and Ayşe to take photos of each other”.



☐ a)



b) ☐

9) Öğretmen, Ayşe ve Fatma'nın kendi saçlarını kendilerinin taramalarını istiyor.

“Teacher asks Ayşe and Fatma to comb themselves”.



a) ☐



b) ☐

10) Öğretmen, Ahmet ve Mehmet'in birbirlerini bağlamalarını istiyor.

“Teacher asks Ahmet and Mehmet to tie each other”.



a) ☐



b) ☐

11) Ayşe kendisine bakıyor.

“Ayşe is looking at herself”.



a) ☐



b) ☐

12) Ayşe, Ahmet’in kendini çizmesini istiyor.

“Ayşe wants Ahmet to draw himself”.



a) ☐



b) ☐

13) Kızlar birbirlerine bakıyorlar.

“Girls are looking at each other”.



a) ☐



b) ☐

14) Ahmet ve Ayşe kendilerinin resimlerini çiziyorlar.

“Ahmet and Ayşe are drawing themselves”.



a) ☐



b) ☐

15) Kızlar ve erkekler kendilerinin fotoğraflarını çekiyorlar.

“Girls and boys are taking photos of themselves”.



a)

☐

☐

b)

16) Ayşe ve Fatma birbirlerinin saçlarını tarıyorlar.

“Ayşe and Fatma are combing each other”.



a)

☐


b)

☐

17) Ahmet ve Mehmet kendilerini bařlıyorlar.

“Ahmet and Mehmet are tying themselves”.



a) ☐



b) ☐

18) Öğretmen, kızların birbirlerine bakmalarını istiyor.

“Teacher asks girls to look at each other”.



a) ☐



b) ☐

19) Öğretmen, Ahmet ve Ayşe'nin birbirlerinin resimlerini çizmelerini istiyor.

“Teacher asks Ahmet and Ayşe to draw themselves”.



a) ☐



b) ☐

20) Öğretmen, Ahmet ve Ayşe'nin kendilerinin fotoğraflarını çekmelerini istiyor.

“Teacher asks Ahmet and Ayşe to take photos of themselves”.



a) ☐



b) ☐

21) Öğretmen, Ayşe ve Fatma'nın birbirlerinin saçlarını taramalarını istiyor.

“Teacher asks Ayşe and Fatma to comb each other”.



a) ☐



b) ☐

22) Öğretmen, Ahmet ve Mehmet'in kendilerini bağlamalarını istiyor.

“Teacher asks Ahmet and Mehmet to tie themselves”.



a) ☐



b) ☐

23) Ayşe kendine bakıyor.

“Ayşe is looking at herself”.



a) ☐



b) ☐

24) Ayşe, kendini Ahmet’in çizmesini istiyor.

“Ayşe asks Ahmet to draw herself”.



a) ☐



b) ☐

APPENDIX 4: CROSS-MODAL NAMING TEST (CMN)

List of auditory stimuli used in the CMN test. The text in parentheses was only included in the long condition. All stimuli were followed by the visual targets HIM and THEM.

1. Futbolcular şanslı çocuğu kendi derbi maçına götürdü. (Stadyum tamamen doluydu). Devre arasında çocuk ONA/ONLARA el salladı.
2. Çocuklar partideki palyaçoğu çok sevdi. (Gösteri çok eğlenceliydi). Gösteri boyunca palyaço, ONA/ONLARA şeker dağıttı.
3. Bayan tezgahhtarlar mağazanın müdüründen nefret ediyordu. (İşler kötü gidiyordu). Çok geçmeden, müdür ONA/ONLARA maaşlarını bile ödeyemez oldu.
4. Hakim suçluları müebbet hapisle cezalandırdı. (Mahkeme salonu çok gürültülüydü). Karardan sonra, suçlular ONA/ONLARA bağırdı.
5. Delikanlı yaşlıları bahçeye çıkardı. (Hava serin ve kuruydu). Gezintiden sonra, yaşlılar ONA/ONLARA bahşış verdi.
6. Genç adam yaşlı çifti gemi seyahatine gönderdi. (Tatil çok dinlendiriciydi). Gezi boyunca, yaşlı çift ONA /ONLARA kart gönderdi.
7. Bir grup öğrenci ünlü profesör ile kafeteryada görüştü. (Toplantı kısa sürmek zorundaydı). Günün ilerleyen saatlerinde, profesör ONA/ ONLARA telefon açtı.
8. Okul müdürü öğrencilere tek sıra halinde dizilmelerini söyledi. (Alan gezisi, planlanan zamandan çok sonra yapılabilecekti.) Öğrenciler her zamanki gibi ONA/ ONLARA aldırmadı.
9. Banka müdürü parayı geri vermeleri için soygunculara yalvardı. (Durum sinir bozucuydu). Soyguncular bankadan çıkarken ONA/ ONLARA sadece güldü.
10. Müzisyenler konser boyunca orkestra şefini dikkatle izledi. (Konser salonu neredeyse doluydu). Gösteri sonrası orkestra şefi ONU/ ONLARI övdü.
11. İnsanlar belediye başkanından maddi destek talep etti. (Şehir panik halindeydi). Belediye başkanı vakit kaybetmeden ONA/ONLARA yardım etti.
12. İmam camiye gelen ziyaretçileri nezaketle karşıladı. (Caminin mimarisi güzeldi.) Ziyaretçiler törenden sonra ONA/ONLARA teşekkür etti.
13. Hastalar emekliliğe ayrılacak olan hemşireye veda partisi düzenledi. (Yemekler az yağlı ve lezzetliydi). Partinin sonunda, hemşire ONA /ONLARA sarıldı.
14. Baba çocuklara uyumadan önce masal anlattı. (Masal sihirli bir kaleyle ilgiliydi).

Masalın sonunda çocuklar ONA /ONLARA öpücük verdi.

15. Koç yüzücülere yeni spor salonunu gezdirdi. (Kapalı bir yüzme havuzu inşa edilmişti). Yüzücüler şakayla ONA /ONLARA su sıçrattı.

16. Yılmaz Ailesi sabah erkenden tamirciyi aradı. (Arabaları çalışmamıştı). Günün ilerleyen saatlerinde tamirci ONA /ONLARA yardım etti.

17. Yönetici kapıcılara yerleri temizlemelerini söyledi. (Koridor oldukça kirliydi). Kapıcılar isteksizce ONA/ONLARA itaat etti.

18. Yolcular uzun otobüs yolculuğunda safari rehberini dinledi. (Manzara zaman zaman sıkıcıydı). Sıkıcı anlarda, rehber ONU/ ONLARI eğlendirdi.

19. Hakem buz pistindeki hokey oyuncularına bağırdı. (Oyun çok gürültülüydü). Bazen oyuncular ONA/ ONLARA kulak veremedi.

20. Yorucu misafirler hizmetçiden temiz bir havlu istedi. (Çamaşır makinası bozulmuştu). Hizmetçi ONA/ ONLARA temiz havlu veremedi.

APPENDIX 5: ORJİNALLİK RAPORU

 HACETTEPE ÜNİVERSİTESİ SOSYAL BİLİMLER ENSTİTÜSÜ YÜKSEK LİSANS/DOKTORA TEZ ÇALIŞMASI ORJİNALLİK RAPORU
HACETTEPE ÜNİVERSİTESİ SOSYAL BİLİMLER ENSTİTÜSÜ İNGİLİZ DİL BİLİMİ ANABİLİM DALI BAŞKANLIĞI'NA
Tarih: 18/07/2017
Tez Başlığı / Konusu: A Psycholinguistic Study on the Pronoun Comprehension and Processing of the Turkish Alzheimer's Patients Yukarıda başlığı/konusu gösterilen tez çalışmamın a) Kapak sayfası, b) Giriş, c) Ana bölümler ve d) Sonuç kısımlarından oluşan toplam 114 sayfalık kısmına ilişkin, 18/07/2017 tarihinde tez danışmanım tarafından Turnitin adlı intihal tespit programından aşağıda belirtilen filtrelemeler uygulanarak alınmış olan orijinallik raporuna göre, tezin benzerlik oranı % 6 'dır. Uygulanan filtrelemeler: 1- Kabul/Onay ve Bildirim sayfaları hariç, 2- Kaynakça hariç 3- Alıntılar hariç 4- 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 tez çalışmamın herhangi bir intihal içermediğini; aksinin tespit edileceği muhtemel durumda doğabilecek her türlü hukuki sorumluluğu kabul ettiğimi ve yukarıda vermiş olduğum bilgilerin doğru olduğunu beyan ederim. Gereğini saygılarımla arz ederim.  18.07.2017 Tarih ve İmza Adı Soyadı: ESRA KÜÇÜKSAKARYA Öğrenci No: N14127741 Anabilim Dalı: İngiliz Dilbilimi Programı: TEZLİ YÜKSEK LİSANS Statüsü: ☒ Y.Lisans ☐ Doktora ☐ Bütünleşik Dr.
DANIŞMAN ONAYI UYGUNDUR.  Doç. Dr. EMİNE YARAR,

APPENDIX 6: ORIGINALITY REPORT

	HACETTEPE UNIVERSITY GRADUATE SCHOOL OF SOCIAL SCIENCES THESIS/DISSERTATION ORIGINALITY REPORT
HACETTEPE UNIVERSITY GRADUATE SCHOOL OF SOCIAL SCIENCES TO THE DEPARTMENT OF ENGLISH LINGUISTICS	
Date: 18/07/2017	
Thesis Title / Topic: A Psycholinguistic Study on the Pronoun Comprehension and Processing of the Turkish Alzheimer's Patients According to the originality report obtained by myself/my thesis advisor by using the Turnitin plagiarism detection software and by applying the filtering options stated below on 18/07/2017 for the total of 114 pages including the a) Title Page, b) Introduction, c) Main Chapters, and d) Conclusion sections of my thesis entitled as above, the similarity index of my thesis is 6%. Filtering options applied: 1. Approval and Declaration sections excluded 2. Bibliography/Works Cited excluded 3. Quotes excluded 4. Match size up to 5 words excluded I declare that I have carefully read Hacettepe University Graduate School of Social Sciences Guidelines for Obtaining and Using Thesis Originality Reports; that according to the maximum similarity index values specified in the Guidelines, my thesis does not include any form of plagiarism; that in any future detection of possible infringement of the regulations I accept all legal responsibility; and that all the information I have provided is correct to the best of my knowledge. I respectfully submit this for approval.	
 18.07.2017 Date and Signature	
Name Surname: ESRA KÜÇÜKSAKARYA Student No: N14127741 Department: English Linguistics Program: Master of Arts in Linguistics in English-MA Status: ☒ Masters ☐ Ph.D. ☐ Integrated Ph.D.	
ADVISOR APPROVAL  APPROVED. Assoc. Prof. Dr. EMİNE YARAR	

APPENDIX 7: ETİK KURUL ONAYI



T.C.
HACETTEPE ÜNİVERSİTESİ
Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu

Sayı : 16969557-1243

ARAŞTIRMA PROJESİ DEĞERLENDİRME RAPORU

Toplantı Tarihi : 2 ARALIK 2015 ÇARŞAMBA
Toplantı No : 2015/24
Proje No : GO 15/698 (Değerlendirme Tarihi: 18.11.2015)
Karar No : GO 15/698 - 10

Üniversitemiz Edebiyat Fakültesi öğretim üyelerinden Doç. Dr. Emine YARAR'ın sorumlu araştırmacı olduğu, Doç. Dr. Şahinde Özlem Erden AKI ile birlikte çalışacakları Arş. Gör. Esra KÜÇÜKSAKARYA'nın tezi olan GO 15/698 kayıt numaralı ve "*Türk Alzheimer Hastalarının Tümceleri Kavrama Yetersizliklerinin Dönüşlülük, İşteşlik ve Kişi Adılları Bağlamında İncelenmesi*" başlıklı proje önerisi araştırmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş olup, ile etik açıdan uygun bulunmuştur.

- | | | |
|---|--------|--|
| 1. Prof. Dr. Nurten Akarsu (Başkan) | İZİNLİ | 9 Prof. Dr. Rahime Nohutçu (Üye) |
| İZİNLİ | | |
| 2. Prof. Dr. Nüket Örnek Buken (Üye) | | 10. Prof. Dr. R. Köksal Özgül (Üye) |
| 3. Prof. Dr. M. Yıldırım Sara (Üye) | | 11. Prof. Dr. Ayşe Lale Doğan (Üye) |
| 4. Prof. Dr. Sevdâ F. Müftüoğlu (Üye) | İZİNLİ | 12. Prof. Dr. Leyla Dinç (Üye) |
| 5. Prof. Dr. Cenk Sökmensüer (Üye) | | 13. Prof. Dr. Hatice Doğan Buzoğlu (Üye) |
| 6. Prof. Dr. Volga Bayrakçı Tunay (Üye) | | 14. Doç. Dr. S. Kutay Demirkan (Üye) |
| 7. Prof. Dr. Ali Düzova (Üye) | | 15. Yrd. Doç. Dr. H. Hüsrev Turnagöl (Üye) |
| 8. Prof. Dr. Levent Akın (Üye) | | 16. Av. Meltem Onurlu (Üye) |

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