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**Language Performance and Impairment of Patients with  
Alzheimer's: Evidence from Patients in Tlemcen**

A Dissertation Submitted to the Department of English as a Partial Fulfillment of the  
Master Degree in Language Studies.

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# *Dedications*

It is with genuine gratitude and warm regards  
that I dedicate this work to my parents, sister  
and brothers.

And all my beloved family.

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# *Abstract*

Alzheimer's disease is characterized by continuously deteriorating impairments in several cognitive domains; it is currently viewed as one of the most severe chronic diseases. Language disturbance is one of the most prominent signs of Alzheimer's disease, causing higher-level communication impairments. The objectives of this research is to extract and summarize the key language deficiencies associated with Alzheimer disease, with an emphasis on the changes in different language domains (semantic, pragmatic, syntactic, and phonologic) during the course of the disease. In other words, using connected speech as a tool to offer a detailed knowledge of language performance in correlation to Alzheimer's disease at various stages and whether the patients have common language errors. Thus, the study's contribution is represented by eliciting and describing the linguistic features adopted for by certain Alzheimer's patients from Tlemcen who accepted to collaborate. As a result, the purpose of this descriptive study is to provide insights into the significance of language in Alzheimer's disease. The research consists of two methods of data collection, conducting interview with three patients at a neurologist's office in Tlemcen, followed by content analysis of a movie. The data obtained was then qualitatively evaluated. Finally, the findings demonstrated that the patients' language behaviour corresponds to their disease prognosis. Furthermore, many linguistic abnormalities are common and discovered in all patients who, according to the doctor, are in different stages of the disease. Semantic, pragmatic and phonological levels of language are deteriorated.

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# Abbreviations and Acronyms

AD: Alzheimer's Disease

ADI: Alzheimer's Disease International

CT: Computed Tomography

FDA: Food and Drug Administration

LAD: Language Acquisition Device

MCA: Montreal Cognitive Assessment

MCI: Mild Cognitive Impairment

MKO: More Knowledgeable Other

MMSE: Mini Mental State Examination

MRI: Magnetic Resonance Imaging

PET: Positron Emission Tomography

UG: Universal Grammar

ZPD: Zone of Proximal Development

# IPA Symbols

Arabic Letters	Transcription (IPA)
ء	[ʔ]
ب	[b]
ت	[t]
ث	[θ]
ج	[dʒ]
ح	[h]
خ	[x]
د	[d]
ذ	[ð]
ر	[r]
ز	[z]
س	[s]
ش	[ʃ]
ص	[sʰ]
ض	[dʒʰ]
ط	[tʰ]
ظ	[ðʰ]
ع	[ʕ]
ف	[f]
ق	[q]
ك	[k]
ل	[l]
م	[m]
ن	[n]
ه	[h]
و	[w]
ي	[j]

# **General Introduction**

## **Chapter One: Literature Review**

Language and the brain are among the intricate systems that make human beings distinct from other creatures. Language is a key differentiation between humans and other creatures. It reflects how human beings are genetically created to incubate specific cognitive and physical capacities that are passed down through generations. Language is the essence of human distinctiveness, innovation, and cultural transmission across history.

The brain, on the other hand, is the human body's computer and one of its most complex organs. The brain is the basis for all of our human qualities. It is the seat of thought, the sensory mediator, the activator of physical movement, and the behaviour's controller.

Language is one of the human brain's miraculous abilities. The study of how language is organized in the brain goes back at least five thousand years, and many theories have arisen. Many researchers have discovered that mental activities are associated to language as a means of thoughts and communicating among members of society; language is only embodied by a means of linguistic organization in the brain, which is the organizer of the thinking process. Thus, the link between the human brain and language is direct, in the sense that each influences and is impacted by the other.

It has been proven that having a healthy brain throughout one's life is the ultimate goal in maintaining health and longevity. However, as people get older, they are more vulnerable to neurological diseases that affect the brain's proper functions, such as memory, thinking, social abilities, and, consequently, language.

## Chapter One: Literature Review

Among them is the ‘Alzheimer’s Disease’. It is a widespread neurodegenerative disease that advances slowly and gradually. Alzheimer’s is one of the most common types of dementia that affects the brain, leading to a decline and harm in several cognitive domains that control thoughts, memory, and language. Therefore, language deficiency is one of the symptoms of this irreversible disease.

Thus, the present investigation aims at discovering whether the severity and progression of the disease can be reflected by a certain linguistic behaviour displayed by Alzheimer’s patients. Besides, the research process aims attention at describing the various features of the language disorders displayed by the patients associated with the stages of Alzheimer’s and which areas of language are impacted. This study helps establish a common ground where both the linguistic field and medical context are mutually correlated.

In order to provide a scrutinized understanding of language performance in relation to AD; and to approach the objective of the study, two questions were formulated narrowing down the research scope:

1. What are the features of language errors exhibited throughout the course of the disease?
2. What are the levels of language affected in Alzheimer’s disease?

Accordingly, the following hypotheses were proposed to answer the questions:

1. To some extent, the linguistic behaviour reflects the disease progression.
2. The patients share the same linguistic profile.

For the sake of answering the previously asked questions, and to test the validity of the hypotheses, a descriptive case study was used by the researcher in order to cover all aspects of language use in the case of AD patients. Clearly, the target population of this study is AD patients; the sample was composed of 3 patients selected purposefully to encompass different factors and outcomes.

## **Chapter One: Literature Review**

Making use of qualitative methods, semi-structured interviews were directed to the patients. As well as, the use of a movie whose content is roughly representative of our case. The data is then analyzed qualitatively.

Concerning the structure of this work, the research is divided into two chapters. The first chapter provides a literature review including the definition, the emergence and the different views on language. Besides, giving some insights about the field of neurolinguistics, and its interest concerning the language faculty in brain, and how this latter is disrupted. At last, the researcher gives scientific explanations about the main topic which is Alzheimer's disease and how it affects the usual use of language of the patients by describing the disease from a linguistic perspective.

The second chapter, on the other hand, is devoted to the practical part of the research. It includes a description of the methodology used throughout the data gathering process, as well as the research instruments employed, along with the justification of choosing such methods. Furthermore, this chapter gives a thorough examination of the results.

Lastly, the discussion and interpretation of the results provide conclusions that are related to the aforementioned research questions and hypotheses. The research concludes with a series of suggestions, recommendations, and future research assumptions associated to the issue.

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### 1.1 Introduction

This chapter gives a literature overview that includes the definition, emergence, and many perspectives on language. Furthermore, providing some insights into the discipline of neurolinguistics and its interest in the language faculty in the brain, as well as how this latter is damaged. Finally, the researcher provides scientific explanations concerning the major issue, Alzheimer's disease, and how it impacts the patients' normal use of language by describing the condition from a linguistic approach.

### 1.2 Human Language

According to Richards & Schmidt (2013) language is: “the system of human communication by means of a structured arrangement of sounds (or their written representation) to form larger units, e.g. morphemes, words, sentences”. (p.311)

In other words, Sapir (1921) regards language as a medium of systematic communication that is used to convey thoughts, ideas, emotions, and desires, as well to transfer complex information and discuss the meaning of events and possible outcomes of alternative actions all these are impossible without language. (Fasold and Connor-Linton, 2014). These latter are transmitted through specific sound combinations (speech), a specific succession of graphic symbols (writing system), gestures, and signs. Human language is regarded as the pinnacle of human uniqueness and creativity because it is unnatural and was created to meet the social needs of humans.

The very formation and existence of society is dependent on language. Thus, language is ubiquitous and the fundamental aspects of all societies. According to Fasold and Connor-Linton (2014, p.1), it is difficult to imagine history without a way to pass a record of what has happened from one generation to the next

Language facilitates the human capacity for self-awareness and abstract thought by allowing us to transfer complex information, discuss the meanings of events, and the potential scenarios of alternative actions.

### 1.3 The Origins of Language

For millennia, scholars from diverse disciplines as genetics, anthropology, and cognitive science have studied the origins of language and have been engaged in "a cross-discipline, multidimensional treasure hunt" to discover how language came (Johansson, 2016). Fasold and Connor-Linton (2014) and other scholars said that the origins of language are mysterious and shrouded , although archaeological evidence suggests that communication with language began around 200.000 years ago.

Many philosophers claimed that the highest evolutionary adaptation of the human species is having the ability to communicate via language. However, Christine Kenneally (2007) stated that searching for the origins of language is the most difficult problem in science. Therefore a clear and precise definition of language is difficult to establish since the phenomenon of language is complicated and has numerous dimensions (Nordquist, 2018). That is , no one knows for certain when language emerged, but fossil and genetic evidence suggests that humanity's ancestors were probably anatomically modern Homo sapiens who lived approximately 150,000 to 200,000 years ago in eastern or maybe southern Africa.

This notion is supported by evidence of abstract and symbolic behaviour in these early modern people, in the form of red-ochre engravings (Pagel, 2016).

### 1.3 Linguistics

Accordingly, many academics and philosophers have contributed to the study of how language is used and acquired, and how it may begin with a set of simple words and phrases and expand into more intricate ones.

Furthermore, the science that contributes to understanding language and the many aspects of this phenomenon is known as "linguistics", which may be simply described as the study of language. This science of language is known to have various subtypes that are divided according to their area of investigation. For example, psycholinguistics that deals with the study of language with reference to human psychology, while applied linguistics deals with language and its application in various fields, particularly educational ones.

### 1.5 Psycholinguistic Views on Language

The term psycholinguistics was used in 1936 by J.R. Kantor in his book "An Objective Psychology of Grammar". It is a combination of psychology and linguistics in order to understand the relationship between the human brain and language in general, (Nordquist, 2019).

Psycholinguistics is concerned with the nature of the processes that the brain undergoes to comprehend and produce language. The field of psycholinguistics is usually limited to one of this main subdivision: language acquisition, language comprehension, and language production. This field studies many different topics, and these topics can be generally divided into answering the following questions: how do children acquire language? How do people process and comprehend language? How do people produce language? The subdivision of psycholinguistics allows us to be aware about the steps that make human language (Purba, 2018).

Throughout history, many researchers have sought to specify and offer tangible knowledge regarding what language is as a psychological human phenomenon, resulting in the development of several theories, some with consensus and some without. These theories have been constructed to show how a person acquires, produces, and perceives both spoken and written language, and they have also been applied to language instruction and teaching. According to some experts, these are the core beliefs for developing language teaching approaches.

### 1.5.1 The Chomskyan Theory

Chomsky, an American linguist and thinker, established the Universal Grammar model of language theory (hereafter UG). His ideas were a major divergence from previous theories. Chomsky opposed behaviorism in general, for according to the behaviourists, learning is a result of stimulus response and the role of the mind is excluded (Lemetyinen, 2012).

Chomsky has emphasized the centrality of the brain in the study of human sciences in general. He claimed that because every human being is born with fundamental grammatical principles, it is easy for them to learn a language, even though certain languages are difficult to learn. Chomsky's UG theory asserts the universality of logic in language grammar, as well as the interconnectedness of mind and language, just as he commented: "There are very deep and restrictive principles that determine the nature of human language and are rooted in the specific character of the human mind." (Chomsky, 1968, p. 90)

According to Chomsky, UG does not state the birth of humans speaking any particular language, but rather being hardwired and genetically programmed with a mental template, which he coined language acquisition device (hereafter LAD), assisting in language acquisition; it is an innate component of the human mind, with deep biological mechanisms ( Dali Ahmed & Dib , 2019).

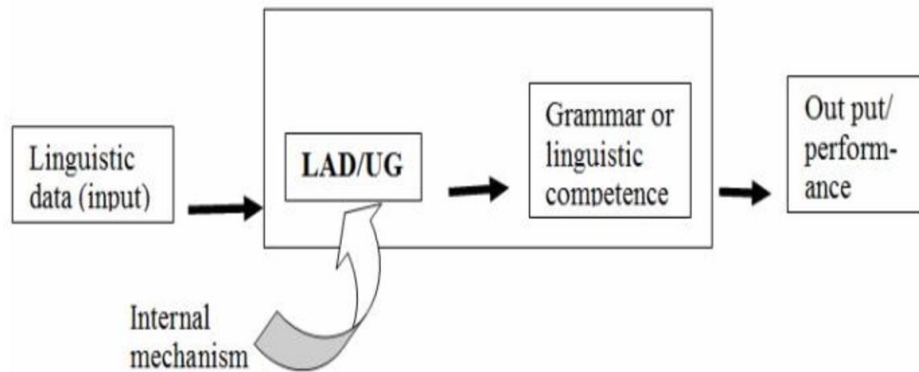


Figure 1.1: Universal Grammar's Position within Chomsky's Theory. Adapted From: <https://www.semanticscholar.org/paper/Children's-first-language-acquisition>

Within his theory of UG and the study of language and thinking nature, Chomsky developed the dualism of “linguistic competence” and “linguistic performance”. Defining linguistic competence as a natural speaker understands of his language, its rules and structures, and his ability to produce and understand. On the other hand, performance as the actual language usage in real-life settings despite grammatical flaws and dialect differences. In a nutshell, “Chomsky was probably the first to reveal fundamental insights into from the nature of language to the nature of mind, rather than vice versa” (Smith & Wilson, 1979, p. 9).

### 1.5.2 Pinker's Mentalese

As a reaction to the Whorf-Sapir and Ordinary Language theories., and in opposition to the localization of cognitive processes in one organ (LAD), "connectivism" emerged as a belief system, claiming that connections and representations are established in the learner's brain through various external operations carried out serially, (Downes, 2012).

One of connectivism's most well-known thinkers is S.Pinker, the professor who coined the term "mentalese". According to the Whorf-Sapir theory, individuals

think in words, or their ideas are mirrored by words, and vice versa. For example, they considered that an English speaker is not the same as an Arabic speaker, in the sense that thinking in Arabic is not the same as thinking in English. (Schlenker's, 2006)

Additionally, regarding the core idea of the Ordinary Language hypothesis, as stated by Wiley (2006): "People often talk silently to themselves, engaging in what is called inner speech, internal conversation, inner dialogue, self-talk and so on." (p.1)

Pinker, on the other contrary, describes mentalese as thinking being given a shape through words stored in the brain (conceptualization), and for him, in order to acquire a language, this language of thought must be "universal and abstract," and therefore moulded or translated into words to be produced. Despite the fact that all humans have the same language mechanism(s) and vehicles, this theory maintains that we think without words. For instance, whether the speaker is French or English, they share the same concepts and thoughts, but the way those ideas are expressed differ. (Alduais, 2015)

### 1.5.3 Vygotsky on the Social Interaction Theory

Following the limitations of Chomsky's mentalist school, as well as cognitive constructivism's inadequacies, Vygotsky, a "social constructivist," believes that children are curious and participating actively in their own learning and prioritize social inputs to the development process. This concept contrasts with J.Piaget's perspective of child development, in which he assumed that development always comes before learning and emphasized self-initiated discovery, (Vygotsky 1978).

Vygotsky (1978) claimed : "every function in child's cultural development appears twice : first , on the social level , and later , on the individual level ; first , between people ( interpsychological ) and then inside the child ( intrapsychological )..."(p.54).

To understand Vygotsky's views on cognitive development, one must first grasp two of his essential principles: the More Knowledgeable Other (henceforth MKO) and the Zone of Proximal Development (henceforth ZPD). The MKO is self-explanatory; it refers to someone who understands or has a higher competence level than the learner in relation to a specific activity, process, or concept.

The idea of the MKO is inextricably linked to Vygotsky's second major principle, ZPD, (Mcleod, 2018). For him, “What a child can do with assistance today, he will be able to do by himself tomorrow.” (Vygotsky, 1978, p. 87). This is an important concept that refers to the gap between what a child could do independently and what a child can achieve with the help and encouragement of a skilled partner.

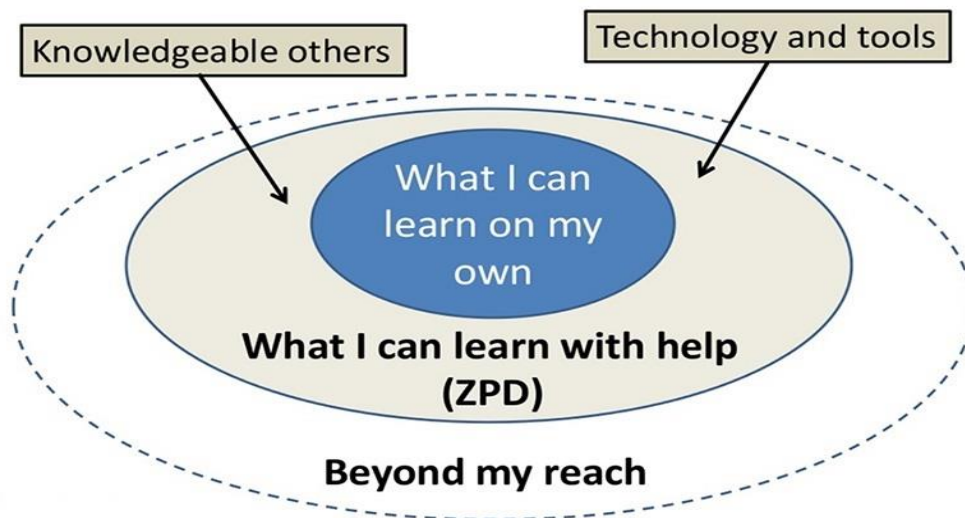


Figure 1.2: Vygotsky -Zone of Proximal Development. Adapted from:  
<https://www.simplypsychology.org/ZPD-Scaffolding.jpg>



### 1.6 Language and Brain Mechanisms

Brain is the messenger of the understanding and the organ whereby in an especial manner we acquire wisdom and knowledge. The human brain is the source of conscious or cognitive mind and thought. The mind is the set of cognitive processes related to perception, interpretation, imagination, memories, and crucial language of which a person may or may not be aware. It is a principal means whereby individuals formulate thoughts and convey them to others (Fromkin, 1999, p.28). It plays a role in analysing the world, in reasoning, solving problems, and planning actions. It also allows us to convey our memories of the past and beliefs about the future, to engage others about events, time and place.

#### 1.6.1 An Overview on Neurolinguistics

"Neurolinguistics" is one of the linguistic sciences that contributes to a better understanding of how the human brain faculties are involved in language processing, which according to Ahlsén(2006) it:“studies the relationship of language and communication to different aspects of brain functions, in other words , it tries to explore how the brain understands and produces language and communication.” (p.3).

Hence, this entails attempting to integrate neurological/neurophysiological theory with linguistic one. Aside from neurology and linguistics, psychology is another important source discipline for neurolinguistics. Neurolinguistics is strongly connected to psycholinguistics but emphasizes on brain studies, (Norquist, 2019).

Neurolinguistics became the established term for the field in 1960s, under the influence of Chomskyan boost to linguistics and the establishment of psycholinguistics as a defined field, (Ahlsén, 2006). The great bulk of research on the biological bases of language has been on brain anatomy, with the aim of determining which areas of the brain are responsible for certain language functions, such as lexical or grammatical abilities.

## **Chapter One: Literature Review**

Nevertheless, the study of all of these aspects of biology must be supplemented and integrated with psycholinguistic studies of how language is actually used as we speak and comprehend; with investigations of language acquisition and theoretical linguistic examinations of language architecture, (Fasold & Connor-Linton, 2014).

### 1.6.2 Language Faculty in the Brain

Dronkers et al. (2017) arrived at an understanding that language is an extremely behavioural intricate system that requires an extensive and interactive network of brain regions and the fibers that connect them. However, identifying the location of language in the brain was an early issue since ancient neuroscientists did not have technologies like fMRI and EEG to look inside the brain as they have now.

According to Ahlsén (2006): “Studies of language and communication after brain damage are perhaps the most common type of neurolinguistic studies.”(p.3). Following the contributions of two pioneers of the field of neuroscience, P.Broca (1861) and C.Wernicke (1874), who conducted experiments on case studies patients who suffered from damage in the front part of the brain but whose language abilities, were unaffected, realizing that brain injuries can be "selective" in their impact on language comprehension and production. This led them to the conclusion that, while language is located in the brain, it is certainly not in the front. Two areas got displayed in “the left hemisphere” of the brain, called after each one of them, Broca’s area and Wernicke’s area, (Dali Ahmed & Dib, 2019).

Furthermore, a type of test known as WADA has helped reveal how language is localized to one side of the brain or the other. Patients are injected with a barbiturate (common sedative / anesthetic) through the carotid artery, putting that half of the brain to sleep.

This type of testing has revealed that most people process language in their dominant hemisphere, which is normally the left hemisphere, which controls the right side of the body; when that hemisphere is put to sleep, patients struggle to talk and understand language, (Alsallom et.al, 2014).

### 1.6.2.1 Broca's Area

Broca's region, also known as the 'anterior speech cortex' which is situated in the frontal lobe, was discovered by the French surgeon P. Broca and it is important for articulating and producing coherent speech, i.e., it is the "home of grammar and meaning". Broca's area is divided into two parts: Area BA44, which is in charge of integrating sounds into words and words into sentences for language production, and Area BA45 is in control of sentence grammatical structure and appropriate use of vocabulary and verbs. (Soffar, 2022)

According to Paul Broca, any lesion in this area would result in reduced and distorted speech, as well as poor articulation; nonetheless, the patient's comprehension appears to be retained. In 1950s, the neurosurgeons Penfield and Roberts revealed that close to Broca's area is the part of the motor cortex that controls the articulatory muscles of the face, jaw, tongue and larynx, (Yule, 2020).

### 1.6.2.2 Wernicke's area

Ahlsén (2006) stated that: "In 1874, neurologist C. Wernicke presented a theory based on Broca's finding and his own dissections of the brains of patients with problems understanding language." (p.18). Furthermore, Wernicke's region was discovered in the posterior part of the auditory association area, which is the temporal lobe (BA41, 42, 22, 37). The primary function of this region is sound analysis (associating sound with concept) for understanding of both spoken and written language. Any damage in this area makes it difficult for a patient to grasp

language, both spoken and written, and to comprehend phrases uttered by others (Soffar, 2022).

In addition to this, Yule (2020) mentioned that the arcuate fasciculus is a bundle of nerve fibers; one of Wernicke's discoveries that are known to constitute a vital link between temporal cortex and inferior parietal cortex to locations in the frontal lobe. That is, it forms a crucial neural pathway between Wernicke's and Broca's regions.

Besides, language production necessitates also the integration of both language and non-language areas, such as the inferior parietal lobule which involves many other areas responsible for the understanding of written words and remembering how to sound words out to determine their spelling. (Soffar, 2022)

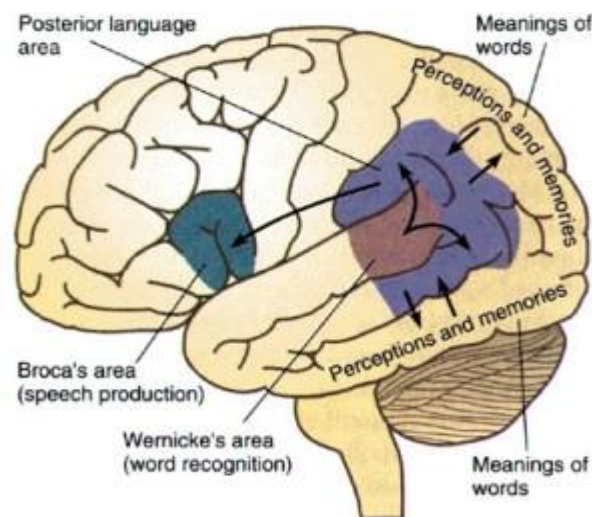


Figure 1.3: Areas of the Brain Involved in Speech Production and Comprehension, Timothy Lyons. Adapted from: <https://psychology-info.com/areas-of-the-brain-involved-in-speech-production-and-comprehension>

### 1.6.3 The Localization View

Thanks to Broca and Wernicke's efforts, language-processing related to mental functions were concretely localized. As John Lyons (1981) clarifies that language is part of the process called "genetic lateralization", where each act is executed by one hemisphere of the human brain. (p. 249)

It is enticing to assume that distinct components of language ability could be allocated to different brain locations. This is known as the "Localization View" or Localism, Yule (2020) explained it as:

It has been used to suggest that the brain activity involved in hearing a word, understanding it, then saying it, would follow a definite pattern. The word is heard and comprehended via Wernicke's area. This signal is then transferred via the arcuate fasciculus to Broca's area where preparations are made to generate a spoken version of the word. A signal is then sent to part of the motor cortex to physically articulate the word. (p.187)

### 1.6.4 Neurolinguistic Research Changes

The Linguistic Society of America stated that for nearly a century, neurolinguistics research was almost entirely based on the study of language comprehension and production by patients with aphasia. Since the 1990s, there has been a massive shift in the field of neurolinguistics, with many established ideas – particularly, the roles of the traditional 'language areas' (Broca's area, Wernicke's area) in the left hemisphere of the brain – being challenged and, in some cases, overturned by new evidence. (Menn, n.d.)

Probably the most important recent studies are that extensive networks involving areas remote from traditional language areas are deeply involved in language use, and that language areas are also involved in the processing of non-language information. This new evidence has become available because of significant advances in modern technology.

Researchers can investigate how normal speakers' brains process language, as well as how a damaged brain processes and recovers from harm. MRI provides fine spatial resolution, producing exquisite images that identify which brain regions are affected; CT scan efficiency has also much increased. (Menn, n.d.)

### 1.7 Dementia of the Alzheimer Type

At the end of life, older persons are more likely to have a variety of chronic diseases such as, high blood pressure, diabetes, dementia and many others. According to the World Health Organization (2021), dementia is a syndrome in which cognitive ability deteriorates beyond what may be expected from the normal consequences of biological ageing. Dementia is a brain disorder that causes decline in cognitive performance, leading individuals to lose the capacity to comprehend, process, judge, and adequately act on information, i.e., it is a term of a cluster or as it is often referred as an 'umbrella' for many symptoms associated with cognition. (UNC Department of Neurology, 2022).

Dementia is not a new phenomenon. It has been associated with aging for centuries but only in the 20th century was it actually recognized as a disease (Orulv, 2008). Perhaps the worst effect of the disease is the loss of self, which is based on the loss of identity and memory (Caddell & Clare, 2010). Just how bad the disease is considered can be noted in the realm of public discourse about the disease, from clinical reports to public information communications.

Dementia is classified as a late-life disease since it primarily affects the elderly. Currently, more than 55 million people in the world suffer from dementia, with approximately 10 million new cases diagnosed each year. Dementia is presently the seventh greatest cause of death among all diseases.

As mentioned above, dementia is a wide term that covers a wide range of brain disorders; it does not refer to a particular disease; rather, it refers to neurodegenerative diseases.

Some of the most common types include dementia with Lewy bodies (abnormal protein clumps that accumulate inside nerve cells) and Frontotemporal dementia (degeneration of the frontal lobe of the brain), Alzheimer's which is the most frequent and Vascular dementia. (UNC Department of Neurology, 2022). People can have mixed dementia. For example, some people have both Alzheimer's disease and Vascular dementia. Dementia can also occur after a stroke or in the presence of certain infections such as HIV, severe alcohol use, repetitive physical traumas to the brain, or nutritional deficiencies.

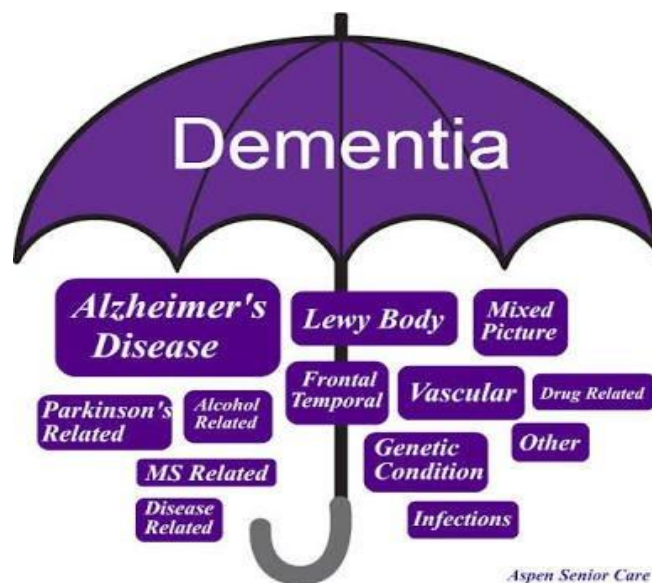


Figure 1.4: Types of Dementia. Adapted from:  
[https://pbs.twimg.com/media/DnI\\_LAIUcAUuxbo.jpg](https://pbs.twimg.com/media/DnI_LAIUcAUuxbo.jpg)

### 1.7.1 Alzheimer's in Numbers



With a growing number of people living into older age, there is a developing clinical research interest in detecting and characterizing cognitive deficits associated with age-related neurodegenerative disorders. Hence, since Alzheimer's disease (hereafter AD) has been the focus of neuropsychological research on dementia since it is the most frequent type and is largely defined by its impact on cognition. (Salmon & Bondi, 2009)

Alzheimer's disease is sometimes referred to as the forgetting disease. For the World Health Organization, it may contribute for 60-70% of cases, and its prevalence is growing faster than that of most other kinds of dementia. Furthermore, Santé Maghreb revealed that there are about 100,000 persons in Algeria who suffers from AD. Alzheimer's disease is closely related to population aging, however it is multifactorial, and it might be caused by hereditary factors or by physiological and environmental variables. Since 1994, the 21st of September is declared as World Alzheimer's Day. (Tropicale, 2015)

### 1.7.2 Alzheimer's History

Alzheimer's is a neurocognitive disease that affects brain functioning and has a substantial influence on human cognitive machines. It is named after the Bavarian physician and neuropathologist Alois Alzheimer (1864-1915). While working in the local asylum in Frankfurt – The Municipal Asylum for the Insane and Epileptic in Frankfurt am Main - Alzheimer conducted many studies on a variety of diseases such as: epilepsy, senile dementia, and general paralysis. (Goedert & Ghetti, 2007)

On November 1901, a woman named Auguste Deter was taken to Frankfurt Asylum after doctors expressed worries over her mental state and other cognitive abilities which were: impaired comprehension, aphasia, memory loss, delusions and unpredictable behaviour. After her death, Alois did an autopsy on her brain when he noticed alterations in her brain tissue and found many abnormal

clumps and tangled bundles of fibers (now called amyloid plaques and neurofibrillary). (NIA, 2021)

Cummings (2020) wrote: “in 1906, Professor Alzheimer gave a talk ‘On a peculiar, severe disease process of the cerebral cortex’ to 37th Assembly of the Southwest German Psychiatrists in Tübingen.” (p.1). Therefore, he presented his results at that day.

From this point, Alzheimer's works began to be published, with his Italian colleague Perusini being the first to share his teacher's passion, writing a paper about four similar patients, which was edited by Alzheimer and Nissl and published in 1909 under the title "On clinically and histologically peculiar mental illnesses in advanced age," which made a significant contribution and advancement in discovering the disease. (Lucci, 1998)

### 1.7.3 The Genetics of Alzheimer's

In recent years, scientists have made enormous progress in understanding Alzheimer's disease. Older age and genetic susceptibility are aetiological factors for AD. A minor percentage of cases (less than 10%) have an early onset, between the ages of 30 and 60. These people inherit in an autosomal dominant fashion, i.e., mutations in one of three genes: the amyloid precursor protein gene on chromosome 21, the presenilin 1 gene on chromosome 14, and the presenilin 2 genes on chromosome 1. (Cummings, 2020)

The majority of persons with Down syndrome may develop Alzheimer's disease. This might be because they have an extra copy of chromosome 21, which has the gene that produces toxic amyloid. The large majority of Alzheimer's disease cases are sporadic and of late onset (after 65 years). The most well-established genetic risk factor for this late-onset variant of the disease is the Apolipoprotein E (APOE) gene. This gene has various variants, one of which, APOE  $\epsilon$ 4 which raises a person's risk of developing Alzheimer's disease. (NIA, 2021).

Conditions and behaviours contributing to the development of vascular disease (e.g., cigarette smoking, midlife high blood pressure and obesity, diabetes, and cerebrovascular lesions) are also risk factors for AD (Qiu et al., 2009). Females are more likely than males to develop Alzheimer's disease (Podcasy and Epperson, 2016). The hormonal changes associated with menopause, notably the decline in estrogen, have been invoked to explain the condition. After all, the significance of each of these factors in increasing or decreasing the risk of developing Alzheimer's disease varies among individuals.

Still, Scientists do not yet completely understand what causes Alzheimer's disease in the majority of cases. (Henderson, 2009)

### **1.7.4 The Pathophysiology**

According to Bayles (1982), AD is a temporal lobe dysfunction with neuronal loss in the temporal-parietal-occipital junction region. The disorder may begin in the Hippocampus and Amygdala, and then spread to the posterior parietal and temporal lobes. (Huppert et al., 1994)

Alzheimer's disease is an age-related degenerative brain disorder in which changes in the brain occur a decade or more before symptoms appear. During this very early stage of Alzheimer's, the damage appears to take place in the hippocampus and the entorhinal cortex, which are parts of the brain that are essential in forming memories. (NIA, 2021)

Braak & Braak (1991) maintained: "Toxic changes are taking place in the brain, including neuronal atrophy, synapse loss, and the abnormal accumulation of amyloidogenic plaques and neurofibrillary tangles in medial temporal lobe limbic

structures and the association cortices of the frontal, temporal, and parietal lobes” (p.239–259).

As more previously healthy neurons cease to function and die, additional parts of the brain are affected and start shrinking. These plaques and tangles in the brain are still thought to be main indicators of Alzheimer's disease. Many additional complicated brain alterations are likely to contribute to Alzheimer's disease as well. (Serrano-Pozo et al., 2011)

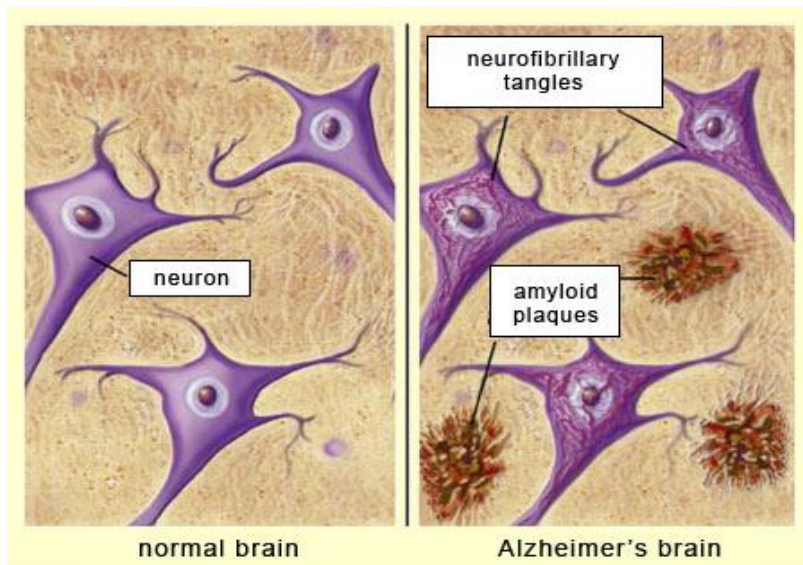


Figure 1.5: A Comparison of Neurons in Normal Brain and Alzheimer one. Adapted from: [https://thebrain.mcgill.ca/flash/d/d\\_08/d\\_08\\_cl/d\\_08\\_cl\\_alz/d\\_08\\_cl\\_alz.html](https://thebrain.mcgill.ca/flash/d/d_08/d_08_cl/d_08_cl_alz/d_08_cl_alz.html)

### 1.7.5 The Symptomatology

Although the pattern of evolution of AD pathology is unclear, evidence shows that the initial abnormalities occur in medial temporal lobe regions essential for episodic memory (amnesia), which is often one of the earliest and most noticeable aspects of the AD dementia symptoms (Salmon, 2000).

Some persons are diagnosed with mild cognitive impairment (hereafter MCI) in which they have greater memory impairments than those associated with normal aging, despite the fact that they do not have functional disability (Gallagher et al., 2016). Though older adults with MCI are more likely to develop Alzheimer's, not all of them do. Some may even revert to normal cognition.

As the disease progresses, many people have deficiencies in language and semantic understanding, including aphasia and apraxia, as well as executive functions and attention (Gallagher et al., 2016). They also have hearing loss, word finding, vision/spatial impairment, and olfactory issues. (Cummings, 2020) Neurodegeneration is thought to occur 20-30 years before symptoms appear. During this period, the pathology burden grows to the point at which clinical manifestation of the disease emerges. (Dubois et al., 2016)

### 1.7.6 Stages of Alzheimer's disease

In research from Mayo Clinic Staff (2021), AD typically develops slowly and worsens gradually over time. With the progression of this pathology, the patients' daily lives change eventually. Alzheimer's stages can allow us predict what might happen, but it's necessary to keep in mind that these stages are only rough generalizations, i.e., vary from person to person. Hence, in addition to the preclinical stage, National Institute on Aging breaks down this disease into three primary stages, with each affects the patients in various ways.

### ➤ **Preclinical Stage**

Alzheimer's disease starts long before any symptoms appear. This is referred to as the preclinical stage. There is a silent accumulation of brain damage that can endure for years, if not decades. At this stage, more or less perceptible symptoms such as increased forgetfulness, difficulties acquiring new information, misplacement of objects, and lack of interest emerge. During this stage, symptoms are undetectable. (Mayo Clinic Staff, 2021)

New imaging techniques can now detect amyloid-beta protein deposits, which are a hallmark of Alzheimer's disease. The capacity to identify these early deposits may be very significant for clinical trials and in the future as novel therapies for Alzheimer's disease are developed. (NIA, 2022)

### ➤ **Mild Stage**

Alzheimer's disease is frequently diagnosed in the mild dementia stage, particularly when family and doctors notice that a person is experiencing substantial difficulties with memory and thinking that affects everyday functioning, as well as personality and behaviour changes. (NIA, 2021). Also for language, where the patient displays communication difficulties due to forgetting simple words. At this stage of disease development, the patient only need minor assistance to accomplish daily tasks.

### ➤ **Moderate Stage**

Cognitive declines have an impact on the patient's autonomy at the moderate stage. Memory problems are exacerbated when the memory of recent events is drastically altered and the memory of old facts becomes distorted, leading patients to have difficulty recognizing family and friends. Damage arises in parts of the brain that control language, logic, and sensory processing, such as the capacity to identify sounds and smells properly. Patients in this stage may have hallucinations, delusions, and paranoia, as well as act aggressively. (NIA, 2021)

### ➤ Severe Stage

Plaques and tangles spread throughout the brain over the last stage of Alzheimer's disease progression, and brain tissue shrinks markedly, because memory is completely damaged, the patient forgets all the experiences and events that have happened in his/her life, being unable to interact and may be in bed most or all of the time as the body shuts down. In the end, Alzheimer's disease becomes a fatal illness. (Mayo Clinic Staff, 2021)

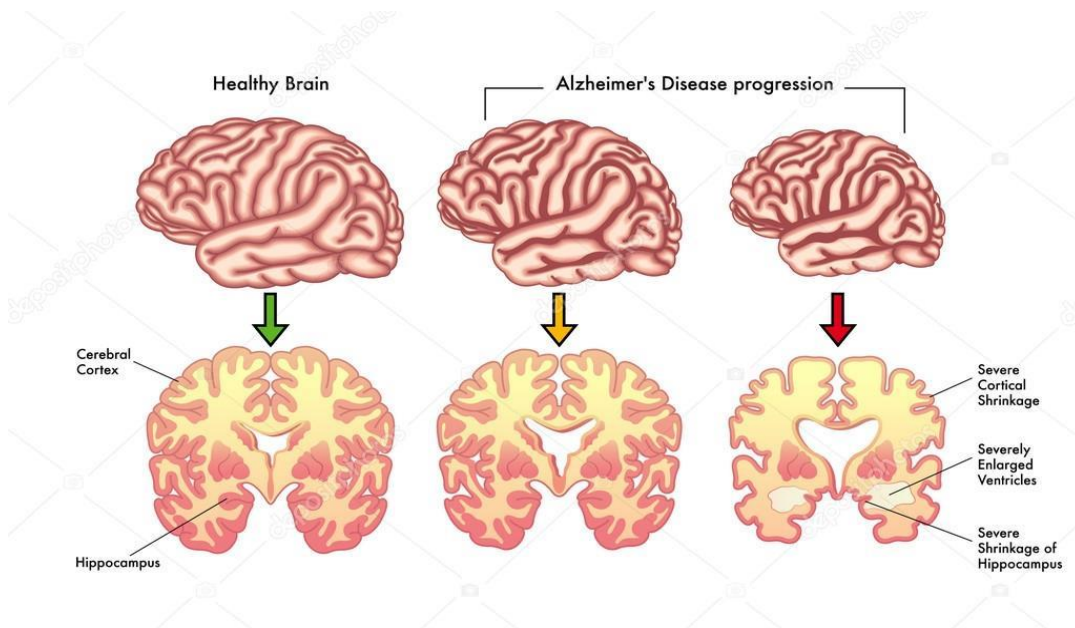


Figure 1.6: Medical Illustration of the Symptoms of AD Progression. Adapted from: <https://c8.alamy.com/comp/2AGNER6/medical-illustration-of-the-symptoms-of-alzheimers-disease-progression-2AGNER6.jpg>

### 1.7.7 Diagnosis and Treatment

Alzheimer's disease remains difficult to diagnose, only the anatomopathological study of the brain allows certain diagnosis. The notion of "mild cognitive impairment" (MCI) emerged at the end of the 1990s and is supported by clinical evidence. (Serrano-Pozo et al., 2011). The advantage of this concept is that it has revealed that there is a transitional condition between normal cognitive aging and dementia; nevertheless, this concept is constrained by the lack

of specificity, which explains the negative results of medication trials conducted with an AD-affected population (Collie A, 2000).

Previously, a neuropathological test, such as autopsy or biopsy, was used to formally establish the presence of the neuropathological hallmarks of Alzheimer's disease (cortical atrophy, senile plaques, neurofibrillary degeneration, and increased white matter abnormality). (Serrano-Pozo et al., 2011)

Nowadays, there are numerous general cognitive functioning assessment tests available. The Mini-Mental State Examination (henceforth MMSE) and the Montreal Cognitive Assessment (henceforth MCA) are two psychometric tests that do not diagnose but do measure the severity of cognitive deficits. Doctors, on the other hand, conduct memory, problem-solving, attention, counting, and language tests in addition to routine medical screenings such as blood and urine testing in order to rule out other probable causes of the problem. Aside from brain scans such as computed tomography (henceforth CT), magnetic resonance imaging (MRI), or positron emission tomography (henceforth PET) are the most effective examinations to identify an Alzheimer's diagnosis and supported by doctors. (Cleveland Clinic, 2019)

Unfortunately, there is no way to fully stop or reverse the onset of Alzheimer's disease. Thereby, scientists are looking at various treatments to delay or prevent the disease.

Many treatments have been approved by the United States Food and Drug Administration (hereafter FDA) to treat Alzheimer's symptoms, including symptomatic drugs that use choline esterase inhibitors and are prescribed in mild to moderate forms. Donepezil, memantine, the rivastigmine patch, and a combination medication of memantine and donepezil are recommended for more severe cases. In 2021, the FDA approved for aducanumab, a medication that aims to decrease amyloid deposits in the brain and may aid slow the progression of Alzheimer's,



though it has not yet been found to significantly alter clinical symptoms or outcomes, such as cognitive decline or dementia progression. (NIA, 2021).

Most medications are most effective in persons who are in the early or middle stages of Alzheimer's disease. However, it is critical to note that none of the treatments now available can cure Alzheimer's.

In contemporary clinical trials, scientists are also developing and evaluating nondrug therapy like as physical exercise, nutrition, and cognitive training. In other words, they focus on helping people in retaining mental function, managing the underlying disease process, and reducing behavioural symptoms, which can make people with Alzheimer's more comfortable and make caregivers' lives easier. (Livingston et al., 2020)

Despite that, Alzheimer's Disease International (ADI) estimates that 75% of people living with dementia globally are undiagnosed – equating to 41 million people. They say the figure could be as high as 90% in some low- and middle-income countries. (Care, 2021)

An early diagnosis gives patients greater chances to participate in clinical trials or other research studies evaluating potential future Alzheimer's therapies, because commencing treatments as early as possible in the disease process may help preserve daily functioning for a time. (Porsteinsson, 2021)

### **1.8 Alzheimer's disease as a Linguistic Disturbance**

“In 1907 Alzheimer described a demented woman who “frequently used perplexing phrases... some paraphrastic expressions” (milk-pourer instead of cup) and suffered from a significant language comprehension deficit.” (Kempler, 1991, p.98)

Language disorders are among the well-studied symptoms of dementia, and they are particularly prominent in AD. The prevalence of linguistic impairment in dementia is estimated to be between 88% and 95% (Thompson, 1987), and is close to 100% in AD (Cummings et al. 1985). Recent accounts of dementia language have affirmed and expanded on Alzheimer's original observation of word-finding difficulties, paraphasias (substitutions), and comprehension impairment. (Appell et al., 1982)

As might be expected with a degenerative process, the deficits of language change over time, and each phase of the disease is distinguished by a specific profile of language deficiencies (Kempler, 1995). In other words, according to Kempler, the type of language abnormalities found in Alzheimer's dementia depends on the stage of the disease.

In the early stages, abnormalities become typically noticeable (Morris, 1996). According to Irigaray (1967): "The most commonly reported finding is an impoverishment of vocabulary and difficulty in finding words, the individual may experience memory lapses, such as forgetting common words or the place of everyday objects, this latter phenomenon is termed as anomia".(p.25–52)). Patients begin to substitute semantically empty words such as things and stuff for instead of content words (Kempler, 1995, p.98).

In terms of language comprehension, Alzheimer's patients frequently demonstrate complete comprehension of simple, organized, and concrete language, which is dependent on the meaning of single words. (Silverman, 2009).

However, their comprehension of abstract language, which needs inference, appears to be inadequate. (O'Brien et al. 2005). For example, if someone speaks fast (or in a high-pitched voice, or uses complex words), a person with dementia will most likely struggle to keep along.

Furthermore, Alzheimer's patients have trouble forming continuous language through writing, despite the fact that the processes of writing appear to be

unaffected. In contrast to increasing anomia and emptiness of speech, the mechanics of speech (phonological and syntactic performance) remain preserved. (Bayles & Kaszniak, 1987). At this point, patients may speak adequately in most social situations, as it should be mentioned that they are aware of these deficits in their language but their awareness decreases by the end of this phase (Kempler, 1995, p.99).

Patients in the moderate to severe stages of Alzheimer's begin to have increased difficulty with both production and understanding of language. Anomia becomes worse and the patients suffer a growing difficulty in finding the right word to say (Kempler, 1995, p. 99). They may also develop pragmatic deficiencies, discourse deficits, poor topic maintenance, poor pronoun use, and breaking turn-taking conventions. (Bayles et al., 1985, p.102). Concerning language comprehension, one aspect is impaired that is the auditory-spoken language (Lezak, 1995, p. 212). Reading and writing mechanisms in the moderate phase are unaffected by the disease at all. This means that Alzheimer's patients can comprehend the written language but not the spoken one (Cutler et al., 1985, p. 299). At this point, they begin avoiding social settings that necessitate discussion.

During the severe phase of the disease, speech intelligibility appears to be totally impaired by the phenomena of echolalia (repeating speech of others) and palilalia (repeating self). There are various pauses and logatomes interspersed throughout the speech, with a loss of fluency, increased paraphasias (substituting words and inaccurate pronunciation).

With the end of the disease evolution, understanding is hindered in all modalities, spoken language, writing, and even for single words. The patients at this point are no longer engaged in conversations and , typically appear ignorant of their communicative deficiencies .(Betti & Hashim, 2020). Kempler pointed out that this population's communication issues are largely confined to two aspects of language: semantic and pragmatic levels.

Language content, such as words and their meaning, is involved in semantic processing, and associated impairments include difficulties with word finding, naming, and comprehension, as well as semantic paraphasia (using incorrect words), empty speech (using ambiguous referents), inventing words, and loss of verbal fluency. Pragmatic processing extends beyond words and their meaning to include language adaption to social situations. For example, speaking excessively at inappropriate times, speaking too loudly, repeating thoughts, and deviating from the topic. Semantics and pragmatics are seen to be related in the sense that semantic limitations in word finding and naming can lead to pragmatic issues in retaining the topic of conversation or might overwhelm the patient's cognitive capacities, resulting in yelling or use of profanity. (Ferris & Farlow, 2013)

Syntax is another linguistic field that can be altered by such a disease, a detailed examination of how Alzheimer's patients deal with sentences of varied lengths and complexity demonstrates that syntax is not spared in many cases to the overall disarray of language output. Sentences are frequently left incomplete, and phrases are sometimes left hanging. (Constantinidis et al., 1978). Thus, language impairment in AD is characterized by declining in semantic and pragmatic processes and reduced syntactic complexity. (Lindsay et al., 2021)

### **1.9 Measuring Language Impairments in Alzheimer's Disease**

Language-specific and validated tests and scales designed to measure progressive language impairments have been established in recent years considering the importance of language to cognitive function. In designing tools to assess language impairment, fluency in spontaneous speech, naming or word-finding, grammar, and paraphasic errors are critical features of the assessment and are

essential for dementia diagnosis. Formal language evaluation includes the following domains: naming (for example, the Boston Naming Test and many others), word/sentence repetition, comprehension (auditory and semantic knowledge), reading, and writing. (Lindsay et al., 2021).

However, clinicians believe that listening carefully to a patient's spontaneous speech is a key part of the assessment. Hence, accurate language evaluation may turn out to be one of the most reliable predictors of Alzheimer's disease stages (prognosis) and gives vital insights into the cerebral organization of language, semantic access, the link between semantic and episodic memory, and the pathophysiology of the disease. Since cognition is the predominant impairment, most AD tests have focused on rating total cognitive deficits rather than functional or behavioural symptoms. The language impairment can be missed—this frequently leads to misdiagnosis. (König et al., 2015)

### **1.10 Conclusion**

This chapter shed the light on language and its relation to neurodegenerative diseases. Starting with providing definition, emergence, and among the prominent psycholinguistic theories on language by many scholars of the field. Furthermore, explaining the discipline of neurolinguistics and its interest in the language faculty in the brain, as well as how this latter is damaged leading to certain linguistic errors. Finally, the researcher provides scientific explanations concerning the major issue, dementia of the Alzheimer's type, and how it impacts the patients' normal use of language by describing the condition from a linguistic approach.

# **Chapter Two: Investigating Language Use in Alzheimer's Disease**

## Chapter Two: Investigating Language Use in Alzheimer’s Disease

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## **Chapter Two: Investigating Language Use in Alzheimer's Disease**

### **2.1 Introduction**

Bluntly put, since language and AD are tightly related, where this disease impacts the normal use of language and communicative abilities of the patients. Thus, the central focus of this chapter is undertaking a qualitative investigation of AD as a linguistic disturbance.

The second chapter, on the other hand, is devoted to the research's practical implementation. It comprises a description of the method adopted throughout the data collection process, as well as the research tools used including the sample population, along with the reasons for choosing such approaches. Furthermore, this chapter aims at dissecting the linguistic features used in an Alzheimer's language. To reach this aim, the process of this research examines the results thoroughly, it summarizes and analyses the findings through a discussion and interpretation that give conclusions linked to the aforementioned research questions and hypotheses. The research closes with a set of limitations, recommendations and the importance of the subject.

### **2.2 Research Methodology**

When conducting an academic research, a predetermined set of steps and procedures are crucial to be followed to ensure the validity of the research findings. Accordingly, research methodology is "a way to systematically solve the research problem..." (Kothari, 2004, p. 8). Hence, the researcher used the case study method, which provides a detailed description and analysis of the studied subject.

The researcher opted for a descriptive case study that identifies the characteristics of this topic and provides descriptions; in which information is collected without changing the environment (i.e., nothing is manipulated).



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The benefit of descriptive research is that it enables the researcher to determine the behaviour of people in a natural setting, i.e., when identifying the linguistic behaviour of Alzheimer's patients analysis of the cases under investigation (Tellis, 1997).

Furthermore, to identify and scrutinize the features surrounding language usage in AD, the qualitative research is undertaken based on the description of the phenomenon to be investigated in greater depth, hence new and richer data in an objective, unbiased, and autonomous context are revealed. The researcher is attempting to extrapolate how language and cognition function in the case of AD.

### **2.3 The sample population**

Before choosing the appropriate instrument to collect data, sampling is a very significant procedure required in any research, since the selection of the appropriate sample population determines the quality of the gathered information and the success of the study. In order to match the research goals and objectives the participants in this dissertation must represent the sample population even though the task of the selection is not an easy one, (L. Frey et al., 2000)

According to the nature and purpose of this research, the appropriate sampling strategy follows an "info-rich" pattern, because the researcher's goal from the investigation is to provide qualified data matching the hypotheses put forward, thus focusing on specific participants who are experiencing Alzheimer's disease and who are able to interact with people regarding their health conditions, in order to be provided with realistic and valid information.

In this research, the individuals chosen among the population cannot be given equal chances of being selected, because randomizing does not suit this kind of study.

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So that, the method applied is a non-probability of a purposive type. This sampling refers to selecting a sample that conforms to a certain criteria, which in our case specific language behaviour and cognitive decline displayed in the case of AD.

To serve the research objective, three patients were selected having different stages of the disease with the presence of their caregivers. The process took place in Doctor C. Belabid's office situated in Tlemcen city; she is a specialist in Neurology –Functional Exploration EEG.

As researchers, it is critical to defend the rights of individuals living with dementia when conducting interview (including the right to anonymity and data protection), and other pertinent issues, such as permissions for data sharing, must be considered.

Hence, the informants are named as X, Y and Z who were diagnosed with Alzheimer's disease and have progressive brain damage according to their doctors' reports. All of them are native speakers of Tlemcenian dialect; they live in the suburbs around Tlemcen: 2 informants are from Nedroma, about 58 km northwest of Tlemcen, 1 informant from Hennaya, 10 km northwest of Tlemcen, and last informant is living in downtown Tlemcen.

The informant (X) is a sixty-one year old female living in Nedroma. She was diagnosed with Alzheimer's 2 years ago and according to the doctor is now in the moderate phase of the disease. She is under treatment in order to slow down the symptoms of the disease. The patient was present with her daughter who grants the researcher the permission to discuss with her. The patient according to her daughter suffers from memory loss and confusion, problems of language especially reading and finding the words.

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The informant (Y) is a sixty-five female living in Hennaya, diagnosed with Alzheimer's 6 years ago, however her daughter said that one year ago she started having problems with recognizing family members, inability to communicate weight loss, and the difficulty organizing thoughts and thinking logically. So according to the doctor's opinion, the patient is now in the beginning of severity.

The informant (Z) is a ninety-one male living in downtown Tlemcen, ancient Mujahid. He was diagnosed for about 1 year ago. The son said that his mental health is quite stable but sometimes expresses mood and personality changes, anxiety and agitation, as well as displaying muteness all the time. He is given medical care several times.

### **2.4 Research Instruments**

Any research technique used to collect data is referred to as the "backbone" to any study. (Cheng & Dörnyei, 2007). Thus, in order to assure the quality and accuracy of the study and obtain reliable findings from the participants, specific instruments are used to obtain information about and from the sample, while giving qualitative or quantitative data, or both. To do so, mixed methods are applied, which include comparing and combining several sets of data to achieve validation, with the finding of one method helping to provide additional details to the other one. (Green et al, 1989, pp. 255-274)

Thus, a semi-structured interview was designed and directed to the patients which is regarded as an efficient method of getting a conversation sample, with the capacity to extract relevant lexical elements as a key feature. Finally, to enrich this work, an assessment of our case study's representation in the filmmaking industry was provided.

#### **2.4.1 Interview Design**

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An interview is 'a conversation with a purpose'. (Webb&Webb, 1932, p.30) As according to Rapley (2001), qualitative interviewing has become a major tool in the human and social sciences, as well as in many other areas of study ranging from education to health sciences.

Furthermore, in-depth qualitative interview may be an effective method of eliciting replies to questions although they are not the only used. Their key potential advantages are the environment's naturalness and spontaneity; the flexibility they allow to some extent; and the control a researcher has over the setting. (Samsi & Manthorpe, 2020). By encouraging participants to feel comfortable, the research interview may be transformed into a friendly dialogue in which the researcher can get to the heart of the study issue. (Grinnell &Unrau 2010).

The interview opted for is a semi-structured interview, since the majority of questions were posed in an open-ended manner during the process. Generally open-ended questions appear to be more suited for those suffering from such an illness. The interview was structured in the manner of a dialogue, with dialectal Arabic used.

However, interviewing persons living with dementia, particularly AD, is a difficult process that presents various ethical and practical problems, including obtaining consent and taking into consideration the patients' symptoms and health conditions. That is, the caregivers and the families of the patients permit all of the interviews since the questions are related to life activities and events of the patients.

According to Quinn (2017), when establishing the interview protocol, the researcher must consider the sequencing of questions in order to ease the participant into the interview.

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By asking brief questions, the individual can grasp what she or he is asking. Therefore, the questions were asked simply and pleasantly in order to ensure that the participants understood. On the other hand, the questions were chosen based on the study hypotheses aimed at identifying how patients behave cognitively and linguistically, i.e., determining the various characteristics of Alzheimer language, as well as their personal traits and life experiences. All done in favor of the research aims.

### **2.4.2 Method of Content Analysis**

The researcher's self-reflection is a fundamental component of qualitative research, regardless of the approach used. (Bernard, 1995, p. 236). Thus, the interview is not the only tool for examining and addressing an issue objectively. To be more precise, content analysis is one strategy to consider for the aim of establishing accurate outcomes. Krippendorff defines this method as: “a research technique for making replicable and valid inferences from texts (or other meaningful matter [documentaries, movies, works of art, TV talks...] to the contexts of their use.”(p.18). In other words, ‘replicability’ is a hallmark of content analysis, i.e., any material linked to the issue may be examined, and the problem can be placed in its context, to develop a set of results by one researcher, such that another researcher with a different point of view than the first obtains the same results from the same content analyses.

Content analysis can provide qualitative data (text, images based on human ideas, actions, and emotional responses) to researchers for a specific topic. It denotes that the researcher is attempting to comprehend the context of a human behaviour, cognition, or emotion. (Kowalczyk, 2021)

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Researchers can use content analysis to filter through vast amounts of data in a systematic manner (GAO, 1996). It can be a valuable tool for identifying and describing the focal point of individual, group, institutional, or societal attention (Weber, 1990). Again, the research value of content analysis is virtually limitless and relevant to almost every subject of study.

Visual media influences the general public's attitudes about people with mental conditions. (Gerritsen et al., 2013). In other words, watching movies related to dementia and Alzheimer's might get us closer to understand how someone with this mental disease feels. However some studies report that, movies may not portray dementia accurately, which may encourage stereotypes.(Hill, 2022)

Though, there have been many media reviews and film adaptations including, for example, the movie *A Vow to Cherish* (1999), *Poetry* (2010), *Away From Her* (2007), along with the beautiful and affecting movie *The Father* (2020), tend to dramatize and capture the audience by covering the challenges of dementia and Alzheimer's.; in order to show how these people feels and seeking support for their caregivers through art and movies.

The researcher picked *Still Alice* (2015) which is a poignant story that is regarded as one of the most realistic renderings of caring on film. It portrays the intricacies of AD. The objective of this step is to describe the ways the Alzheimer character in 'Still Alice' movie produce utterances. Therefore, this study is conducted based on the basic purpose of observing the language process in the exceptional circumstances.

### **2.5 Data Analysis**

Data analysis is an important part of the research process that the researcher goes through while presenting the results. Data analysis is the process of examining and transforming data in order to achieve a given conclusion.

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It is classified as qualitative and quantitative. Check and Schutt (2012) stated that: "Qualitative analysis transforms data into findings. No formula exists for that transformation" (p.321). On the other hand, quantitative analysis is based on numbers and statistics.

However, due to the nature of the data obtained and the number of informants, this study is limited to just qualitative data. However, qualitative methodologies generate data that is deeper and more insightful into underlying diverse aspects and patterns within the AD, and such information can give a detailed understanding of how the illness correlates with language performance. Thus, qualitative research data analysis entails detecting and critically evaluating common patterns among responses in order to attain study aims and objectives.

To put it simply, the analysis of each research instrument was done separately; and the results were summarized in a form of paragraph through description, explanation and interpretation. Therefore, the semi-structured interview and the appraisal content method are described.

### **2.5.1 Interview Analysis**

The collaboration of three patients and their caretakers throughout the semi-structured interview process aided the researcher in discovering the nature of Alzheimer's language. While the patients were speaking, the researcher was taking notes. Following the collection of data, detailed replies, and caregivers' opinions, the findings were described as a conversations and the analysis was summarized into paragraphs. In fact, the responses were transcribed into phonemic symbols (see list of IPA symbols), because phonemic transcription is a useful tool for correctly analyzing the reported errors made by informants while responding to the interview and naming test. In addition, the responses were translated into English.

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### Interview with Patient X

In this section the researcher is going to state the questions and answers of the patients in the form of dialogue. P\* refers to pauses during conversations.

The patient X is a 61 years old female who has been diagnosed 1 year ago with AD, she came with her daughter. The interview will be under the name of interview X

### Conversation

Researcher: Ki rakii? / How are you?

Patient: bχiir/ Fine

Researcher: f ħaal f ſomrek? / How old are you?

Patient: ...63 ſaam, 61, 61 waah / 63years, 61, 61 yes

Researcher: ſandek d̄rari waħduχriin? Do you have other children?

Patient: (She looks to her daughter)

Patient: ſandi waħda w ſandii waħda / I have one and I have one

Researcher: Ki semhom? / would you tell me their names?

Patient: Fatima P\*...w ſandii Fadila P\* waah Fadila / Fatima P\*... and I have Fadila P\* wah Fadila

Researcher: Fajen teskun? / Where do you live?

Patient: ...

Daughter: gives a the first letter of the place name to her mother

Patient: ħnaaja / The place is called 'Hennaya'



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Researcher: şamt ramđaan? / did you fast in Ramdhan?

Patient: laa la / No no

Researcher: Thellaa f raşek / Take care of you.

Patient: kunt nřayeb w nařref nřejeb řwalař/ yes I was cooking and I cook things

Repetition, empty words, anomia

### Analysis

The preceding conversation was between the researcher and patient X in the presence of her daughter. It begins with a simple typical question, "how are you?" This type of question helps in creating a friendly atmosphere with the patient, and as a result, the patient was able to answer this with ease, proving that when it comes to simple questions that do not require a lot of cognitive efforts, patients still have the capacity of responding properly. This implies that Alzheimer's individuals in their early stages may still engage with others when it comes to simple communication.

However, having such a disease will surely create certain problems, among language problems that can be observed in this interview is repetition, this can be noticed when the researcher asked for her daughters' names, she first looks to her daughter in order to remind her obviously because she has memory problems, however when answering she said: '3andi wahda w 3andi wahda' / I have and I have one instead of saying I have two daughters. Lichtenberd and other (2003) stated that repetition is a common feature of having an Alzheimer.

In addition to what has been mentioned, the patient exhibits what is known as anomia, which is the patient's inability to find words; for example, when she was unable to produce her home address, she uttered "h..h.." instead of "hennaya."

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Furthermore, some scholars, such as Kempler, associate this difficulty of word finding with patients' use of what are known as empty words. For example, when she stated "nteyeb swalah" / I cook things instead of "food."

Although small language deficiencies are observed in the early stages of Alzheimer's disease, phonological and syntactic performance appear to be largely maintained, and the perceived defects are caused by impairment in nonlinguistic domains, including memory. Eventually, the patients can keep up with the discussion and understand the researcher's questions.

### Interview with Patient Y

The patient Y is a 91 years old male who is diagnosed 1 year ago with AD; the doctor said that he is in the moderate stage. According to his daughter his memory is still preserved.

### Conversation

Researcher: Rak mliih? / How are you?

Patient: ...

Nurse: she told him to talk

Researcher: rak ʕajan? / Are you tired?

Patient: waah P\* rani ʕaja / Yes I'm tired.

Patient: ntijaa...[biiba? / Are a doctor?

Researcher: mʕamen dʒiit? / Who did come with you?

Patient: he pointed to her daughter

Patient: bent men ntii ?/ Who are your parents ?

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Researcher: wiin kbert ? Where did you grow up

Patient: waldija mat P\* da f haal / my parents is dead P\* long time ago.

### Analysis

The second interview was set for a moderate stage patient. In this respect the researcher has followed the same approach for the previous interview. However this patient even the 'how are you' question could not answer it but the nurse intervened and told him to speak.

The most remarkable error observed in this patient which is the inability to maintain the topic clearly and coherently, the patient seemed to digress from the researcher's speech for example when the patient asked about the researcher's parents by saying: bent men ntii? / Who are your parents? , as well as when he asked: ntija tbiiba? / are you a doctor.

Besides, the patient seemed to suffer from phonological deficiencies such as sound omission, when he said: 'rani 3aya' instead of '3ayan' like saying 'tire' instead of 'tired'. The patient exhibit long pauses in the conversation which is long comparable to normal people. When they pause, they seem they are thinking about something, and trying to recall it. Furthermore, the patient has difficulty of using the right pronouns when he said: 'waldija maat' / my parents is dead instead of saying my parents are dead. Ultimately, even that the patient's speech was filled with errors, he was still able to comprehend the researcher's questions.

### Interview with Patient Z

Patient Z is a 69 years old female diagnosed 6 years ago with AD. According to the doctor reports this patient is in the severe stages of the disease, for this reason she has few responses because she was expressing muteness during the interview as she was afraid from the researcher, but thanks to the nurse aid she could produce some utterances.

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### Conversation

Researcher: ki raaki l ħadza? / How are you?

Patient: ṣaħa / Okay

Researcher: m ṣamen džiit / Who did come with you?

Patient: waah džiit / yes I came.

Patient: tʃabhi l.../ You look like...

Researcher: wiin rah weldek? / Where is your son?

Patient: (laughing)

Researcher: ljuum naar raha berra / it is hot today like fire

Patient: naar? win raha naar? / fire?where is fire?

Patient: džiiti dirili liibra (with expression of fear) / you came to inject me?

### Analysis

In the last interview with patient Z which is suffering from severe Alzheimer's tends to express muteness and her speech was almost ambiguous and sentences were left unfinished. For instance when she said: "tʃabhi l".../ "you look like..." this sentence was left hanging. Besides of answering 'how are you' by 'okay', 'who did come with you' by 'yes I came' show that the patient has a low level of comprehension of speech.

However, the researcher tried to test the informant's connotation by saying a phrase containing connotative meaning and see whether she understand the associations carried by the words or not.

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The sentence was: ljuum naar raha berra / it is hot today like fire, the patient replied: naar? win raha naar? / Fire? Where is fire? , she was incapable of understanding the associations that are carried by the word in which fire is associated to hot weather. The patient thus, displayed a total inability to see the associations carried by the words.

### 2.5.2 Content Analysis

As stated previously, one of the research instruments used to collect qualitative data is the content analysis method. A strategically chosen movie adaptation entitled “Still Alice” (2014), an American drama film written and directed by Richard Glatzer and Wash Westmoreland and based on the eponymous novel by Lisa Genova (2007).

Julianne Moore plays the role of “Alice Howland” who is a linguistics professor at Columbia University. She is 50 years old and married to a physician, John, with whom she had three adult children. After she forgot the word during a lecture and becomes lost during a jog on campus, her doctor, indeed, diagnoses her with early onset familial Alzheimer's disease, and this cause her to have language impairment.

Therefore, the movie is to be scrutinized and psycholinguistically analyzed in order to explore the case of AD. The researcher is to investigate traits of Alzheimer's character including any unusual language production, and behaviour throughout every scene in the movie.

- 4:11: “...but I hope to convince you that, by observing these baby steps into the...into...Ah!” This scene shows that, while Alice was giving a lecture, she ironically forgot a word which she once used to use during her lectures. After she recognized that the word was “lexicon”

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- 10:00: Alice found herself lost on when jogging on university campus  
After having these two symptoms, Alice decided to visit a neurologist thinking that the memory problems were due menopause. However that was only the beginning of a long, shocking journey.
- 13:14: When she went to the doctor, he tested her by asking to remember an address and a name which were: “42 Washington Street, Hoboken”, “John Black”. However the doctor tried to distract Alice by talking with her about her parents and children. After a while he asked to repeat the address and the name that he gave her, but she was unable to recall them. The memory test revealed that Alice has sporadic memory impairment, totally out of proportion to her age. This thing made the doctor worry as she is still young, then asked her to do a PET-scan to see whether the results consisting with AD.
- 16:32: As Alice's memory begins to fade she daydreams of her mother and sister who died in a car crash when she was young. In order to slow it down, Alice memorizes words she writes on a blackboard, and sets a series of personal questions on her phone which she answers every morning.
- 16:59: Alice tells her son Tom to grab the cheese plate however she could not remember the word by saying: grab the...cheese thing  
Thus word finding started to worsen and retrieve.
- 25:14: The results of PET-scan showed the accumulation of Beta Amyloid, but regarding her age, the neurologist told Alice to do a genetic test, as her children too. According to him, the type she has is very rare which familial Alzheimer's disease.
- 29:48: As her disease advances, Alice becomes unable to give focused lectures and eventually loses her job. She feels lost and started doing unusual things like putting the shampoo in the fridge.
- 30:50: Alice's elder daughter Anna, and son, Tom take a genetic test to find out if they will develop the disease. However her daughter Lydia decided not to be tested. Eventually, Anna was positive.
- 38:51: Alice wrote a notes list of questions to be answered like what her name is, the month of her birthday and her daughter's name. She hid sleeping

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pills in her room, and records a video message instructing her future self to commit suicide by overdosing on the pills when she can no longer answer these questions.

- 52:19: At a point, the disease progresses and Alice started using wrong words in her speech; this is noticed in the scene when she said: “what I like about it was how, how big, how wide the “scape” of it was”. Instead of saying “scope”, Alice said “scape”, which means in terms of level of language production, there is an error at phonological encoding the wrong vowel /ei/ was activated instead of /au/.
- 54:56: Alice delivers a speech at Alzheimer's conference about her experience with the disease, using a highlighter to remind herself which parts of the speech she has already spoken, which she refers to as “yellow thingy” as a substitute to the highlighter. That is to say, she cannot find the words with the correct meaning, i.e., she has semantic deficits.
- 1:01:24: In the picture naming test, the doctor showed Alice a picture of a duck which she refers to as: “It is like a chicken but, it is not”. Alice suffers from a deficit at the level of denotative meaning.
- 1:12:44: Alice had an argue with her husband in which her language seemed to be deteriorated, saying: “...but to pick up and, and move, when, when, when..., why can't I say what I wanna say?” She described her situation by : “I can see the words...hanging in front of me and I can't reach them”
- 1:34:22: At the end, the disease reached the late stages and Alice's comprehension and memory were affected. The last scene of the movie, Lydia read her a section of the play “Angels in America” and asked her mother what she thinks it is about. However, Alice could not say what it was about instead she just replied by simply one word: “love”. Due to her working memory which became very poor and not able to hold on information as much as before.

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In a nutshell, the researcher chose "Still Alice" because it explores very well themes of personal identity and how loss of language can equate to loss of the individual – especially for someone whose job is dealing with linguistics.

### 2.6 Discussion and Interpretation of the Main Findings

This section focuses on the various results obtained from the sample; it is concerned with generating new findings about the nature of the correlations between AD and language use, the extent to which disease progression influences normal language usage, and the levels of language that deteriorate during the course of AD. To achieve the research objective, qualitative data analysis was applied to the results obtained from patient interview and the content analysis approach, which was used to offer precise results that allowed the researcher to confirm or reject the research hypotheses.

As far as the first hypothesis is concerned, which is that language behaviour predicts disease progression and severity, the researcher has concluded that AD patients tend to lose their communication abilities as the illness progresses. In other words, various phases of the malady reveal distinct patterns of language impairments in a particular domain, which impact AD patients in different ways. Disorders are often visible in their early stages.

According to Iragay (1967): "The most commonly reported finding is an impoverishment of vocabulary and difficulty in finding words, the individual may experience memory lapses, such as forgetting common words or the place of everyday objects, this latter phenomenon is termed as anomia". Many psychologists claim that forgetting terms leads to the usage of empty words, such as when Alice asked her son to grab the cheese plate but could not remember the word, so she said: "grab the cheese thing."



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Repetition is also seen, such as when the patient said, "I have one and I have one," rather than "I have two daughters." She stutters and says the same thing again and over.

Despite emerging anomia and repetition, phonological and syntactic performance appears to be mostly preserved. At this time, AD patients can communicate well in the majority of social circumstances; these deficiencies are the result of deterioration in non-linguistic areas.

Understanding begins to deteriorate as the disease advances, especially if someone speaks fast or employs complex speech. Even the phrase "how are you?" is difficult to respond. The patient struggles to follow along and begins to deviate from the topic; this was evident when the patient stopped the researcher and began a new topic by asking, "who are your parents?" At the level of language production, phonological mistakes are common, and there is a loss of fluency and the use of inaccurate pronunciation, such as when Alice pronounced "the scape" instead of "the scope". Likewise, when compared to normal persons, speech is interspersed with several pauses. To this point, even though the patient's speech was filled with errors, he was still able to comprehend.

Eventually, near the climax of the progression, the patients are no longer engaged in social contexts where communication demands may arise. They frequently appear ignorant of their communicative deficiencies at this stage and are generally mute. However, while speaking, they make ambiguous utterances or leave the sentence unfinished, indicating that their understanding is compromised in all modalities. Furthermore, they were unable to comprehend the connotative meaning and connections conveyed by the words and took everything literally, in which fire is associated to hot weather. Simply put, as the disease progressed, the patients' working memory deteriorated and they were unable to retain as much knowledge as before, while also losing their language. Other studies, including Kempler, confirmed that the sort of language abnormalities exhibited in Alzheimer's dementia vary according to the stage of the disease.

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Adding that one of the most important elements of Alzheimer's disease is the appearance of mistakes and difficulties in the different levels of language processing, the most common of which are semantic and pragmatic abnormalities, which are a combination of expressive and receptive deficiencies.

Consistent with the second hypothesis, the information collected from patients and the movie analysis suggest that AD patients have a specific linguistic profile, but this latter may differ in the sense that each patient has a unique personality and reaction to the sickness. Aside from their emotional and physical states, their caregivers' support and how each patient is treated all play an important influence in how the disease advances. They do, however, share numerous linguistic flaws.

Further to that, it was discovered throughout the research investigation that all of the patients have difficulty finding the right words to use or its meaning, and this symptom is often used to describe what the disease is like, causing them to be slow to respond, and their speech is thus characterized by long pauses, interruptions, stuttering, and repetition. Many investigations have indicated that naming problems begin in the early stages of this neurodegenerative illness and worsen over time. Inventing words is another trait that is common in the speech of Alzheimer's sufferers. In a nutshell, these symptoms appear early and worsen throughout the disease.

Concisely but inconclusively, it is validated, along with the research findings and prior evidence from other studies, that Alzheimer's disease weakens patients' language and communicative abilities, and they experience difficulty in the phonological, semantic, and pragmatic aspects of language. In other words, Alzheimer's disease damages patients' semantic memory, causing them to construct hazy semantic representations. These deficiencies worsen as the disease advances, resulting in an exceptional linguistic profile.

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As a result, the first hypothesis proposed in this review is confirmed along with the second one which is partially verified.

### **2.7 Research Limitations**

Limitations hampered the pace and outcome of this investigation during the research process. The first limitation is related to the chosen topic itself; due to the nature of the research subject, which is still being tackled, there is a lack of resources and limited evidence from previous research, making the research process time consuming, also because most of the time Alzheimer's illness is treated clinically. Simply said, the use of linguistics to the subject of medicine is still in its infancy.

Another constraint that hampered the researcher was the target population, since this purposive sample may or may not be representative of the total AD target population. Furthermore, conducting interviews with AD patients is a difficult process; some of them were unable to talk with due to health issues. This resulted in sample biases.

Finally, the current findings' validity is certainly a concern. In terms of the semi-structured interview approach, the majority of questions retrieved qualitative data from the patients. As a result, quantitative data was not obtained through the use of the mixed methods approach, which may be explained by the nature of the research questions chosen and the unavailability to undertake a large sample evaluation of AD patients owing to time constraints.

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### 2.8 Recommendations

The research main findings show that Alzheimer's patients have specific language flaws, making communication difficult for them since they have difficulties recalling things. They may struggle to find the right words or may forget what they want to express. It frustrates them to understand what words mean and to pay attention during lengthy talks. In other words, when communication breaks down, irritation sets in, especially when things appear to become worse over time.

Based on the findings of this study and previous studies, speech impairment therapy may be an important training that may assist these people continue to speak for as long as possible and make communication simpler for them. Speech language pathologists help Alzheimer's patients enhance their language skills for as long as possible. They use and offer several strategies for caretakers. The first step is to recognize that the disease alters communication ability. They also develop individualized treatment programs that focus on memory and language while taking the patient's present cognitive condition into account. The objective is to improve all modes of communication, including spoken, reading, gesturing, and writing. It allows patients to perform at their highest ability.

Thus, instead of speaking, adopting other strategies such as body language and gestures might aid in comprehending and decoding what the person is saying. Furthermore, when engaging with an Alzheimer's patient, a calm setting is required; the caregiver should make eye contact when conversing with the patient, calling the patient with her/his actual name while being aware of the tone of voice and body language. Finally, it is advised for the caregivers to attempt to be a good listener, attentive and patient.

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Eventually, this has a significant influence on the quality of life. It is better for persons suffering from Alzheimer's to express their desires and for carers to comprehend their demands, as well as to assist them with future challenges. Therefore, in addition to medical and psychiatric treatments, a speech pathologist can yield significant long-term changes in speech and memory.

### **2.9 Significance of Study**

Language impairment is one of the key components of cognitive decline in Alzheimer's disease, and it contributes considerably to patient and caregiver suffering. Based on existing study findings, it can be concluded that the language loss in AD is apparent in the early stages of the illness; hence, objective assessments of the different language domains are critical in recognizing these patients. Language impairment assists in the proper identification of a certain kind of dementia, modifies the prognosis, and influences treatment.

This work is intended to provide a substantial theoretical and practical addition to the study of psycholinguistics, and more specifically neurolinguistics. In theory, the findings might be beneficial in a variety of situations, particularly those involving language. Hopefully, it will broaden the psycholinguistic viewpoint on speech disorders, particularly language production by an Alzheimer's patient. In practice, it may be a useful resource for psycholinguistic researchers, particularly those working on language problems.

Finally, this document might serve as a useful resource for English students. The findings of this study will provide them with significant information regarding language production by an Alzheimer's patient, as well as for future researchers conducting research in this field.

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### **2.10 Conclusion**

The primary purpose of this section was to explain how this study was carried out by listing and summarizing the data collection method and the processes used to generate qualitative data. Two research techniques, in-depth interviews and a content analysis approach were purposefully designed to investigate AD from a psycholinguistics standpoint and its associations to atypical linguistic behaviour.

The chapter included an interpretation of the data, a discussion of the findings, and a summary of the researcher's obstacles. Following the discussion, a conclusion was derived, carefully approving and revoking the ideas stated in this research. Finally, the researcher provided some suggestions that might be taken and implemented in the process of considering the importance of language assessment among the major symptoms of AD. The study importance is also included.

# **General Conclusion**

The study of language in connection to neurodegenerative illnesses is still in its initial phases. This research concentrates on observing and analyzing language performed by Alzheimer's disease patients at various stages to discover how this linguistic ability deteriorates with time and whether the severity and course of the disease may be mirrored by linguistic behaviour. Furthermore, the study procedure focuses on characterizing the many features of the language problems exhibited by the patients, as well as which areas of language are impacted. One of the goals of this study is to explore how language evaluation might play a critical role in clinical diagnosis of Alzheimer's disease when language impairment is less evident and often obscured by other cognitive and non-cognitive traits.

As a result, this study reviewed, discussed, and highlighted the influence of Alzheimer's disease on receptive and expressive language abilities in patients at different phases of this cognitive disorder. As a result, the first chapter was devoted to a literature review that revisited the definition, emergence, and various perspectives on language. Accordingly, providing some insights into the discipline of neurolinguistics and its interest in the language faculty in the brain, as well as how this latter is affected. Lastly, the researcher provides scientific explanations concerning the major issue, Alzheimer's disease, and how it impacts the patients' normal use of language by describing the condition from a linguistic viewpoint.

The second chapter covers the study methods used to achieve the aims and objectives; the researcher attempted to identify the key anomalous language flaws produced by the patients, and the main results were thoroughly examined and interpreted.

A mixed method technique involving an interview with three patients and a content analysis method of the movie, "Still Alice," reflecting a young demented lady and her terrible life while having AD, was used to get particular conclusions. The analysis of the collected data confirmed the first hypothesis while only partially validating the second.



Overall, interesting findings supported the aims of this study. However, like with every study process, several obstacles hampered the current process. First, owing to the nature of the research problem, which is still being handled, there is a shortage of resources and limited evidence from earlier study was found, making the research process time consuming, and also due to treating Alzheimer's disease from a medical standpoint most of the time. Second, conducting an interview with AD patients is a challenging task; some of them were unable to speak with due to their health problems. In addition to creating sample biases, especially when the researcher selects individuals who display specific features. Moreover, the data collection procedure captured qualitative data the most of the time. Finally, the researcher's lack of knowledge of this particular situation may induce subjectivity.

To conclude this research work, the researcher aimed to combine other studies from different domains such as medicine, psychology, neurolinguistics, and speech therapy in this study, which may pave the way for future research. The investigator then suggested some potential recommendations. The first step is to evaluate the necessity of speech treatment in such cases, as well as the value of language in detecting Alzheimer's disease. Almost few linguistic approaches for the early detection of Alzheimer's disease have been revealed to date. This may make language impairment an important aspect in comprehending this disease and its symptoms. And thus, the area of neurolinguistics is being reconsidered.

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