THE EFFECTS OF EARLY ALZHEIMER'S DISEASE ON THE LANGUAGE OF A RECOVERING MONOLINGUAL APHASIC: THE STUDY OF MR. I's LANGUAGE

BY

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DECLARATION

This Project is my original work and has never been submitted to any other University.

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This Project has been submitted for examination with our approval as the candidate's supervisors.

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Dr. Jefwa Mweri

DEDICATION

To my grandmother Sarah

For her love, encouragement and prayers

To my husband Moshe Zinyuk

For his abundant love, support, inspiration and encouragement

To our children Jacob, Claire and Daniel

For your love, enduring patience and terrific sense of humour and

I hope you will find some answers to the many questions you always asked me about your grandfather in this thesis

To Daisy

You will forever be cherished

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Sara Zinyuk

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ABBREVIATIONS AND SYMBOLS

SDAT -	Senile dementia of Alzheimer's type
S -	Subject
DAT -	Dementia of Alzheimer's type
R -	Researcher
/ -	Corresponds to one second in the appendix
.. -	Each dot corresponds to one second in the subject's utterances
*	Words that could not be deciphered

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ABSTRACT

This study set out to establish the extent to which linguistic segments have been affected by dementia of Alzheimer's type in a recovering aphasic in phonology and morphology. The study had two objectives: a) to investigate how the subject's pronunciation patterns has been affected by early dementia of Alzheimer's type by establishing which phonemes got substituted by which, which phonemes were added and which vowels were lengthened. b) to find out to what extent the subject's grammar and lexis has been affected by early dementia of Alzheimer's type by establishing which type of word finding difficulties were manifested, which inflectional morphemes were deleted and what entailed neologisms. Collection of data was elicited using an IC Sony recorder to record the subject's spontaneous speech and reading exercises. Relevant information regarding the subject background and condition concerning the study was sought from his doctor and his wife. The collected data was presented in tables and then discussed. The study found that the subject's pronunciation was characterized by phoneme substitutions, phoneme additions and vowel lengthening. Phonemes were substituted the most followed by additions and vowel lengthening. The study also found out that the use of fillers, vocalized space fillers, repetitions and empty pauses manifested word finding difficulties. The English past tense morphs and the progressive marker were deleted while neologisms resulted from clipping and blending of words.

CHAPTER ONE:

INTRODUCTION

1.1 Definition of terms

This section briefly defines the following terms: dementia of Alzheimer's type, aphasia, aphasic and recovery of aphasia. Definitions provided below were taken from Crystal (1997) and Obler & Gjerlow (1999).

1.1.1 Dementia of Alzheimer's Type

Obler and Gjerlow (1999:91) note that "the term '*dementia*' is very broad and refers to results of a number of diseases all of which lead to a loss of intellectual abilities. Dementia is caused by the deterioration of brain tissue. Different dementias affect different parts of the brain, but they do not result in obvious brain damage in distinctly localized areas of the brain the way aphasias do. Rather they appear as more generalized atrophy. There are two major distinct forms of dementia are the cortical and subcortical dementias. In the cortical dementias, the cellular changes associated with dementia are primarily in cortical areas; in the subcortical ones, conversely, the cellular changes are primarily in the subcortical structures. The most commonly known cortical dementia is Alzheimer's disease. This disease, the characteristic changes in cortical cells results in patients showing at least three of the following four symptoms: they evidence problems with language; they have memory problems; they have problems performing new tasks with knowledge they already know (e.g. spelling 'world' backwards); and they have personality changes."

1.1.2 Aphasia

Crystal (1997:272) says that "when an area of the brain involved in language processing is damaged, the language disorder that results is known as aphasia. Aphasia can be as a result of strokes, cerebral tumours, brain disease and traumatic damage (head injuries due to traffic accidents, falls, acts of violence etc.)"

Crystal (1997:273) classifies aphasia into three broad categories namely: Broca's aphasia, Wernicke's aphasia and Global aphasia.

1.1.3 Aphasic

"Aphasics are affected to varying degrees linguistically depending on the category of aphasia. Broca's aphasia is located in and around Broca's area and the language is usually characterized as markedly non-fluent – slow, labored, hesitant, often one syllable at a time, with great difficulty in articulation, and disturbed suprasegmental features. Sentences are short and reduced to a 'telegramatic' style, with little use of the normal processes of grammatical constructions. Individual words are often repeated. Comprehension of everyday language is near-normal. These symptoms have led to this aphasia to be referred also as expressive or motor aphasia.

Wernicke's aphasia's lesion is located in Wernicke's area and the language is characterized as fluent, often excessively so, with no articulatory difficulty, though there may be several erratic pauses. There is usually a severe disturbance of comprehension, though this is obscured by a normal intonation. The speech is marked by circumlocutions, unintelligible sequences (known as 'jargons'), errors in choosing words and phonemes, and problems in retrieving words from memory. Wernicke's aphasia is also referred to as receptive or sensory aphasia.

Global aphasia exhibit symptoms of severe Broca's and Wernicke's aphasia combined. There is an almost total reduction of all aspects of spoken and written language. The patient's expressive abilities are minimal, and in most cases do not improve much over time. Comprehension of spoken language, initially very poor, shows limited recovery. The disorder is sometimes known as 'irreversible aphasia syndrome'.

Aphasia is often accompanied by other symptoms such as agnosia, apraxia and anarthria. Agnosia is a difficulty in recognizing familiar sensory stimuli. Apraxia is often a severe difficulty in controlling voluntary movements of limbs or vocal organs. In particular, there maybe an inability to control sequence of sounds (articulatory or verbal apraxia) or gestures. The intention to communicate is present, but the patient cannot carry it out. Anarthria or dysarthria on the other hand is often an accompanying weakness or paralyses in the side of the body opposite the hemisphere which has been damaged. When this affects the neck or face, the functioning of the vocal organs can be impaired, to produce a poorer quality of articulation. The effects range from mild to severe – from a light slurring to total unintelligibility", Crystal (1997:273).

1.1.4 Recovery from aphasia

Crystal (1997:272) notes that "about a quarter of all aphasic patients recover within three months. The rate of recovery then decreases, with full recovery increasing unlikely after six months. A further 25% of patients are still severely affected after a year, with little subsequent improvement expected. The different communication modalities usually recover at different rates: generally, comprehension improves more rapidly than production."

1.2Background to the study

Communication breakdown is very frustrating for all participants and more so for those who are not able to use language not because they do not possess the ability to engage in conversation but as a result of inability to express themselves appropriately. This could be as a result of word finding difficulties or physical problems with the articulators themselves due to brain injury or a cognitive degenerative disease.

The inability to express oneself is usually as a result of language being affected in various aspects. This can be caused by either aphasia where the lesion, its location and extent determines the language breakdown or dementia which slowly degenerates cognitive abilities and as such language capabilities.This phenomenon which is not new in the society and especially that of early dementia of Alzheimer's type affects a substantial population particularlyof the elderly and therefore necessitated an inquiry into how it all starts and how it affects linguistic segments of a speaker. This study is based on a monolingual native speaker of English and seeks to establish how the subject's recovered language from aphasia has been affected by early dementia of Alzheimer's type.

An aphasic can exhibit difficulties in oral and written language. Such difficulties include: unintelligible sequence of linguistic segments, retrieval of words, circumlocutions and illegible handwriting.

In comparing the language problems of aphasia and dementia, Obler and Gjerlow (1999:102) illustrate that "both aphasic and demented patients produce some speech with disturbed form and some with unusual content. In general, it is the demented population that shows a greater

weakening of the ability to encode meanings, the connection between cognition and language."

An example given by Obler and Gjerlow (1999: 102) confirm "both Wernicke's aphasics and demented patients experience difficulty with the use of functors. However, as explained in Obler (1983), the typical Wernicke's patient uses only a subset of the functors available in his or her language, with a marked preference for the 'emptier' ones such as 'and'. Demented patients, on the other hand, are more likely to misuse a wide range of functors as seen in the example below.

1) (a) I'd like a cup of coffee, but I'd like one.

(b) The mother's neither caring, the son's neither caring or can't help it.

This kind of difference as explained by Stevens (1991) suggested that difference in patterns of errors might serve as a diagnostic for differentiating linguistic disturbances in aphasia and SDAT (senile dementia of the Alzheimer's type). On a test battery with many subtests, the clearest differences were found in tasks involving descriptions of actions and the use of objects. SDAT patients were more likely not to respond, respond with something irrelevant, or perseverate on a previous response".

Various studies by scholars on dementia and aphasia show that the localization of language in the brain and the lesions as a result of brain injury and degeneration of the brain have varying implications on the affected linguistic elements.

Kimani (2008) in analyzing the linguistic properties senile dementia in Gikuyu found out that "linguistic segments presented a range of linguistic errors with a majority being either

exchange or substitution errors." An example of phonological errors of substitution (pg. 37) is given below:

2) Riu *ni-ngu-og-a

Target: Riu ni-ngu-gu-a

Now I will fall.

In this case a phoneme or sound sequence is substituted.Whereas most sounds are retained, the second last segment has a substitution resulting in a non-word thus – og – [ɔg] takes place in the place of –gu- [gu]

Other phonological errors included errors of insertion.

3) Subject: *niyo tuthomagia

Target: niyo tuthomaga.

It is the one that we read

In the example the sound –i- [i] has been inserted before the final vowel creating a sequence of the two final vowels and a word that is not grammatically correct in the language.

In her study, Obuya (2009) compared the patterns and degree of language loss in bilingual aphasia and found out that the patients exhibited different underlying deficits in either of the two languages that the patients spoke. For example in English words Wernicke's aphasic indicated stuttering in sounds.

4) Patient 6: W.O responds to an interview by Obuya

This one I think was…she looks like me but…

Eh…is a s…stress – at what do you call this.

"The sound /s/ in the word s…stress, has been stuttered on. There is minimal use of fillers like 'eh…' probably in an attempt to retrieve a certain word."

Syntactically,) she found out (pg. 61) that "the individual words did not combine well to make meaningful units."

5) they are many I don't know they were doing know they were doing in one…

"These errors were found in Wernicke's aphasia, though their sentences seemed to flow, the individual words did not relate well with one another."

The findings by the scholars quoted above clearly show that language is affected adversely by aphasia and dementia. These findings motivated the present study of the language of a 67 year old who is referred to in this study as Mr. I. Below are excerpts from his spontaneous speech.

On a discussion about eye glasses and contact lenses, Mr. I. says:

6) Extract: [about eye glasses]

Subject: …well, I started wearing glazzes when I was at school when I was fourteen, round about the age of thirteen, I moved to contact lenses…

As evident in Mr. I's speech from the above extract, there was aphonological error which involved phonemes. Phonological impairment was evidenced by the substitution made in the word *glasses* /*gla:sɪz/* where the voiceless alveolar fricative /s/ was substituted by the voiced alveolar fricative /z/ resulting in the word being produced as *glazzes*. Using the Activation-Spreading theory, this speech error happens as a result of anticipation of articulation of the voiced alveolar fricative /z/ word final. The distinctive feature 'voice' was more primed by the phonemes in the word and thus it spread its activation to the intruding phoneme /z/. This intruding phoneme is similar in target in terms of its distinctive feature composition (except voicing) with the one it substituted /s/.

When the subject recollected memories from childhood he said;

7) Extract: [about childhood, education and career]

Subject's utterance: …when I was five [faɪ:v] we moved house [haʊ:s]…umh…from a plaze called….

In this extract the spontaneous speech of the subject portrayed vowel lengthening in English words that normally have short vowels in the words *five* and *house*. The subject also had word finding difficulties as seen in the extract below.

8) Extract: [about childhood, education and career]

Subject's utterance: …umh……but …. ……while I was there someday I read from a paper that because we'd gone to oxford we were the first…

The subject had fluency in this sentence construction but the impediment of searching for words as evidenced by the use of fillers (umh) and long pauses (number of dots correspond to seconds) slowed down his conversation and one had to be very patient not to interrupt him so that he could complete his sentences.

Reflecting on these observations as have been sighted in the extracts above one notices that there are linguistic elements that have been affected and which would necessitate further probing to establish to what extent the subject's recovered language has been affected in terms of pronunciation and grammar by dementia of Alzheimer's type.

1.3 Statement of the Research Problem

From the illustration of Mr. I's linguistic disorders in the previous section, the key issue that arises for study is to determine the exact nature of those linguistic disorders and their extent.

The study will be guided by the following questions:

- What are the linguistic segments affected by early dementia of Alzheimer's type on a recovering Aphasic?
- Is the pronunciation of Mr. I's recovered language affected by early dementia of Alzheimer's type?
- How is Mr. I's recovered grammar affected by early dementia of Alzheimer's type?

1.4 Objectives of the Study

The general objective of this study is to identify the linguistic segments affected by early dementia of Alzheimer's type on a recovering aphasic. Specifically however, this study will have the following objectives:

a) To identify and discuss how the pronunciation patterns of Mr. I's language are affected by early dementia of Alzheimer's type.
b) To establish and evaluate the extent to which the grammar of the subject has been affected by early dementia of Alzheimer's type.

1.5 Research Hypotheses

The study will be guided by the following research hypotheses:

a) The pronunciation patterns of Mr. I. are characterized by phoneme substitutions and deletions, and vowel lengthening.

b) The grammar of the subject is characterized by word finding difficulties, deletions of inflectional morphemes and neologisms.

1.6 Justification of the Study

The linguistic segments affected by early dementia of Alzheimer's type on a recovering aphasic is of profound interest as it gives insight into the intricate relationship between language and cognition. To be able to identify and analyse the linguistic segments affected as a result of brain injury and degenerative diseases could generate crucial knowledge on various aspects of language.

The present study will provide detailed analyses into the language impairment caused by early dementia of Alzheimer's type on a recovering aphasic by scrutinizing the language, the pronunciation patterns and the grammar.

The findings of this study will contribute immensely to the data available from other researches done in other languages and to future researchers interested in understanding the effects of early dementia of Alzheimer's type on language. Speech therapists will also benefit from the findings in their endeavour to reclaim the language lost in aphasics and management of language breakdown in patients suffering from dementia of Alzheimer's type.

1.7 Scope and delimitations of the study

This study will focus on a single case whose language has been affected by aphasia and early dementia of Alzheimer's type. This study limits itself to the effect of early dementia of Alzheimer's type. A single English monolingual case was found appropriate since language is highly idiosyncratic the findings thereof of this study can be used with others in other languages to make generalizations. The study of the affected language will take place in the subject's residential home at Loresho in Nairobi, Kenya. Specifically, the study will focus on the subject's language, pronunciation patterns and grammar.

1.8 Literature Review

This section will look at the literature review of language recovery in the case of aphasia and the possible effects of early dementia of Alzheimer's type on this type of recovery.

1.8.1 Literature review on language recovery

The language that shows marked improvement in the process of recovery according to Pitres (1895) is the native language. The oldest language is usually the first to be recovered during recovery of language loss. This language is usually the native language of the patient, Ribot (1985). Furthermore, the first recovered language is the one the patient is emotionally attached to, (Minkowski 1928, 1949, 1965). The present study is based on a native monolingual speaker of English and it is expected that it is the language he recovered after the stroke.

Antagonistic recovery of language posits that one language is recovered at a time as patients begin the recovery process. Other languages the patient may have known prior to the language loss follow although in rare cases the first learnt language can degenerate and disappear completely, William and Bhatia (2009:357).

Cook (2009:199) asserts that differential recovery is seen when on the path of recovery, these languages deviate from their premorbid status; note that these languages were fluent before the aphasia bout. It is possible that one of the languages was severely impaired or efficiently recovered better than the other one. Minkowski calls them 'synergistic'. He adds that it could be that language used immediately before the insult being recovered better or that it was mildly affected. Though this work deals with differential recovery based on two languages while this study deals with a monolingual aphasic, it will give us insights into the recovery process of a lost language. Prior to the stroke, the subject exclusively used English for communicating and it is the only language he was exposed to after the stroke.

Ongaga (2012) studied language recovery in two bilingual aphasics and found out that one of the patients showed mixed recovery pattern as he displayed pathological mixing and code

switching between languages. The other patient showed parallel recovery pattern as all languages seemed to recover at the same time. The study established that the first learned language of the subjects was their mother-tongues and the one subsequently recovered first. In morpho-syntactic and phonological aspect of language, she concluded that there were morpho-syntactic errors of omission, substitution of morphemes and derivations as well as poor word order due to the patient's word finding difficulties and echolalia. These findings give insights into the present study because the subject is a recovering aphasic who has managed to recover most of his language though there may still be errors in his language which are now being affected by early dementia of Alzheimer's type.

1.8.2 Effects of early dementia of Alzheimer's type on aphasia recovery

Bromley (1974: 293, 303,305) notes that the loss of judgment and intellectual powers is more common in women than in men, and its onset is gradual. Intellectual deterioration is relatively slow but progressive and that eventually the disease encroaches on lifelong habits and the patient cannot think properly, speak coherently or write effectively. He tends to talk around the issue, wander off the point, repeat himself and use empty phrases. His speech becomes incomprehensible, inappropriate, and finally a meaningless babble. The present study would want to find out if the subject's language will exhibit empty phrases and repetitions in his speech.

Garman (1990:471) points out that "cognitive decline associated with normal aging or with early dementia must be taken into account when asking how age interacts with severity of aphasia and recovery from aphasia. The discrimination between normal cognitive decline and specific dementias may be possible on the basis of associated language abilities." Does the age of this study's subject contribute to the severity of aphasia and his recovery?

Crystal (1997:272) in distinguishing between aphasia and dementia states that aphasia is usually defined as a handicap of language comprehension and/or production caused by a specific brain damage. It therefore clearly excludes language handicaps associated with other conditions, such as dementia. From Crystal's analysis this study's focus will be to analyze those linguistic segments that have been affected by early dementia of Alzheimer's type.

Obler and Gjerlow (1999:102) show that both aphasic and demented patients produce some speech with disturbed form and some with unusual content. In general it is the demented population that shows a greater weakening of the ability to encode meanings, the connection between cognition and language. This study will seek to discover what aspects of the recovered language of an aphasic have been affected by early dementia of Alzheimer's type.

Field (2004 : 86-87) notes that some forms of dementia such as Alzheimer's Disease affect the cortex while others affect the sub-cortical areas. Cortical dementia begins relatively young, there is a higher probability of extensive language impairment than when the onset occurs at a more advanced age. Some of the effects resemble those of Aphasia, especially Wernicke's Aphasia; this is not surprising, given that the syndrome affects similar areas of the brain. These findings are crucial to this study in that as much the present study analyses affected linguistic segments of early dementia of Alzheimer's type, a recovering aphasic may still exhibit effects of aphasia especially Wernicke's since they are both cortical.

The language that is recovered first is usually the one the patient used frequently and that which is of significant importance to the patient. Care givers language is also likely to be recovered first. In this study, the subject is an English monolingual and it is expected that the

first language he recovered was his native language and the one he frequently used and also attached to, it is consequently the one being affected by early dementia of Alzheimer's type.

1.9 Theoretical Framework

This study will be based on the Activation-Spreading Theory.

1.9.1 The Activation-Spreading Theory

The Activation-Spreading Theory by Dell (1986) as outlined by Levelt (1989: 352-359) is found appropriate for the present study. "The activation-spreading model is organized in four strata or levels of nodes: the semantic, the syntactic, the morphological and the phonological which are permanently available in long-term memory. Nodes according to Crystal (2008:327) "is a term in generative grammar to refer to any point in a TREE from which one or more branches emanate." Nodes are points or positions in a tree diagram where branches meet and each node is a symbol for a grammatical category. "Nodes can be activated, and when active they spread their activation to connected nodes at other levels. At the syntactic level the nodes stand for lemmas and their diacritical features. At the morphological level they stand for stems and affixes. At the phonological level they stand for syllable constituents and phonemes. Spelling out, i.e., going from level to level, is done by activation-spreading." Dell illustrates this using diagrammatic stratum with examples of the words *reset* and *resell*. "The representations at the syntactic, the morphological, and the phonological strata are web connected. Web connections lead from the syntactic level where their long term form representations in the mental lexicon are. The two words *reset* and *resell* share an affix at the morphological level as well as syllable and several phonemes at the phonological level. At each level of representation and each discrete moment in time there is one and only one

current node." If *reset* is the current node at the surface structure, its activation spreads to the morphological level with the stem *set* and affix *re* which is the morphological spell out. This activation is further spread to the connected nodes at the phonological level. The onset of *reset* is activated and the phoneme /r/ becomes a current node and spreads its activation to its distinctive feature nodes i.e. the syllable node requests a nuclei /i/ and a coda /Φ/ which completes the first syllable. After a current node has been selected and its activation boosted and spread, the activation resets to zero. This is a check off mechanism in the slots-and-fillers theory. This activation and spreading also occurs in the same manner to *set* when at the morphological level *set* becomes a current node, is activated and spread its activation to the phonological node where a syllable is requested then the onset, nuclei and coda are also activated. When after the prefix stem node is sought at the morphological level, *set* is the most strongly activated one whereas *sell* is not very active. If by chance *sell* is more active and becomes a current node spreading its activation to the phonological node, a malapropism will occur where the speaker will say *resell* instead of *reset*.

The control structure of spreading activation is one of parallel processing and there is simultaneous actions of a whole set of nodes at a given level of representation, and there is simultaneous activity at all levels which accounts for the high-speed performance of speech generation.At the phonological stratum, a syllable's onset, nucleus and coda are requested and filled in serial order and in English this is done from left to right.

This theory describes several speech-error phenomena that are otherwise hard to understand and elaborates on just a few such as malapropisms, lexical bias, the repeated-phoneme effect, check off failure and phonemic similarity." For instance, "the occurrence of substitution errors, in particular anticipations and perseverations, are a result of a combination of a

misselection and check off failure. A misplaced filler, once used, remains available as a filler. Its activation is apparently, not turned back to zero." For example in articulating the pair of words *boot coat*" if the syllable node *boot* is the current node, it spreads its activation to /b/, /u/, and /t/. The *boot's* activation resets to zero. In their turn, however, the activated phonemes /b/, /u/, and /t/ return part of their gained activation to *boot*. As a result, *boot* it reactivated shortly after it fired, this makes it a candidate for a subsequent choice as current node. The speaker may say *boot boot* instead of *boot coat*. Also, the syllable node *boat* will be activated by /b/ and /t/. This makes *boot boat*, where there is perseveration of /b/, a possible slip of the tongue."

In phonemic similarity "the intruding phoneme tends to be similar to the target in terms of its distinctive feature composition. Each activated phoneme node will spread its activation to the corresponding set of feature nodes, i.e., to nodes representing features such as voicing, place of articulation, and nasality. In their turn, the activated feature nodes will return activation to all phoneme nodes that share these features. Hence /s/ will, through its distinctive feature node "unvoiced", activate /t/; /i/ will, via the feature node "front" activate /e/. In this way, similar phonemes increase their mutual availability as candidate fillers. This enhances the chance that an intrusion will be similar in target."

This study will use of this theory to analyse and describe the linguistic segments affected by early dementia of Alzheimer's type in the subject's spontaneous speech and reading.

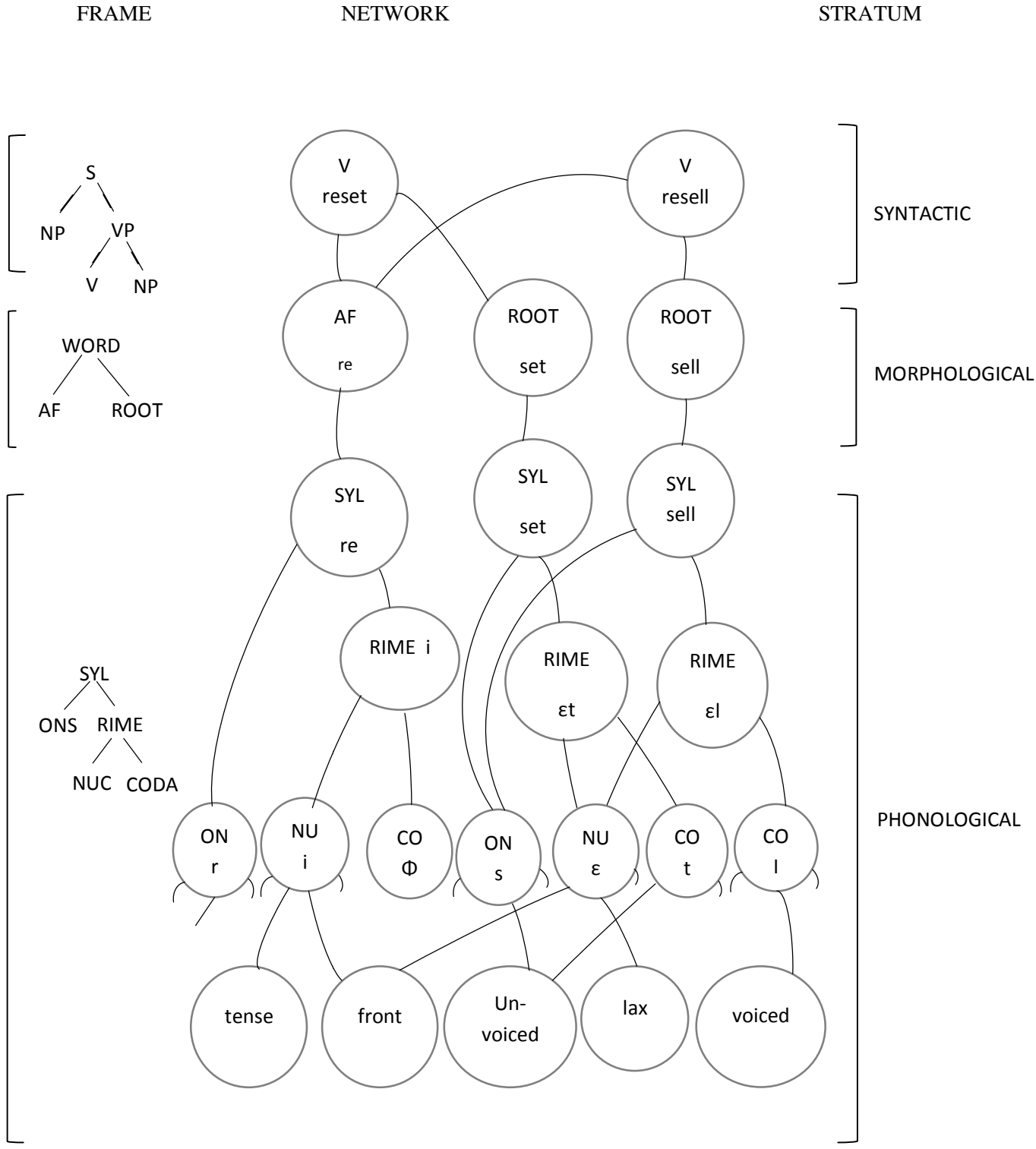

Figure 1:Example of strata, frames, and connected network in activation spreading theory

Adapted from Levelt (1989:535) figure 9.2

1.10 Methodology

This section presents the subject, the procedure followed in data collection and the techniques used in data analysis.

1.10.1 The subject

The subject is a 67 year old adult male who is a native speaker of English. He was identified through a direct referral by my physician at Nairobi Hospitalas a good, willing and cooperative candidate for this study. He speaks English with a BBCaccent. He is right handed. He has 12 years' education, plus a further 4 years of BSC Chemistry and 3years of Accountancy. He suffered a stroke on October 2007on an airplane on landing point at the Jomo Kenyatta International Airport from the United Kingdom.

He was diagnosed with dysarthria ("muscular problems at the end stage of speech productions" Obler and Gjerlow (1999: 95)) and suffered aphasia. Four months later on January 2008 his speech according to his doctor had improved with 95% intelligibility for known people and 75% for unknown. He was involved in a motor accident on November 2011 but with no significant head injury, but according to his doctor this accident affected his speech articulators. In September 2014 there was concern that his memory was deteriorating. The subject also acknowledges that his long-term memory seems intact whereas his short-term memory is not as it used to be.

1.10.2 Data collection procedure

Data was collected from samples of the subject's language through interviews which took place once a week for one hour for a period of three months from January 27th 2015 to April 28th 2015. The interviews took place at his natural home setting in Loresho, in Nairobi. The

interaction sought to elicit data using formal interviews where the subject was engaged in activities such as prose reading, reading lists as well as recalling past events such as memories of the stroke, childhood, education, career and hobbies. Casual speech was also initiated. Information from the subject's wife was sought and used to complement the recorded speech. Data from the subject's medical file was sought detailing the exact dates of stroke, recovery, accident and probable early dementia of Alzheimer's type. The subject's spontaneous speech was recorded using a Sony IC recorder for transcription and analysis. This was found appropriate, discreet and efficient.

1.10.3 Data analysis procedure

In analysis, Mr. I's spontaneous speech and reading exercise was done. The data selected from the corpus data of the subject's spontaneous speech and reading exercise madetwo different chapters: phonological, lexis and morphological patterns. Chapter two was divided intophoneme substitutions, phoneme additions and vowel lengthening and chapter three was divided intoword finding difficulties, deletion of inflectional morphemes and neologisms. The subject was referred to as Mr. I as earlier indicated.

A summary for each of the speech errors in the subject's language was presented in tables and the affected linguistic segments tabulated, rated and briefly discussed. Different speech errors were presented in different tables and the frequency of occurrence rated. Only sample excerpts of the whole data was analyzed in the twochapters with the remainder of it being referred to from the appendix.

CHAPTER TWO:

THE EFFECTS OF EARLY DEMENTIA OF ALZHEIMER'S TYPE ON MR. I's PRONUNCIATION PATTERNS

This chapter presents the patterns of Mr. I's recorded speech. It describes the phonological segments that have been affected in his language. These will be analyzed in terms of phoneme substitutions and additions, and vowel lengthening.

2.1 Phonological errors

2.1.1 The phoneme /s/ substituted by /z/

In the subject's spontaneous speech and in reading the voiceless alveolar fricative /s/ was substituted by the voiced alveolar fricative /z/.Table 1 shows the instances of substitution of /s/ by /z/ word initial, medial and final.

Example 1. All the instances (in the extracts in the appendix) where the voiceless alveolar fricative /s/ was substituted by the voiced alveolar fricative /z/ in spontaneous speech and reading exercise word initial, medial and final are exemplified in table 1 below.

Table 1: The phoneme /s/ substituted by /z/

No.	Word	Target word	No of times /s/ was substituted by /z/word initial, medial and final	Occurring in utterances
1	Zertain	Certain	1	24
2	Ztrong	Strong	1	61
3	Zizcovered	Discovered	1	68
4	Glazzes	Glasses	5	52
5	Underztand	Understand	3	45, 61
6	Mezzage	Message	2	64
7	Againzt	Against	1	60
8	Dizzentients	Dissentients	1	1
9	Plaze	Place	3	10, 61
10	Ziz	This	7	24, 61, 63, 64
11	Polize	Police	1	49
12	Uz	Us	3	63, 65, 67
Totals			29	

From table 1, it is evident that Mr. I substituted the voiceless alveolar fricative /s/ with its voiced counterpart /z/ word initial, medial and final with a total of 29 instances. Citing just a few instances, word initial, he articulated the word *certain* as *zertain* and in word medial *glasses* was produced as *glazzes*, and in word final the word *this* was produced as *ziz* which is a non-word in English.

Using Dell's 1986 activation-spreading theory found in Levelt (1989:352-363), these substitutions can be explained using the model which is organized in four strata or level of nodes. Nodes "refer to any point in a TREE from which one or more branches emanate" Crystal (2008:327). These nodes are also symbols for a grammatical category. When a node is activated they spread their activation to connected nodes at other levels.

Taking one example from the linguistic segments affected in table 1 from Mr. I's language, the voiceless alveolar fricative /s/ is substituted by its voiced counterpart /z/ in the words zertain and ziz both occurring in utterances 24 in the appendix i.e. 1.24 and 10.24 in table 1, this substitution can be elaborated using the extract below.

Example 2.24 [spontaneous speech]

Subject's utterance: …there was ziz zertain amount of pressure from home, I should desire on a career and apply myself to it.

Target utterance: …there was this certain amount of pressure from home, I should desire on a career and apply myself to it.

In the above extract, the substitution of phonemes occurs at the phonological node where the word *was* influences the subsequent articulation of the words *this* (ziz) and *certain* (zertain). The word *was* transcribed as /wəz/ at the coda node affects the articulation of the words: *this* /ðis/ where both the onset /ð/ and coda /s/ are substituted by /z/ and the word *certain* /sɜ:tn/ whose onset /s/ is also substituted by /z/ as illustrated in figure 2.

The explanation for this phoneme substitution according to Dell (1986) as quoted by Levelt (1989: 352-359) can be attributed to phonemic similarity. At the morphological node the root

word *was* is activated and spreads its activation to the phonological node where it becomes current node and further spreads its activation to the distinctive feature nodes where a syllable is requested and the onset /w/ requested, the nuclei /ə/ requested and the coda /z/ requested. In phonemic similarity the voiced alveolar fricative in *was* /z/ coda is activated as the current node using its distinctive features and spreads its activation to the next word *this* /ðis/ where the voiced dental fricative /ð/ and the voiceless alveolar fricative /s/ in the word are substituted by /z/. Furthermore, its activation also spreads to the voiceless alveolar fricative /s/ in the word certain /sɜ:tn/ where /s/ is also substituted by /z/. Dell (1986) quoted by Levelt (1989:358), notes that "the intruding phoneme tends to be similar to the target in terms of its distinctive feature composition because each activated phoneme node will spread its activation to the corresponding set of feature nodes, i.e., to nodes representing features such as voicing, place of articulation, and nasality. In their turn the activated feature nodes will return activation to all phoneme nodes that share those features." In this case the voiced alveolar fricative /z/ in the word *was* through its distinctive feature node 'fricative' will activate /ð/ and /s/ in the word *this*as well as /s/ in the word *certain*. See in figure 2 that there are four arcs convening at the manner of articulation 'fricative' which enhances the likelihood that a substitution will be tagged to this feature.It is the place of articulation and voicing that affects the subsequent phonemes /ð/ and /s/ to be articulated as /z/ since these two features are more primed and spread their activation to the subsequent words. "In this way" continues Dell (1986) quoted by Levelt (1989:358), "similar phonemes increase their mutual availability as candidate fillers. This enhances the chance that an intrusion will be similar to a target". "Errors", continues Dell, "occur when a wrong item is more activated than the correct one and is selected and tagged. For this wrong item to be selected, it must be a member of the same

category as the correct item". Note that the phonological errors given in this example in Mr. I's language strictly adhere to the phoneme constraint where phonemes exchange other phonemes through the influence of their distinctive features.

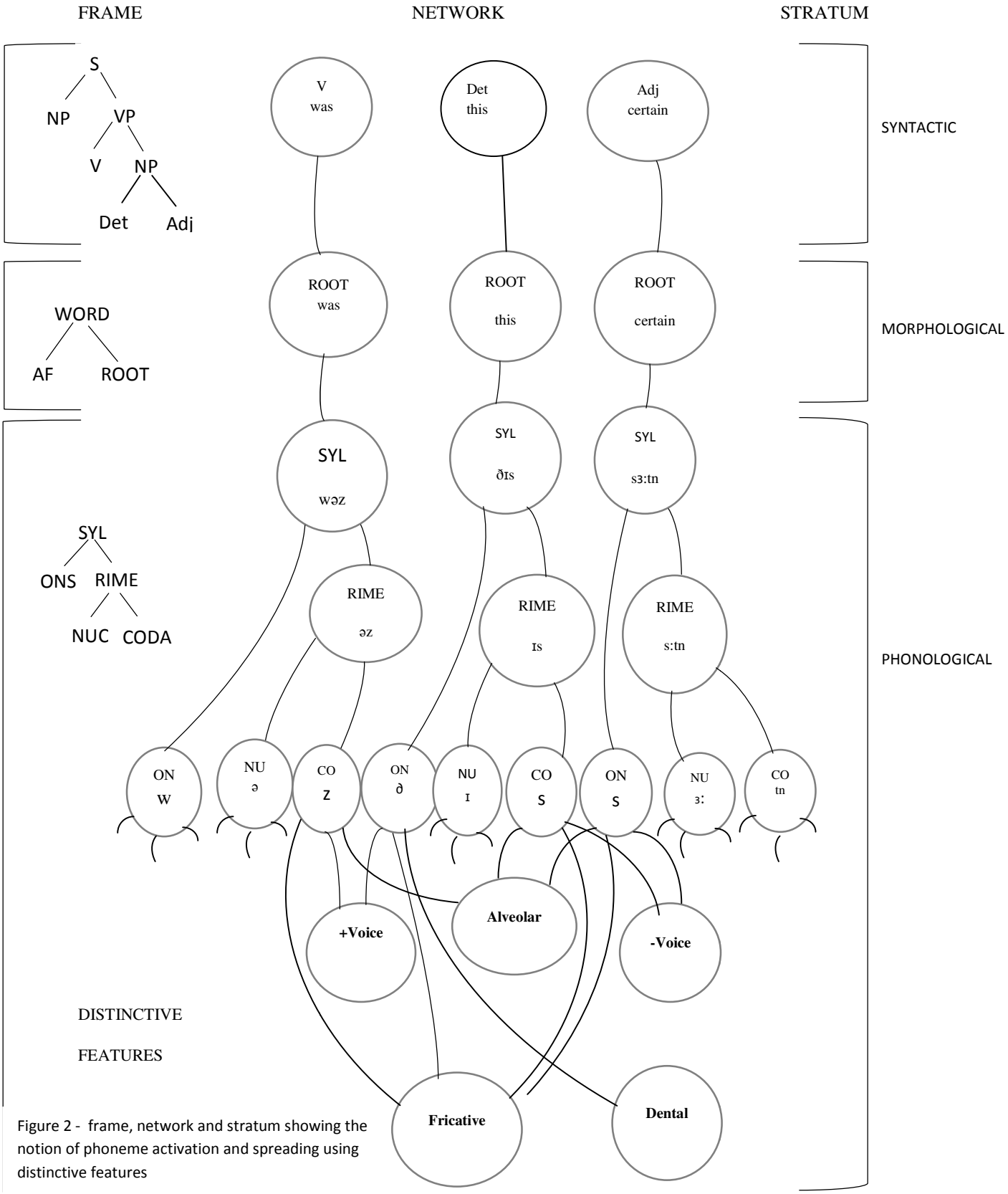

Figure 2 - frame, network and stratum showing the notion of phoneme activation and spreading using distinctive features

2.1.2 Other phoneme substitutions

Example3: All the instances (in the extracts in the appendix) where the other phoneme substitutions were evidenced in spontaneous speech and reading exercise.

Table 2: Other phoneme substitutions

No.	Word	Target word	No. of times phonemes were substituted by /z/	Occurring in utterances	Phoneme substitutions
1	Ziz	This	7	24, 61, 63, 64	/ð/ by /z/
2	Ze	The	4	13, 22, 51, 65	/ð/ by /z/
3	Zirty	Thirty	1	13	/θ/ by /z/
4	Iz	It	2	61, 63	/t/ by /z/
5	Ziscovered	Discovered	1	68	/d/ by /z/
6	Tigging	Digging	1	9	/d/ by /t/
7	Turing	During	1	12	/d/ by /t/
8	Sigsty	Sixty	2	13	/k/ by /g/
Totals			19		

Table 2 shows that in Mr. I's spontaneous speech and reading there were substitutions in the following phonemes: voiceless alveolar dental /θ/, its voiced counterpart /ð/, voiceless alveolar plosive /t/ by the voiced alveolar fricative /z/; the voiced alveolar plosive /d/ by its voiceless counterpart /t/ and the voiceless alveolar plosive /k/ by its voiced counterpart /g/.

These kind of phoneme substitutions can be explained using Dell's (1986) activation-spreading model as quoted by Levelt (1989:352-359). Using an example from the table where

Mr. I substituted the voiceless alveolar plosive /k/ with its voiced counterpart /g/ in the word *sixty* to produce it as *sigsty* (table 2 no. 8) the intruding phoneme /g/ shares the distinctive features of place and manner of articulation with /k/. What they differ in is the voicing where /k/ is voiceless and /g/ is voiced. A shift of voicing occurred in the articulation from voiceless to voiced where voicing was anticipated in the subsequent node for the vowel /i/ which is naturally voiced. Since activation of nodes at any given time is simultaneous, the nodes for the feature voicing were primed and spread its activation to /k/ resulting in its voicing to produce /g/. This observation is in tandem with what Dell found out that "an intrusion will be similar in target." In this case /g/ is similar in target with /k/ except for the feature voicing.

Let's look at another example where phonemes were substituted.

Example 4.65 [reading]

Subject's utterance: Iz iz all lies.

Target utterance: It is all lies.

In this utterance, Mr. I substituted the phoneme /t/ with /z/ in *it* to articulate *it* as *iz.* This kind of phoneme error is called an anticipatory error where Mr. I anticipated the articulation of the voiced alveolar fricative in the word *is* /ɪz/. The phoneme /t/ in *it* is activated with the distinctive features voiceless alveolar plosive whereas /z/ is activated with the distinctive features voiced alveolar plosive. /t/ is the coda of the word *it* articulated which was articulated as *iz* whereas /z/ is the coda of the word *is,* there is anticipation of voicing and the manner of articulation of the coda in *is* which resulted in the substitution of the coda in the word *it* (articulated as *iz* by the subject). This is so because these two distinctive features (voicing and manner) are more primed at the time of articulation.

2.1.4 Addition of phonemes

The voiceless glottal fricative /h/ was added in Mr. I's spontaneous speech as well as in reading.

Example 5: All the instances (in the extracts in the appendix) where the voiceless glottal fricative /h/ was added in spontaneous speech and reading exerciseare exemplified in table 3 below.

Table 3: The phoneme /h/ added

No	word	Target word	No of times /h/ was added	Occurring in utterances
1	Haccent	Accent	1	1
2	Whould	Would	2	30, 45
3	Hus	Us	1	62
4	Hanimal	Animal	9	62
5	Hour	Our	3	62, 64
6	Habove	Above	1	64
7	His	Is	1	62
8	Whild	Wild	1	67
9	Hevery	Every	1	63
Total			20	

Mr. I added the voiceless glottal fricative /h/ in select words as seen in table 3. He added the phoneme /h/ word initially in the following words: *accent* which was produced as *haccent*, *us* articulated as *hus*, *animal* was articulated as *hanimal* and *above* as *habove*. The words *is* and

every were produced as *his* and *hevery* respectively. Word medial, Mr. I added /h/ to the words *would* and *wild* which were articulated as *whould* and *whild* respectively.

2.1.5 Vowel Lengthening

Example 6: Mr. I exhibited vowel lengthening in his spontaneous speech but not in reading as seen in table 5.

Table 4: Vowel lengthening

No	Word	Vowel(s) lengthened	No of times vowel was lengthened	Occurring in utterances
1	Well	/e/	8	5, 16, 18, 24, 29, 41, 43, 52
2	Loresho	/ɔ:/, /e:/	2	2
3	Groove	/u/	2	2
4	Five	/ɪ:/	1	10
5	House	/ʊ:/	1	10
6	Slowed	/əʊ:/	1	29
7	After	/a::/	2	14
Totals			17	

From table 4 Mr. I lengthenedall the vowels in the word *Loresho* which was articulated as /lɔ:re:ʃɔ:/. The lengthened vowels /ɔ/ open, back, low vowel and /e/ close, front, high vowel are both proceeded by consonants and /e/ was also lengthened in the word *well*. The word

groove /gru::v/ was uttered with a super lengthened /u::/ close, back, high vowel. The vowels in the words *five /fɑɪv/* /ɪ:/ close, front, high vowel and *house /hɑʊs/* /ʊ:/ close, back, high vowel were both articulated with lengthened vowels. The word *slowed /slәʊd/* was articulated with a lengthened diphthong */әʊ:/.* The word *after /a::ftә/* was pronounced with a super lengthened /a::/

Let's consider the following example.

Example 7.29: [spontaneous speech]

Subject's utterance …umh… for a long time after the stroke I felt I was thinking through cotton wool so that everything was slowed up …

In this utterance, Mr. I articulated *slowed /slәʊd/* as */slәʊ:d/.* The vowel */әʊ:/* preceding the voiced alveolar plosive /d/ was been lengthened. Recall that in phoneme substitutions shown in table 2 Mr. I had instances where /d/ was substituted by the voiced alveolar fricative /z/ and the voiceless alveolar plosive /t/. Although Dell's (1986) activation spreading theory as quoted by Levelt (1989:352) does not give an insight as to how and why vowels get lengthened in words that normally do not have lengthened vowels, Ohman (1966) as quoted by Perkell (1968:62) gives the concept of "separate vowel-producing and consonant-producing function in speech production and states that the production of the vowels and the apical and dorsal consonants involve the activity in the three (probably partly overlapping) sets of muscles. These sets have separate neural representation in the motor networks of the speaker's brain. Articulatory commands may be transmitted over the three neural control channels independently of each other. However, the dynamic response of the tongue to a compound

instruction is a complex summation (neural, muscular, and probably mechanical also) of the responses to each of the components of the instruction."

Perkell (1968:62) adds that "the articulation of vowels is accomplished principally by the larger, slower extrinsic tongue musculature which controls tongue position. On the other hand, consonant articulation requires the addition of the precise, more complex and faster function of the smaller, intrinsic tongue musculature."

In vowel lengthening, Mr. I probably lengthened the vowels and diphthongs as a compensatory mechanism so as to achieve the precise articulation of the consonants given that some of the consonants involved in the lengthened words are the same phonemes he tended to substituteas shown in phoneme substitutions in tables 1 and 3 above and illustrated with example 7.29.

2.1.6 Summary

Table 5: Mr. I's pronunciation patterns

Type of error	Total errors	Proportion of the errors	Percentage
Substitution	48	48/85	56.47%
Additions	20	20/85	23.52%
Vowel lengthening	17	17/85	20%
Totals	85	85	100%

From the various observations discussed in this chapter, it is evident that Mr. I's pronunciations were characterized by phoneme substitutions and additions as well as vowel lengthening. Table 5 shows that Mr. I's language had more phoneme substitutions at 56.47%

whereas additions were 23.52% and vowel lengthening stood at 20%. Noteworthy was the substitution of various phonemes by the voiced alveolar fricative /z/ which gave Mr. I a buzz-like speech as its articulation was done with prominence. This buzz-like speech also influenced words that naturally havethe voiced alveolar fricative /z/ such as *houses* and *is* in extracts 10, 61, 25 and 29 whose articulation was produced with a prolonged /z/ making this phoneme quite prominent in the subject's speech.

CHAPTER 3:

THE EFFECTS OF EARLY DEMENTIA OF ALZHEIMER'S TYPE ON MR. I's LEXIS AND MORPHOLOGY

This chapter presents the effects of early dementia of Alzheimer's type on Mr. I's ability to retrieve lexical items and to use inflectional morphemes. The chapter also presents neologisms in Mr. I's speech.

3.1 Lexical retrieval

3.1.1 Word finding difficulties

"Anomia (word finding difficulties) is the earliest and most common language symptom of DAT (dementia of the Alzheimer type). Patients have difficulty coming up with words in structured tasks such as word list generation as well as in elicited narratives and spontaneous conversation", Kempler (1991:98 &101).

Mr. I's spontaneous speech had manifestations of word finding difficulties as shown on table six. These difficulties were manifested by the use of fillers, vocalized space fillers, repetitions of words and empty pauses.

Table 6: Manifestations of word finding difficulties in Mr. I's speech

No	Type of word finding difficulty	Approximate No. of times repeated	Total	Percentage
1	Fillers (Umh, uh, tsh, agh, eeh)	83	83/255	32.5%
2	Vocalized space fillers	9	9/255	3.52%
3	Repetitions	20	20/255	7.8%
4	Empty pauses	143	143/255	56%
Totals		255		100%

3.1.1.1 Fillers

Mr. I's spontaneous speech exhibited word finding difficulties which were occasioned by fillers. The notion of fillers encompasses filled pauses of empty words such as: *uh, umh, tsh, egh, eee, agh* which Mr. I used at a rate of 32.5% relative to the other types of word finding difficulties.

Consider the following examples:

Example 1.41: [spontaneous speech]

Subject: Well … I haven't … I haven't written …umh… since I had the the stroke and recovered from that …umh…agh…. I have written about ten chapters of the second novel ….umh….but I've sort of left it at that ..umh…umh….the ideas for the book don't seem to come ….umh… as …. as…they did before.

In this example, Mr. I used the fillers *umh* (six times) and *agh* (once). The example also shows that the use of fillers is spread throughout within the utterance. The fillers characteristically came before:

a) Conjunctions – *since, but* and *as*

b) Personal pronoun – *I*

c) Determiner –*the*

In another example (2.13) Mr. I used the filler *uh* at the beginning of an utterance. This filler *uh* came before the personal pronoun *I.*

Example 2.13 [spontaneous speech]

Subject's utterance: Uh … uh … uh …. I uh … I didn't enjoy school, certainly to begin with, because I crack this arm playing rugby and umh …. I couldn't use the arm at all.

These cited examplesexemplify word finding difficulty for function words. Moreover, the fillers characteristically appeared between silent pauses (indicated by dots each dot corresponds to a second) ranging from three seconds and above. Radford et al (2009:205) mentions "English-speaking agrammatics who omit many function words" even though Mr. I's spontaneous speech did not elicit omission of function words in this extract, at early stages of Alzheimer's disease it is plausible that he had started having difficulties in the lexical representation accessing these functional words as indicated by the delay in articulating them.

A point to note is that in reading, Mr. I tended to omit the same words that characteristically followed the fillers. He from time to time omitted the following words in his reading: *his, the, it, had* and *a*. In the example 3.61 below there is omission of the personal pronoun *his* in the subject's utterance.

Example 3.61 [reading]

Subject's utterance: With the ring of light from lantern dancing from side to side, he lurched across the yard.

Target utterance: With the ring of light from his lantern dancing from side to side, he lurched across the yard.

And in yet another example (4.60), Mr. I deleted *it* as shown below.

Example 4.60 [reading]

Subject's utterance: He seldom talked, and when he did was usually to make some cynical remark.

Target utterance: He seldom talked and when he did it was usually to make some cynical remark.

In comparison with other fillers that Mr. I used in his spontaneous speech, the *umh* was used more at 73.4% relative to other fillers used in his spontaneous speechas seen in table7:

Table 7: Fillers

No	Filler	Approximate No. of times repeated	Total	Percentage
1	umh	61	61/83	73.4%
2	uh	8	8/83	9.6%
3	eeh	5	5/83	6.0%
4	agh	8	8/83	9.6%
5	tsh	4	4/83	4.8%
Totals		83		100%

Clark and Fox Tree (2002:103), as quoted by Corley and Stewart (2008:5) say that "fillers conform to the 'phonology, prosody, syntax, semantics and pragmatics of English words'. They can be used to transmit a variety of interpersonal messages, such as 'speakers want to keep the floor', and should therefore be considered members of the word class of interjections, like, ah and oh. Moreover, Clark and Fox Tree agree that the 'um' and 'uh' serve different

functions: um is used when the speaker is having greater difficulty than uh". *Umh* was used more frequently in Mr. I's speech at 73.4% relative to the other fillers used indicating word finding difficulties.

3.1.1.2 Vocalized space fillers

Vocalized space fillers are word finding difficulties such as: well, as, you know etc. Mr. I used the following vocalized space fillers: *well*, *okay*, and *I suppose so*. The use of these vocalized space fillers had an overall percentage of 3.52%compared to other vocalized space fillers.

Example 5.24: [spontaneous speech]

Subject's utterance: Well …..umh.…tsh….there was less money in chemistry …tsh…umh….the only chemistry job was senior assistant research worker.

Mr. I used vocalized space fillers in the beginning of the utterances and in this instance used *well*. These, were usually followed by silent pauses (indicated by dots each dot corresponds to a second) and by fillers such as *umh* and *tsh.*

Connell and Kuwal (1982:460) say that "filled pauses do indeed characterize spontaneous spoken discourse quite ubiquitously. They vary in duration and frequency from individual to individual and in various genres of speech. Typically, they are monosyllabic; they occur more frequently than silent pauses. Functionally, they have been analyzed clinically as indicators of emotional disturbance (e.g., Mahl, 1954), psychologically as indicators of 'preparedness problems'(e.g., Clark & Fox Tree, 2002, p.98), and sociolinguistically as indicators of turn protection (e.g., Maclay & Osgood, 1959, p.41)". In this context, Mr. I used vocalized space

fillers such as *well* and *I suppose so* to compensate for the word searching difficulties he experienced before the anticipated flow of words resumed.

"Although fillers in general create disfluencies in conversations they rarely complicate understanding for a devoted listener, they do hamper the natural flow of a conversation making it monotonous as the vocalized space fillers are repetitive" Johnson and Lease (2006: 74).

3.1.1.3 Repetitions

Corley and Stewart (2008:4) say that "the increase in repetitions can be explained by Blackmer and Milton's (1991) 'autonomous restart capacity': if the cognitive processes that result in a phonetic plan fail to keep up with articulation, the articulation of the existing phonetic plan is restarted, causing words to be articulated more than once."

Mr. I's language showed repetitions of phrases and function words.

a) Repetition of phrases

Example 6.40 [spontaneous speech]

Subject's utterance: Well … I haven't … I haven't written … umh … since I had the the stroke and recovered from that … umh … agh …. I have written about ten chapters.

In the example above, Mr. I used a vocalized space filler *well,* had empty pauses as indicated Bythe use dots (each dot corresponds to a second) and repeated the phrase *I haven't* and the determiner *the* twice. The fillers *umh* and *agh* were also used.

b) Repetition of function words

i) Determiner *the*

In other instances Mr. I repeated the determiner *the* as *th* as seen in the extract below.

Example7.43 [spontaneous speech]

Subject's utterance: Well yes …umh….it was easier … not bothered ……..the first book was easy to do ….umh…th…th… it flowed naturally.

In this example, Mr. I exhibited word finding difficulties with repetitions of the non word *th* which was repeated twice. According to the context, the subject was searching for the word *ideas* to show that the ideas of the first book flowed naturally and when the word was not forthcoming, he used the dummy *it* to refer to the word he had difficulty accessing but did not articulate the supposed word.

ii) Conjunctions

Example 8.41 [spontaneous speech]

Subject's utterance: umh….but I've sort of left it at that ..umh…umh….the ideas for the book don't seem to come ….umh… as … as … they did before.

Target utterance: but I've

In the above example, the conjunction *as* is repeated twice.

Example 9.51 [spontaneous speech]

Subject's utterance: …which I take once a week which is supposed to be good for osteoporosis so I …umh….haven't…umh… driven since since I broke my arm.

Target utterance: …which I take once a week which is supposed to be good for osteoporosis so I haven't driven since I broke my arm.

This example shows that the conjunction since too was repeated twice in the subject's spontaneous speech.

3.1.1.4 Empty pauses

An empty pause is a silent interval in a subject's spontaneous speech. Mr. I evidenced substantial word finding difficulties manifested by empty pauses as seen in table 6 whose percentage stood at 56% relative to other word finding manifestations. The duration of the empty pauses ranged from three seconds to ten seconds and were repetitive in an utterance. These pauses are indicated as dots in the subject's utterance and as slashes in the appendix.

Example 10.13: [spontaneous speech]

Subject's utterance: Uh …. uh… uh …. I uh … I didn't enjoy school, certainly to begin with, because I crackthis arm playing rugby and umh…

Target utterance: Ididn't enjoy school, certainly to begin with, because I cracked this arm playing rugby and …

Mr. I's spontaneous speech had empty pauses spread throughout his utterances and characteristically the empty pauses were mostly between fillers as seen in the example above. Empty pauses are a characteristic of word finding difficulty.

"Sandson et al (1987:266–277) point out that "the inability to name objects or actions to command is a conspicuous early symptom of SDAT (senile dementia of the Alzheimer type) and that naming errors are attributable not to perceptual distortion but to difficulty with lexical access or retrieval. Language changes in the early and moderate stages of SDAT are most likely to be manifest in tasks of naming. Naming difficulties may also be manifest in spontaneous speech that, although still informative, is characterized by pauses, occasional word substitutions, digressions, and wordiness."

3.1.2 Deletionof Inflectional Morphemes

The morphs that mark English regular past tense are /-ɪd/, /-d/ and /-t/. Katamba and Stonham (2006:26) illustrate that "/-ɪd/ is realized if the verb ends in /d/ or /t/ whereas /-d/ is realized after a verb ending in any voiced sound except /d/ while /-t/ after a verb ending in any voiceless consonant other than /t/.

In his spontaneous speech and reading, Mr. I deleted the past tense morpheme markers and the progressive marker -ing. See table 8.

Table 8: Deletion of tense inflections

No	Inflection deleted	No. of times deleted	Deleted in the words	Occurring in utterances	Total	Percentage
1	/-ɪd/	2	Interested, started	32, 38	2/15	13.3%
2	/-d/	5	Managed, summed, banned	49, 56,63	5/15	33.3%
3	/-t/	3	Parked, slipped, stopped	49, 51, 60	3/15	20%
4	-ing	5	Being, concentrating listening, looking, standing	22, 29, 38, 60	5/15	33.3%
Totals		15				100%

3.1.2.1 Deletion of the past tense morphs

a) **The morph /ɪd/**

From table 8, Mr. I produced 13.3% errors in marking past tense in words involving the past tense morph marker /ɪd/ relative to other inflections deleted. This was evidenced in the words: *interested, and started,* which were produced as *interest and start* respectively as seen in the following example.

Example 11.38 [spontaneous speech]

Subject's utterance: I wanted to add to the conversation, by the time I had start speaking, the moment had gone so that I was slow to contribute really, initially.

Target utterance: I wanted to add to the conversation, by the time I had started speaking, the moment had gone so that I was slow to contribute really, initially.

This sentence is obviously in the past tense but Mr. I deleted the past tense marker in the word *started* to produce it as *start*.

b) **The morph /d/**

This morph was deleted in the words *managed*, *summed* and *banned* which were produced as *manage, sum and ban* respectively with a 33.3% frequency compared to the other inflection deletions. Consider the following example where the word *banned* was produced as *ban*.

Example 12.56 [spontaneous speech]

Subject's utterance: He was prime minister at the time and he ban pistol shooting which I used to do.

Target utterance: He was prime minister at the time and he banned pistol shooting which I used to do.

c) **The morph /t/**

Deletion of the morph /t/ was evidenced in the words *parked*, *slipped,* and *stopped* which were articulated as *park, slip* and *stop* respectively with the past tense morph /t/ being deleted at 20% relative to other inflection deletions. In the example below *parked* was produced as *park* where the morph /t/ was deleted in the utterance even though the entire sentence was in the past tense.

Example 13.49 [spontaneous speech]

Subject's utterance: There was a polize check point and there were two buses park right on the other side of the road both facing Nairobi.

Target utterance: There was a police check point and there were two buses parked right on the other side of the road both facing Nairobi.

Mr. I deleted the past tense morphs /ɪd/, /d/ and /t/. If we consider his pronunciation patterns which were discussed in chapter two where he tended to substitute the phonemes /t/ and /d/ with /z/, we realize that these same phonemes as past tense morpheme markers were not substituted but deleted in his language.

Going by Dell's (1986) activation-spreading theory as explained by Levelt (1989:352) which does not give an account on deletions of morphemes, one can postulate that the deletion of inflectional morphemes occurs at the phonological stratum. This is because at the morphological level words (root) and affixes are primed which spread their activation to

syllables and phonemes at the phonological level. Taking an example from example 13.49 in the word *parked* which was produced as *park,* this root (*park*) is selected as a current node. It spreads its activation to the syllable node where /p/ is activated, and the rime node which activates /a:k/. This rime node further activates the nucleus node /a:/ and the coda node /k/. These nodes (onset, nuclei and coda) spread their activation to their distinctive feature nodes. Missing is the activation of the past tense morph /t/ syllable at the phonological level. This shows that there is a failure in the process of mapping from the morphological level to the phonological level resulting in deletion of morphemes as exemplified in figure 3(note that at the syllable node the affix is missing shown by a question mark (?)) which is in tandem with what Schwartz et al (2004:159) found that " a key assumption to the Dell family of naming models, and all models that share its properties, is that normal and aphasic naming errors arise from selection of incorrect units in the lexical framework and that errors can result from a malfunction somewhere in the process of mapping from a lexical representation to a fully specified phonological representation." Mr. I's deletions of inflectional morphemes seem to emanate from deletions at the phonological level.

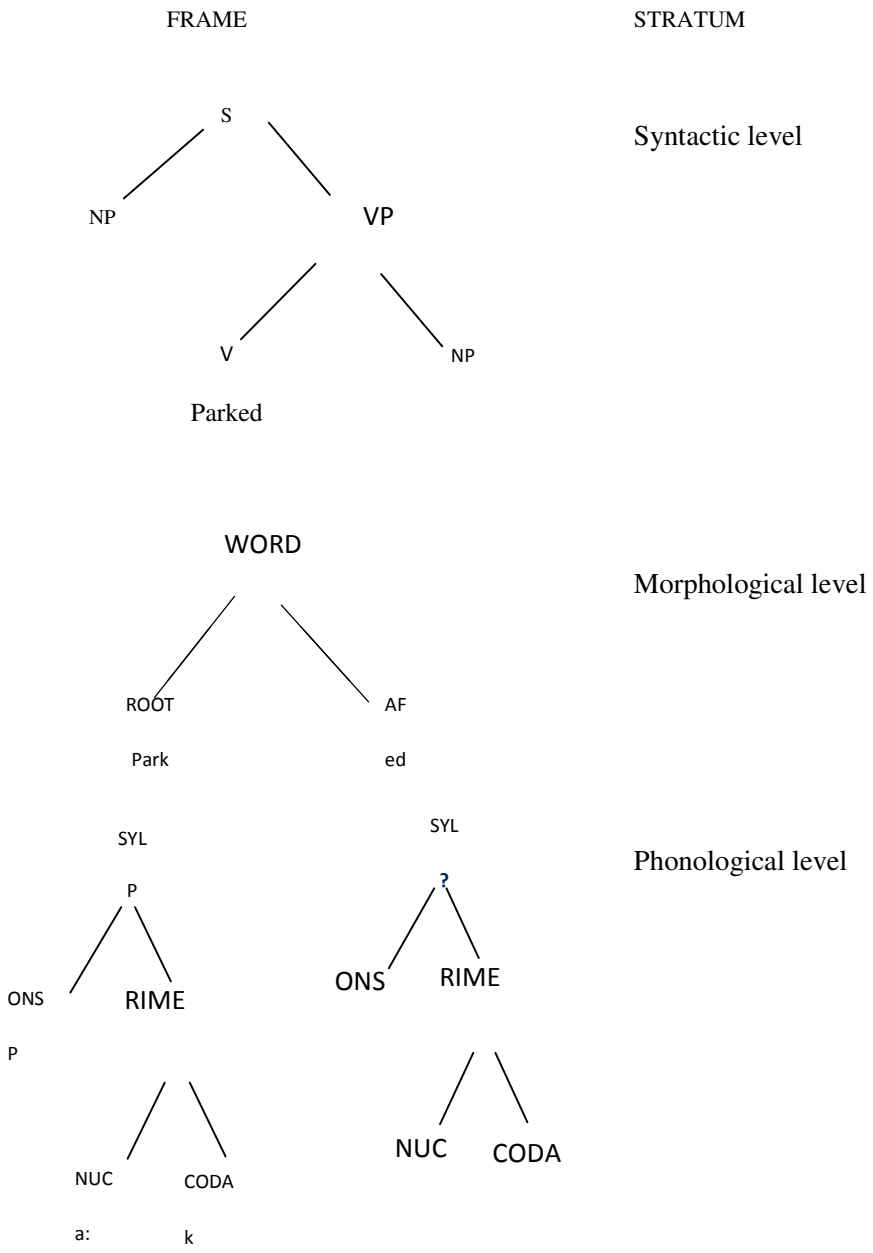

Figure 3: Example of deletion of the morph /t/ at the phonological level

3.1.2.2 Deletion of the progressive marker -ing

The English progressive marker -in expresses the relationship between the time an utterance is spoken and the time of the event. This marker was deleted at a rate of 33.3% in comparison with other inflection deletions in the following words in Mr. I's language: *looking, standing, being, concentrating* and *listening* which were produced as *look, stand, be, concentrate* and *listen* respectively.

Example 14.29 [spontaneous speech]

Subject's utterance: I start writing when I had my first stoke ….umh…ah ..it was difficult concentrate at that time.

Target utterance: I started writing when I had my first stroke …. umh … ah .. it was difficult concentrating at that time.

In this example, the subject deleted the past tense morpheme marker /ɪd/ in the word *started* and the progressive marker /ing/ in the word *concentrating*.

This deletion of the progressive marker –ing too can be explained as a failure in the mapping from the morphological stratum to the phonological stratum where the affix (progressive marker) in the word *concentrating* was not activated and thus did not spread its activation to the syllable node in the phonological stratum. This then meant that it could not be articulated.

3.1.3 Neologisms

Akmajian et al (2001:25) define neologism as the creation of new words by speakers using various processes such as coinages, acronyms, clippings, blends etc. In Mr. I's language neologisms came about as a result of clippings and blends.

3.1.3.1 Clipping of words

"Clipping is the shortening of a word by dropping or 'clipping' one or more syllables, usually removing the end of the word, but sometimes the beginning or both the beginning and ending together" Crystal (2008:80).

See example15.50 where end of the word was clipped which resulted in a non-word *o*in the subject's language. The word *other* was reduced to *o.* The clipped word *other* here is an adjective.

Example 15.50 [spontaneous speech]

Subject's utterance: …and so some o things which I take once a week…

Target utterance: …and so some other things which I take once a week …

In yet another example (16.60) the subject clipped the end of the word *Manor* a noun articulating is as *Ma*.

Example 16.60 [reading extract]

Subject's utterance: Mr. Jones of the Man Farm, had locked the hen-houses for the night...

Target utterance: Mr. Jones of the Manor Farm, had locked the hen-houses for the night…

The examples cited above show that the clipped words were content words.

3.1.4 Blending of words

Blending according to Akmajian et al (2001:573) is "the process of creating a new word from existing words typically by combining the beginning of one word with the end of another".

Richard and Schmidt (2010:58) define blending as a "process of word formation by which new words are formed from the beginning (usually of the first phoneme or syllable) of one word and the ending (often the rhyme) of another.

Example 17.60 [reading]

Subject's utterance: …iz iz zabo ziz….

Target utterance: …it is about this …

The word *about* was produced as a non word *zabo*. Its articulation was affected by the preceding words *it is* articulated as *iz iz* where the last phoneme /z/ was carried to the word *about*. The final phoneme /t/ in the word *about* was clipped, resulting in the non word *zabo.* In this context, *zabo* (about) was used as a preposition.

Using Dell's (1986) Activation-Spreading theory as quoted by Levelt (1989:357) the following occurred in example 17.60:

a) Phoneme substitutions
b) Misselection
c) Checkoff failure
d) Clipping

In anticipation of the voiced alveolar fricative /z/ in the coda node in the word *is* /*iz*/ Mr. I articulated the word *it* as *iz* where the voiceless alveolar plosive /t/ in the coda node of *it* was substituted by /z/ in the coda node of *is*. This substitution was affected by the distinctive features voicing and manner of articulation. These two distinctive features were more primed. Their activation did not reset back to zero.

The articulation of the word about as zabo was as a result of misselection and checkoff failure. At the syllable node, *is* was primed and spread its activation to the rime node where /i/ spread its activation to the nuclei node and /z/ to the coda node. The activation of /z/ did not reset to zero as is required and as such /z/ remained available as a filler. This is a checkoff failure. There is a constraint in the activation and spreading of a phoneme, activation must reset back to zero. Since at the phonological strata the syllable slots are filled in serial order from left to right and the voiced alveolar fricative /z/ in the coda node of the word *is* did not reset back to zero, it became a misplaced filler. This misplaced filler was also misselected and attached to the word *about*. When at the morphological level about became a current node, it was activated and spread its activation to the phonological nodes: onset, nuclei and coda. A malfunction happened here where the coda in the word /t/ failed to spread its activation to the distinctive feature node and was clipped. Since there was a misplaced filler /z/ it was attached to the clipped word resulting in the production of the word *about* as *zabo*.

In the word *this* articulated as *ziz* by Mr. I. There were two phoneme substitutions. The voiced dental fricative/ð/ and the voiceless alveolar fricative /s/ were substituted by the voiced alveolar fricative /z/. This substitution can be explained as a repeated phoneme error where the voiced alveolar fricative was primed in the words (*iz iz zabo*) preceding *this* (articulated as *ziz*) where voicing and the place of articulation (alveolar) were more primed thus affecting the articulation of /ð/ at the onset node whose place of articulation (dental) was substituted with the place of articulation alveolar to become /z/ and at the coda node /s/ became voiced and was articulated as /z/. This is the repeated phoneme effect where one phoneme is repeated many times due to its distinctive feature components differing with the phoneme it substitutes with a mere distinguishing feature. Schwartz et al (2004: 159-186) say that "the sole

mechanism for aphasic phonological non word errors is faulty selection at the phoneme level of the lexical network. All non-word errors are assumed to arise from incorrect selection of the target's phonemes."

Since neologisms are new words created from existing words, they tend to conform to the morphology and phonology of the language from which they are created. In clipping, Mr. I created the words *o* and *ma.* The invented word *o* is plausible in English conforming to the word class of interjections such as *oh* and *ah* while *man* created from *Manor* is an existing word in English. In blends the word *zabo* too is plausible just as a word such as *taboo* exists in English. This shows that in creating new words, Mr. I created words that are plausible in his native language English.

CHAPTER FOUR: GENERAL CONCLUSION

5.1 Summary of the findings

This study investigated the effects of early Alzheimer's disease on a recovering aphasic's language, Mr. I. It sought to identify and discuss how the pronunciation patterns of Mr. I had been affected by early dementia of Alzheimer's type. The study also wanted to establish and evaluate the extent to which the grammar of the subject had been affected by early dementia of Alzheimer's type. The study sought to analyze the extent to which Mr. I's discourse had been affected by early dementia of Alzheimer's type.

In the first objective, the pronunciation patterns of Mr. I were characterized by phoneme substitutions and additions and vowel lengthening. In phoneme substitution, the phoneme /s/ voiceless alveolar fricative was substituted bythe voiced alveolar fricative /z/ word initial, medial and final. The phonemes: voiceless dental fricative /θ/, voiced dental fricative /ð/ and voiceless alveolar plosive /t/ were also substituted by the voiced alveolar fricative /z/. It was also apparent that the voiceless velar plosive /k/ was substituted by its voiced counterpart /g/. It was evident that the phoneme /h/ voiceless velar fricative was added word initial and medial in Mr. I's pronunciation patterns. Vowel lengthening was also evidenced in various words in the subject's language. In pronunciation patterns, Mr. I made more phoneme substitutions at 56.47% compared to phoneme additions which stood at 23.52% and vowel lengthening at 20%. Dells Activation-Spreading theory showed that the phoneme substitutions were attributed to phonemic similarity which enhanced the likelihood of the intruding phonemes being similar to the targets.

The findings of the second objective showed that the grammar of the subject was characterized by word finding difficulties, deletions in inflectional morphemes and

neologisms. Word finding difficulties were evident in the subject's language. These were manifested by use of fillers, vocalized space fillers, repetitions and empty pauses. The empty pauses had the highest frequency at 56% relative to the other types of word finding difficulties. Furthermore, the filler *umh* which denotes greater difficulty in word finding in relation to other fillers occurred more frequently at 73.4% relative to the other types of fillers used. The study found out that the English past tense makers the morphs /ɪd/, /d/ and /t/ and the progressive marker –ing were deleted in the subject's language with the morph /d/ being deleted the most at a rate of 33.3% compared to the other morphs while the progressive marker was also deleted at a rate of 33.3%. These deletions in Activation-Spreading theory were noted to result from a malfunction somewhere in the mapping from a lexical representation to a fully specified phonological representation. Neologisms were created in Mr. I's language resulting from clippings and blends. In neologisms Mr. I created words plausible in his native language.

5.2 Limitations

The study had intended to study Mr. I's discourse patterns and establish if these would be manifested with emptiness and lack of topic maintenance. This was to be studied in a social context but,in the event the opportunities for these were limited and could not generate enough data for the study.

5.3 Suggestions for further research

The study recommends that continued research be carried out in other aspects of the language not studied here for instance syntax, semantics and pragmatics to find out how these too have been affected by early dementia of Alzheimer's disease. Furthermore, a continuation of this

research is highly recommended to find out how the linguistic segments are affected in the subject's language in future at different stages of DAT. It would also be of great interest to compare the language of a normal aging subject with that of Mr. I on the effects of DAT on all aspects of linguistic segments.

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Appendix: Transcription of the Researcher's Conversations with Mr. I, the Subject.

(Note: The Researcher is R, while Mr. I is S. The * denotes a string of words that could not be deciphered)

Extract No. 1. [(Telephone conversation one and two)]

1. R: Could you please give me your physical address

2. S: …I live on six Loresho Groove…

3 S: …She is fine she is at work she's got a few problems with ze ztatistics which were supposed…

Extract No. 2 [childhood memories, education and career]

4. R: Tell me about your childhood memories.

5. S: Well / / / / I was born in Cheshire which is north west near Manchester / / / umh/ / / I went to school in Yorkshire, university at Oxford and then I went and lived in London.

6. R: Which accent do you speak?

7. S: I don't really have an haccent as such. I mean / / / / you can put **** umh / / / / Normally / / / / umh / / / I speak BBC standard English.

8. R: Give me an insight into your childhood memories.

9. S: Umh / / / / well / / / my earliest memory is tigging holes in the garden and with a view to people falling in them which was absolotely nice.

10. When I was five / / / we moved house/ / / / umh / / / from / / / / a plaze called Haayo to a plaze called Bouldton which was / / / /Bouldton was up the hill and / / / tsh / / / / umh / / / we continued to live in Bouldton in / / / umh / / / / well two houzes until my parents moved to Shropshire in 1974 / / / and / / / umh / / / / / / / /

11. Did you school there?

12. S: I went away to to school at the age of fourteen in nineteen sigsty two to to Yorkshire and / / / / / umh / / / it was a boarding school. Previously I had been enrolled in a primary school ****. Umh / / / everybody else in this school was a boy it was a single sex school came from Yorkshire. At that time Yorkshire / / / / umh / / / / had won the country cricket championship for several years / / / / umh / / / this will be what nineteen / / / / / in the early sigsties.

13. S: Uh / / / uh / / / uh / / / / I uh / / / I didn't enjoy school, certainly to begin with, because I crack this arm playing rugby and umh/ / / I couldn't use the arm at all, so I was one armed and of course boys being boys being cruel / / / / tsh / / /umh / / / made fun of me because I didn't have one arm at the time. So/ / / uh / / /my performance fell off / / / umh / / / in the monthly marks / / /umh / / / / turing my first term and / / / umh/// it was only when the exams came in the end of the term that I shot up to fifth in the form and there were about zirty boys in ze form.

14. S: After / / / / / after that / / / umh / / / I / / / umh / / / I went into the science side of things / / / umh / / / and eventually I went to to university to Oxford to read chemistry. My grandfather was a / / / umh / / / a doctor of chemistry from Glasgow

University and he also taught chemistry in China in the early years of the last century / / / umh / / / eeh / / / so chemistry runs in the family az it were / / / / umh.

15. R: Is that maybe what inspired you to do chemistry?

16. S: Well I was / / / I was best at chemistry / / / umh / / / so it seemed logical that I should go and read that at the university. Besides chemistry was a four year course and most other course subjects were three year courses.

17. R: So it was challenging?

18. S: Well / / / I just wanted to be a student for as long as possible! (humorous)

19. R: You must have enjoyed Oxford

20. S: It was a great place for university/ / /umh / / / I didn't do a great deal of work. Yes it was enjoyable.

21. R: It comes with prestige, it is one of the best universities in the world.

22. S: Yes, I suppose so / / / umh / / / uh / / / but / / / / / / / / while I was there someday when I read through a paper that because we'd gone to Oxford we were the top one to sent in the entire gen youth of our generation. My thought was * * * *go to hell with be ze besht.

23. R: What made you move from chemistry to Accountancy.

24. S: Well / / / //umh / / / / tsh / / / / there was less money in chemistry / / / tsh / / / umh / / / / the only chemistry job was senior assistant research worker into water pollution control chemistry * * * * so I made sure I didn't get that job cause well it

isn't a pleasant place to be so I decided I didn't want that job and / / / umh / / / there was ziz zertain amount of pressure from home, I should desire on a career and apply myself to it. So / / / umh / / / /my, both, my father and grandfather were solicitors and because I was fairly mathematical I opted for accountancy which have the prospects of huge money is this.

Extract No. 3 [On a discussion about women's' employment]

25. S: I think there iz a great difference in attitude between the UK and Kenya / / / / umh / / / with regard to to women's employment / / umh / / / many women in the UK earn very good salaries and are the main bread winners for their families.

26. R: Context is different

27. S: Yes

Extract No. 4: [Writing as a hobby]

28. R: Tell me about your science fiction writing.

29. S: Well, I've written / / / umh / / / a novel which izn't published yet. I start writing when I had my first stoke / / / / umh / / / ah / / it was difficult concentrat at that time, and also / / / / umh / / / for a long time after the stroke I felt I was thinking through cotton wool so that everything was slowed up ****.

30 S: Umh / / / / I read so many book, science fiction, and otherwise in my life, that I thought that I hould be able to write a better book than the ones I had read. So I sat down / / /ah / / / wrote a book. It took me / / what/ / / about a months / / working most days / / / but / / umh / / / agh/ / / / nobody seem to want to publish it.

31. R: Here in Kenya?

32. S: I haven't tried in Kenya, but I tried / / / egh / / / in the UK / / / / / / / / / / tsh / / / / well // I don't know. I sent the synopsis of the book on the first couple of chapters to various agencies and publishers nobody seemed interest. I gave the book to various friends after I had written it and they said it was good.

33. R: Did it assist you in recovering your language?

34. S: Eee / / / umh / / / not really / / / / I / / I / / don't think when I had the stroke I lost any memories / / / umh / / / of course I wouldn't know if I had lost them. But everything seemed to be there that was there before.

35. R: So you didn't have a problem searching for specific words?

36. S: I have physical problems to start with about speaking.

37. R: It is more of a psychomotor issue?

38. S: I also found initially that / / / umh / / / that if I was listen to a conversation, I wanted to add to the conversation, by the time I had start speaking, the moment had gone so that I was slow to contribute really, initially.

39. S: Slows down your thought processes, and then you've got to think about / / / umh / / / actually speaking and what you want to say.

40. R: Are you still writing?

41. S: Well / / / I haven't / / / I haven't written / / / umh / / / since I had the the stroke and recovered from that / / / umh / / / agh / / / I have written about ten chapters of the

second novel / / / umh / / / / but I've sort of left it at that / / umh / / / umh / / / / the ideas for the book don't seem to come / / / / umh / / / as / / / as / / /they did before.

42. R: Gap in ideas?

43. S: Well yes / / / umh / / / / it was easier / / / not bothered / / / / / / / / the first book was easy to do / / / / umh / / / th / / / th / / / it flowed naturally.

44. R: How do you find your speech overall.

45. S: Umh / / / / / I think that now my speech is okay, it's probably a bit slower than it was, the voice according to other people is a bit deeper than it was / / / umh / / / generally I make people underztand what I am saying. Umh / / / after / / / immediately after I had had the stroke, you whould have had enormous difficulty in underztanding what I was saying.

Extract No. 5 [Life in Kenya]

46. R: Are you enjoying your stay in Kenya?

47. S: Am enjoying living in Kenya / / / / umh / / / / apart from the stroke and car accident. The car accident kept me thirteen weeks in hospital / / / I was / / / / seven week in ICU and I don't remember the first 6 weeks at all.

48. R: What actually happened?

49. S: I was / / / / / I was a front passenger, we were going / / / / eh / / to Amboseli with a driver / / / / and umh / / / / near Machakos / / / / umh / / / / there was apolize check point and there were two buses park right on the other side of the road both

facing Nairobi, we were headed between the buses and a matatu came the other way and before we knew the matatu had no effort to stop. So we hit head on, and the the///Umh / / / / we were taken by bus to Machakos hospital. We were airlifted to Nairobi Hospital / / / / umh / / / and umh / / / put in ICU / / /so / / / / / / / / / / / / I think / /am fully determined / / / so I manage to pull through and / / / umh / / / and eventually I was put on a ward the day before Christmas 2011 and I was allowed home sometime in January.

50. R: You pulled through.

Extract No. 6 [About the subjects broken arm]

51. S: Last July I fell and broke my arm / / / / / we just moved into this house / / / we hadn't even moved I slip on a partly wet grass outside the front and fell on a concrete slab so the edge of ze slab hit my arm and broke it quite badly and the doctor found out that my / / / umh / / / bone quality was not good. I got / / / umh / / / something osteoporosis / / / / so I have been taking calcium tablets ever since, and so some o things which I take once a week which is supposed good for osteoporosis so I / / / umh / / / / haven't / / / umh / / / driven since since I broke my arm.

Extract No. 7 [about eye glasses and contact lenses and hobbies]

52 S: Well, I start wearing glazes when I was at school when I was fourteen. Round about the age of thirty I moved to contact lenses but then I found out that while wearing contact lenses I have to wear glazzes for an up-close view/ / / / I can read well without glazzes / / / / well / / / / / / yes glazzes can be bulky compared to contact lenses.

53 R: Tell me about your other hobbies?

54 S: Well / / / umh / / / / I do a bit of gardening / / / / umh / / I / / / / used to shoot, but that was before I came to Kenya and Tony Blair stole all my guns.

55 R: How come?

56 S: He was prime minister at the time and he ban pistol shooting which I used to do. So all my guns now reside in Belgium and I can't get at them.

57 R: Why Belgium?

58 S Because Belgium has fairly / / / umh / / / / / lax rules on gun issues unlike the UK.

59 R: Here in Kenya the rules are very strict on private guns except illegal ones.

60 S: I saw one hijacking where / / / / two guys with AK47 stop a car / / / umh / / outside / / / / PC World / / / / bundled the occupant relieved him of a huge box of cash and drove off in his car. Of course everybody who was in PC World immediately ran to the windows and look out. I hid behind the wall in case they start shooting. Well people stand againzt looking at the window can be injured by flying glass so I told them to stay clear of the windows.

Extract No. 8 [reading from Animal Farm by George Orwell]

Chapter 1

61. Subject: Mr. Jones of the Man Farm, had locked the hen-houzez for the night, but was too drunk to remember to shut the pop-holes. With the ring of light from lantern dancing from side to side, he lurched across the yard.

Az zoon az the light in the bedroom went out there was a stirring and a fluttering all through the farm buildings…

…She took a plaze near the front and began flirting her white mane, hoping to draw attention…

…Boxer was an enormous beast, nearly eighteen hands high, and az ztrong az any two ordinary horses put together…. The hens perched themselves on windowsills, pigeons fluttered up the rafters, sheep and cow lay down…

He seldom talked, and when he did was usually to make some cynical remark …

All the hanimals were now present except Moses, tame raven, who slept on a perch behind the back door. When Major saw that they all made themselves comfortable and were waiting attentively, he cleared throat and began:

"Comrades, you have heard already about the strange dream that I had last night. But I will come to the dream later. I have something else to say first. I do not think, comrades, that I shall be with you for many months longer, and before I die, I feel it my duty to pass on to you such wisdom az I have acquired. I have a long life, I have much time for thought as I lay

alone in my stall, and I think I may say that I underztand the nature of life on this earth as well as any hanimal now living, iz iz zabo ziz that I wish to speak to you.

62. Subject: "Now, comrades, what is the nature of this life of hours? Let hus face it: our lives are miserable, laborious and short. We are born, we are given just so much food az will keep the breath in our bodies, and those ov uz who are capable of it are forced to work to the last atom of hour strength; and the very instant that out usefulness has come to an end we are slaughtered with hideous cruelty. No hanimal in England knows the meaning of happiness or leisure after he iz a year old. No hanimal in England iz free. The life of an hanimal iz misery and slavery: that his the plain truth.

63. Subject: "But iz this simply part of the order of Nature? Is it because ziz land of ours iz so poor that it cannot afford a decent life to those who dwell upon it? No, comrades, a thousand times no! The soil of England is fertile, its climate is good, iz iz capable of affording food in abundance to an enormously greater number of hanimals than now inhabit it. Ziz single farm of ours would support a dozen horses, twenty cows, hundreds of sheep – and all of them living in a comfort and a dignity that are now almost beyond our imagining. Why then do we continue in this miserable condition? Becauze nearly the whole of the produce of our labour is stolen from uz by human beings. It is sum up in a single word – Man. Man is the only real enemy we have. Remove Man from the scene, and the root cause of hunger and overwork is abolished…you young porkers who are sitting in front of me, hevery one of you will scream your lives …

64. Subject: "It is not crystal clear, then, comrades, that all the evils of ziz life of ours spring from the tyranny of human beings? Only get rid of Man, and the produce of hour

labour would be hour own. Almost overnight we could become rich and free. What then must we do? Why, work night and day, body and soul, for the overthrow of the human race! That is my mezzage to you, comrades: Rebellion! I do not know when that Rebellion will come, it might be in a week or in a hundred years, but I know, as surely as I zee ziz straw beneath my feet, that sooner or later justice will be done. Fix your eyes on that, comrades, throughout the short remainder of your lives! And habove all, pass on ziz mezzage of mine to those who come after you, so that future generations shall carry on the struggle until it iz victorious.

65. Subject: "And remember, comrades, your resolution must never falter. No argument must lead you astray. Never listen when they tell you that Man and hanimals have common interest, that prosperity of the one iz ze prosperity of the others. Iz iz all lies. Man serves the interests of no creature except himself. And among uz hanimals let there be perfect unity, perfect comradeship in the struggle. All men are enemies. All hanimals are comrades."

66. Subject: At this moment there was tremendous uproar. While Major was speaking four large rats had crept out of their holes and were sitting on their hindquarters, listening to him. The dogs had suddenly caught sight of them, and it was only by a swift dash for their holes that the rats save their lives. Major raised his trotter for silence.

67. Subject: "Comrades, he said, here is point that must be settled. The whild creatures, such as rats and rabbits – are they our friends or our enemies? Let uz put it to the vote. I propose this question to the meeting: Are rats comrades?"

68. Subject: The vote was taken at once, and it was agreed by an overwhelming majority that rats were comrades. There were only four dizzentients, the three dogs and the cat, who was afterwards zizcovered to have voted on both sides. Major continued: