

DIFFERENTIAL DIAGNOSIS OF
DEMENTIA FROM APHASIA USING A LANGUAGE
TEST IN HINDI : A PILOT STUDY

Register Number M 9413

Nidhi (Mahendra)

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DEDICATED

TO MY PARENTS

To you I humbly owe what I am today
Not a volume of words would suffice to say
Of my pride and Joy in being of you
To the very end of my existence, I will love you.

CERTIFICATE

This is to certify that this dissertation entitled :
**"Differential diagnosis of dementia from aphasia using a language
test in Hindi : A pilot study"** is the bonafide work in part
fulfilment of the degree of Master of Science (Speech and
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DECLARATION

I hereby declare that this dissertation entitled :
"Differential diagnosis of dementia from aphasia using a language test in Hindi : A pilot study" is the result of my own study under the guidance of **Dr. Prathibha Karanth**, Professor and Head, Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore and has not been submitted earlier at any University for any other Diploma or Degree.

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INTRODUCTION

INTRODUCTION

"GROW OLD ALONG WITH ME!

THE BEST IS YET TO BE, THE LAST OF LIFE

FOR WHICH THE FIRST WAS MADE"

(ROBERT BROWNING)

Aging is a dynamic process that continues from conception to death and no doubt, the process of aging should be a wonderful and exciting experience but it is certainly NOT without its challenges. Before any discussion on the challenges faced by the aged population is undertaken, the current research foray into the discipline of gerontology, needs to be Justified. For this, a birds eye view of the current as well as the projected demographic trends, regarding the composition of the world's population is but essential. According to Pulkys and Gilbert ('86), projected demographic trends indicate that society at large is poised on the threshold of a significant proportional shift in the make up of its population towards that segment of people 65 years of older.

According to an official WHO presB release in 1993, India has the second largest population of the world's elderly and the rate of growth of the population aged 60 and above is greater than even the overall rate of growth of the population. The number of very old individuals (i.e. 80+) is expected to show a four-fold rise by the year 2025. This trend is true and representative not just of the Indian population but also the world population (in millions).

This dramatic rise in the percentage of elderly persons is due to partly, the accelerating rate of growth of the human population and partly due to constantly improving health care facilities which have made the longevity of human life a reality. Given this radical change in the composition of the world population, it is indeed time for us to pay greater attention to the unique problems that the geriatric population faces. The geriatric population is the one that is most affected by dementia (Bayles et al '82), as also by cerebrovascular accidents (Obler and Albert '81).

Over the past decade, dementia has come to be regarded as the "disease of the century" (Reisberg '82), being the major disorder of the geriatric group. Its heightened incidence in the geriatric group, combined with its staggering medical, social and psychological dimensions, has led to a great amount of attention to this syndrome from research groups across the world.

Dementia has also been indicated on survey studies as the major cause for institutionalization of the elderly in the United States (CENSUS BUREAU POPULATION REPORT '75) a trend which has since then only further escalated. Epidemiological data also provide empirical evidence for this projected increase in the number of geriatric individuals suffering from dementia. Given the backdrop of this statistical information, it comes as no big surprise that early identification; thorough assessment and differential diagnosis in the dementias have become the key foci of research in this area.

Before any further discussion, it is imperative to state a comprehensive definition of the term 'dementia'. As defined by Cummings and Benson ('83). 'Dementia' is a syndrome characterized by acquired, persistent impairment of several of the following neuropsychological functions :

- (1) Memory
- (2) Language
- (3) Visuo-spatial skills
- (4) Emotions or personality
- (5) Cognition (abstraction, calculation, Judgment, etc.)

Individuals suffering from dementia constitute a rather heterogeneous population, with a varying clinical picture from one individual to the next. Further, dementia may result from a wide variety of underlying causes and distinguishing between the myriad potential etiologies depends upon identifying specific areas of deficit and establishing behavioral or symptomatological profiles unique to each. Amidst this rather heterogeneous and variable clinical picture that the dementias represent; the need of the hour is to zero in on one such aspect of functioning, which is or gets affected, irrespective of the type or severity of dementia. Narrowing our attention to considering language as being such an aspect, we can see that most recent definitions of 'dementia' as a term do indicate the presence of language impairment. Current research findings have also strengthened this observation by indicating that disturbed language function is

present at all stages of most dementia syndromes (Irigaray '73; Obler and Albert '81; Bayles '82).

Since language impairment is a well-documented and consistently observed feature of dementia, the disorder has important implications for the future case loads of speech and language pathologists, working with adults suffering from other neurogenic language disorders. Regarding the question of the speech-language pathologist's role in the management of dementia patients, the answer is very much in the affirmative as the speech language pathologist is in a position to develop language testing material, which may be sensitive enough to detect dementia even in the early stages. Beyond any doubt, this could revolutionize the management of dementia cases. Moreover, a speech pathologist can further enhance diagnostic accuracy by working towards high sensitivity and specificity in the test material. Such a language tool could also be used for differential diagnosis of dementia from aphasia, on one hand and on the other hand to evaluate differences in performance on language tasks between the dementias and the normal elderly.

Such a language test material, with a dual aim of early identification of Alzheimer's disease and differential diagnosis of dementia from aphasia, could have a variety of implications and answer quite a few questions that researchers in dementia are faced with :

- (1) Providing insight into the performance of the normal elderly and the existence of an age-related decline in linguistic abilities.
- (2) Potential for identifying the linguistic level at which the speech and language deficit in dementia manifests.
- (3) Implications for the relationship between language and non-language deficits (of attention, memory, etc.) and how these may interact with each other.
- (4) Early identification of dementia and exploring the speech and language characteristics - both qualitative and quantitative in a hitherto unexplored area.
- (5) Detailed response analyses of patients with senile dementia would permit theoreticians to better conceptualize the relationship of thought to language (BAYLES and BOONE '82).

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

Over the past decade or so, there has been a burgeoning interest in researching the effects of dementia and the process of normal aging on linguistic abilities. Of late, research is focusing on the use of language tasks to differentiate between the normal elderly, dementic and aphasic populations. A look at the recent literature indeed reveals that research in aging and dementia has matured impressively in its scope, quantity and quality. In this section, an attempt will be made to review the current literature on language deficits in dementia and the application of language tasks in identifying dementia as separate from aphasia.

Dementia is a clinical state, defined as an acquired impairment of intellectual and memory functioning associated with disease of the brain, that is not accompanied by disturbances in the level of consciousness, and is often of such severity that it interferes with social or occupational functioning. Patient with dementia, have memory disturbances, as well as defects in varied mental abilities as judgment, abstract thinking, language, praxis or visual-spatial skills.

(Friedland '93)

It is but essential to trace the historical roots of the study of language dissolution in dementia and the application of

language tasks in the detection of dementia. From this point on, the discussion of dementia will move from the domain of clinical neurology and psychiatry to the domain of speech language pathology. The earliest studies on neuro-psychological functioning (which included language functioning) were almost exclusively within the domain of clinical neurology. However, there is no doubt that the neurologists early interest was in localizing the site of lesion and identifying the focus of cortical damage in the dementias.

Gradually, the 80's saw the sophistication of imaging techniques as well as a more enhanced understanding of neurolinguistics and brain - behaviour relationships, both of which led to greater diagnostic accuracy of dementia. However, amidst this greater clinical insight into the neuropathology behind dementia, there was but scant information about the language profiles and the specific language impairment that results from such diffuse neuronal damage.

This lack of evidence to address the language deficits in dementia prompted researchers to pursue the study of language dissolution in dementia and compare these language deficits due to diffuse cortical lesions with the language deficits seen in aphasias, which are due to more focal lesions in the cortex. Moreover, given that there are various types of dementing diseases, another question that arose was whether the language deficit also varied with different underlying etiologies of dementia.

All sources of statistical information strongly and consistently support that the incidence of dementia is exhibiting a meteoric rise and that Alzheimer's disease is the most common cause of dementia in adults. According to Bayles et al ('87) Alzheimer's disease accounts for approximately half the reported cases of dementia and those with Alzheimer's disease constitute the fastest growing and most expensive clinical population in the United States. Given this heightened incidence of Alzheimer's Disease (AD) and its staggering medical and social dimensions as well as the fact that language deficits do form an essential part of the clinical picture of AD, there is not much doubt that this is one population that researchers and clinicians in language pathology will be faced with in ever increasing numbers.

Diagnosing the language deficit in Alzheimer's disease as distinct from other adult neurogenic language disorders is one monumental task that a speech-language pathologist faces. This also appears to be an area where the language pathologist can contribute his expertise by developing a test capable of differentially diagnosing dementia from aphasia, based upon the profile of respective language deficits. Such differential diagnostic information is crucial in determining prognosis and also treatment and intervention strategies.

Though it is a well-known and well-documented observation that communicative functions are impaired at some stage or the other in all individuals with dementia, there is limited information describing the specific nature of the language deficit or the precise linguistic level at which language

abilities break down in dementics. Moreover, when we talk of language deficits in the elderly aphasic, we are considering a disorder which we are well acquainted with. On the other hand, when it comes to language deficits associated with Alzheimer's disease or the normal aging process, these areas still represent largely unexplored territory. Hence, the increasing attention being paid to these areas in research.

Dementia, or more specifically within the purview of this study, Alzheimer's disease is understood as being the result of widespread, multifocal pathology and is characterized by chronic progressive deterioration of intellectual function resulting from bilateral, diffuse cerebral degeneration. Inherent to this understanding is the notion that with a progressive dissolution in intellectual function, language disturbances form an essential feature of dementia at some stage or the other. This notion is well-grounded in the fact that "language and intellect are related but dissociable functions of the mind" (Mathews, Obler and Albert '94).

Not surprisingly then, the crucial effects of cognition or the deterioration in cognitive functions can be observed and are paralleled by a deterioration of linguistic capabilities. For instance, Fisher ('68) described dementia as a "chronic reduction in any or all of the higher verbal and non-verbal cerebral functions". Similarly, Pearce and Miller ('73) characterized the speech of a patient with dementia as "repetitive verbal perseveration". Wells ('77) listed aphasia as a symptom of

dementia and Aker, Walsh and Beam (77) reported dysphasic errors in the spoken and written language of the dementic patient.

Bayles, Boone, Kaszniak and Stern ('82) found that language impairment was not only present in all stages of dementia but was found to be proportionate to the cognitive impairment. Because of the interdependence of language and cognitive functions and the strong agreement among clinicians that language functions are affected in dementia, Bayles and Boone ('82) hypothesized that language measures could indeed prove useful in diagnosing Alzheimer's disease. Regarding the evidence to support this hypothesis, there seems to be one classic reference that is repeatedly quoted in the literature, which is a study by Kaszniak et al ('78) who reported that tests of memory and language were better predictors of mortality in pre-senile and senile dementia than the degree of cerebral atrophy apparent on CAT scans.

Upto this point, the discussion has largely centred upon dementias per se with no further classification of the dementias. However, any study that were to simply group all patients with different sorts of dementing illnesses is bound to report vague and even contradictory results. Broadly speaking, dementia can be classified into three basic types - cortical dementias, subcortical dementias and mixed dementias. A brief discussion of this classification follows :

1. CORTICAL DEMENTIAS :

Degenerative disorders which involve the cerebral cortex.
For eg : Alzheimer's disease, Pick's disease.

2. **SUBCORTICAL DEMENTIAS :**

Degenerative disorders which primarily involve the subcortical structures such as basal ganglia, thalamus and the brain stem. For eg : Progressive supranuclear palsy, Parkinson's disease, Wilson's disease, etc.

3. **MIXED DEMENTIAS :**

These dementias can occur due to a variety of causes :

A. Metabolic and Toxic Encephalopathies :

- i) Nutritional deficiencies, eg : Vit B deficiency
- ii) Endocrinal disturbances, eg : Hyperthyroidism, Addison's disease, Cushing's disease
- iii) Drug toxicity
- iv) Heavy metal exposure
- v) Alcohol exposure

B. Cerebrovascular Disease : For eg : Multi-infarct dementia (MID)

C. Infectious diseases : Neurosyphilis; Creutzfeldt-Jakob disease

D. Miscellaneous dementia syndromes

The distinction between cortical and sub-cortical dementias has been rather controversial, despite the fact that clinically described differences between the two do exist.

According to Huber et al (85), the key differences between the two are:

CORTICAL DEMENTIA	SUB-CORTICAL DEMENTIA
1. Motor impairments are not usually present, until late in the clinical course in cortical dementias.	The motor system is affected and sub-cortical dementias are often associated with movement disorders such as rigidity and bradykinesia in Parkinsonism.
2. Characterized by classic disordered language symptoms - aphasia, agnosia or apraxia	Typically absent in the sub-cortical dementias.
3. Intellectual and memory impairments are more severe and show more rapid progression	Present, but are less severe and progress less rapidly.
4. Patients lack insight but most tend not to be depressed.	Patients are described as apathetic and often depressed
5. Typical example : Alzheimer's disease.	Typical example : Progressive supranuclear palsy.

The major difference between cortical and subcortical dementia is considered to be the lack of aphasia, agnosia and apraxia in the latter. These focal, cognitive symptoms were first described as consequences of regional cortical damage, secondary to vascular disease and thus, were expected to be associated with cortical changes in dementia. However, cortical symptoms have been reported in subcortical dementias also. For instance, visuo-spatial and language problems do occur in Parkinson's disease and Huntington's disease. Moreover, lesions in

subcortical structures (such as basal ganglia and thalamus) can cause "cortical" symptoms such as aphasia (Cummings et al '84; Albert '84). Other observations also place this classification system under doubt. For instance, in the early stages of Alzheimer's disease, memory alone may be impaired and only later do language and perception deteriorate. Does this then suggest that patients with Alzheimer's disease evolve from a subcortical to cortical dementia? The main problem with this distinction is indeed in the form of such unanswered questions and the lack of sufficient clinical and neuropsychological evidence to support the concept of the difference between the two.

Returning to the differences in language deficits between cortical and subcortical dementias, there seems to be a more clear distinction, with reference to this aspect.

LANGUAGE DISTURBANCES IN CORTICAL DEMENTIAS :

1. Language disturbance is always present in a more or less severe form. In fairly advanced stages, Alzheimer's patients resemble the Wernicke's aphasics more and more with reference to the language deficit pattern.
2. In spontaneous speech, the Alzheimer's patient is likely to insert verbal paraphasias but self-correction is present in the early stages. Speech is however repetitive and vague at the same time.

3. On repetition tasks, the patient is able to correctly repeat long sentences which contain high frequency words, but tends to breakdown on sentences, which contain low frequency words.

For eg : "He pried the tin lid off" may be repeated as "He bride the tin lid off".

4. Naming tasks are considered to be highly sensitive indicators to the language breakdown in Alzheimer's disease. on a naming task, an AD subject tends to be more verbose than necessary, producing literal paraphasias and jargon. Production of nouns on picture naming tasks is revealed to be more affected than production of verbs.
5. Comprehension deficits gradually complicate the picture and subjects are likely to respond incorrectly to YES - NO questions or to questions about the agent in a passive construction.
6. Subjects also exhibit dismal performance on metalinguistic tasks such as giving antonyms, converting a sentence from active to passive or from one tense to another and repetition of commands.
7. In discourse too, gradually the deficit becomes more severe as the patient digresses greatly from both the speaker's as well as his/her own points. A typical verbosity and tangentiality marks discourse.

8. Gradually, there is emptiness of speech, breakdown of pragmatics and certain non-linguistic features which include diminished eye contact and the need to touch test objects more than is appropriate.

LANGUAGE DISTURBANCES IN SUBCORTICAL DEMENTIA :

1. Neurobehaviorally, the subcortical dementias are characterized by
 - a) emotional or personality changes (typically inertia or apathy)
 - b) memory disorders
 - c) defective ability to manipulate acquired knowledge
 - d) and striking slowness in the rate of information processing.
2. Speech disturbances consist of dysarthria, monotony and equal stress for each syllable. The patient may begin a long word/phrase intelligibly and with good volume but the speech trails off to a murmur by the end. Difficulties in controlling the exhalation phase of the respiratory cycle limit the amount of speech the patient is able to produce on any given breath.
3. Subtle naming disturbances occur in case of the patient with progressive supranuclear palsy and are more evident in speech than on confrontation naming tasks.

4. It is not the nouns that are preferentially affected but the verbs and verb phrases are affected.
- 5) While reading is relatively unimpaired, in the writing samples of subcortical dementias, agraphic errors can be seen not unlike those of patients in confusional states (Cummings et al '80).

Before we move onto the various language tasks at different linguistic levels which have been studied in the literature, a brief mention of the general speech and language features of dementia, as cited in literature. Whitaker ('76) was the first to report dissociation of linguistic processes in dementia, described in an advanced dementia patient who could neither produce nor comprehend language. However, she could perfectly echo spoken utterances. The amazing feature of her echolalia was her ability to spontaneously correct errors of phonology and syntax, never those of semantics. Similarly, a dementia patient described by Schwartz, Marin and Saffran ('79) was unable to use semantic information to disambiguate spoken homophones, but could successfully use minimal syntactic cues to make correct lexical selections.

Specifically, in Alzheimer's disease it has been observed that the semantic subsystem is more vulnerable to dissolution than either the phonological or the syntactic subsystems. This finding prompted the view that semantic abilities are more dependent upon the integrity of higher cognitive functions. This greater deficit in semantic abilities is a rather well-documented

fact (Irigaray '73 and Whitaker '76). Syntax appears to be a relatively well - buffered aspect of language, relatively well-protected from the effects of cognitive decline. However, as the severity of dementia worsens, it is not uncommon to note syntactic disturbances.

Along with the semantic system, the pragmatic or functional aspect of language use also shows steady decline, right from the initial stages of Alzheimer's disease. Another early and inevitable symptom of dementia is memory impairment. It is manifested by both an inability to transfer newly - acquired information to long term memory (**Miller '73**) and an inability to recall information from remote memory (Wilson, Kaszniak and Fox '80). The implications for language tasks would be that tasks which are heavily reliant on memory function such as story recall and verbal description would seem particularly promising for detecting dementia in its early stages itself. In assessment of dementias, one of the essential goals remains to determine the interaction of cognitive and memory impairments with the linguistic deficits that manifest.

With this background information as a starting point, we will now review all the specific linguistic levels and tasks that have been probed. For ease of understanding, these studies and their findings will be grouped as those dealing with :

1. **Phonological Aspects**
2. **Syntactic Aspects**
3. **Semantic Aspects**

4. Pragmatic Aspects

5. Others - Reading, Writing, Drawing, Praxis

In the purview of this discussion, 'language' refers to

- a) linguistic knowledge comprising phonologic, syntactic, semantic and pragmatic rules

AND

- b) the use of these rules in the production and comprehension of meaningful expression.

These different types of linguistic knowledge are apparently represented in distinctive areas of the brain and the processes by which this linguistic knowledge is manipulated are subserved by different neuronal systems. The distribution of neuropathology in various dementing diseases may affect the neuro-anatomical substrates important for certain types of linguistic knowledge and processes, at the same time selectively sparing others and giving rise to the specific clinical profiles existing in the various dementia types.

I. PHONOLOGICAL ASPECTS :

No categorical evidence exists at present that Alzheimer's disease (AD) patients lose their knowledge of the sounds of their native language. Even the neologisms AD patients produce respect the rules of their native language. According to Whitaker ('76) and Bayles et al ('82), even severe AD patients spontaneously

correct phonological errors in sentences they repeat. Whitaker was the first to observe this phenomenon of spontaneous correction as cited earlier. Bayles and Boone ('82) further validated Whitaker's observation by demonstrating that spontaneous correction of phonological errors was not idiosyncratic in Whitaker's patient but common in severely demented AD patients.

II. SYNTACTIC ASPECTS

By and large, syntax is considered to be a relatively preserved aspect in the language comprehension and production aspects of the AD subject. Many investigators have observed the preservation of grammar in the AD subject's language, although some reports do exist which indicate simplification of grammar. If simplification does exist, it does not necessarily signify loss of knowledge of syntax per se, but may reflect the need to use structure that is less demanding of memory.

Coming to the specific references in literature, Irigaray ('73) was probably the first to conclude based upon her findings in a large scale study that phonological and syntactic linguistic codes are comparatively preserved in Alzheimer's disease, compared to lexical - semantic abilities. Schwartz et al ('79) observed that it was not entirely uncommon to find reports of syntactic deficits in the later or more advanced states of dementia. Constantinidis, Richards and Ajuriaguerra ('78) reported that syntactic deficits do manifest in Alzheimer's

disease subjects in the form of breakdown in the use of phrase markers, sentences and phrases being left unfinished (ApoBioposisB). Along the same lines, Gritchley ('84) noted that aposiopsis is a phenomenon that is a conversation trait also manifested in the normal aged population and is not entirely unique to AD subjects. Some of the specific tasks have been studied are :

1. SENTENCE CONSTRUCTION

Kemper et al ('93) researched the effects of Alzheimer's disease on syntax. The study was done on two groups - AD subjects and normal elderly, both of whom were asked to write a sentence in response to an item on a psychometric battery. These sentences were then subjected to a detailed syntactic analysis. Kemper's study is definitely impressive in terms of its large sample size and its clear-cut results. Based upon the performance of 368 subjects, he concluded that written language output was reduced, as the severity of dementia increased. Other findings in the study included:

- a) Information content, measured by the number of propositions decline with progression in severity of dementia.
- b) Sentence length in clauses, and the occurrence and form of main verbs, secondary verbs and conjunctions also declined.
- c) Although the written sentences of mildly and moderately demented adults contained the above deficits, which were not

observed in nondemented adults, even these AD subjects produced complete, grammatically well-formed sentences.

Thus, the authors concluded that syntactic simplification may be an early marker of the onset of Alzheimer's disease.

2. SENTENCE CORRECTION

Bayles and Boone ('82) based upon Whitaker's discussion of his demented echolalic patient, designed a Sentence Correction Task on which they compared normal senescents and AD subjects. Subjects were asked to listen to and correct three sets of sentences with errors in phonology, syntax or semantics. Practice sentences were provided for errors of each type, and two scores were recorded for each type of sentence, one representing subjects ability to judge well-formedness and another representing ability to make corrections.

AD subjects were encouraged to repeat the sentences after the examiner to determine if severely involved subjects would make spontaneous corrections of anomalous sentences. Results indicated that ability to correct semantic errors most strongly differentiated between the two groups again, re-inforcing the fact that semantic abilities are more affected than phonological or syntactic ones in dementia.

The general opinion regarding phonological and syntactic intactness in dementia could be due to the fact that certain phonologic and syntactic Judgments appear to be more automatic

and unconscious. Further, the processing of phonology and syntax by lower order automatic mechanisms may be possible because the phonologic and syntactic rules of language are finite, learned early in life and well-rehearsed by the time of senescence. Another aspect is that while phonemic combinations and syntactic strategies are limited, no limit exists as to the number of possible meanings a speaker can produce. Quite possibly then, it could be the highly unpredictable nature of the semantic aspects of language which require conscious thought for proper interpretation, thus making this aspect for more vulnerable to the ravages of senescence and dementia.

III. SEMANTIC ASPECTS

A clear cut majority of studies support the fact that erosion of semantics is more likely to occur than phonologic or syntactic disturbances (Irigaray '67). Most of the literature is overwhelmingly directed to the study of naming deficits in AD subjects.

1. CONFRONTATION NAMING

Impairment of naming is often an early symptom of dementia and has been shown to occur as one of the earliest measurable language deficits (Appell, Kertesz and Fisman '82; Kirshner et al '84, Cummings et al '85). The sensitivity of confrontation naming tasks has also emerged in comparisons of normal young controls and healthy, normal elderly subjects, where the elderly subjects showed naming impairments (Bowles et al '85, Goodglass

et al '85). A confrontation naming task is one in which the subject is given a visual presentation of the stimulus by means of real objects, line drawings or photographs. Researchers have been concerned with the locus of naming impairment as seen in the healthy aged, Alzheimer's disease, other dementing illnesses and in certain types of Aphasia, such as Anomia. According to Kirshner et al '84, the widely held belief is that naming impairments in healthy older adults is due to a difficulty purely in lexical access, while in the case of the AD subject, both lexical access and concept identification per se are thought to be compromised.

Confrontation naming is a complex process involving several stages. In the first or **perceptual** stage, following the presentation of a picture, the pictorial image is analyzed for correct identification of the stimulus. The information is transmitted to the second or **semantic** stage, where its semantic representation is activated, then to the third or label **retrieval** stage, where the phonological representation corresponding to the semantic representation is retrieved. This is followed by the **motor programming** stage, where the articulatory sequence is activated, leading to correct naming.

The key aspects of the naming deficit observed in AD are ••

i. Type of naming error

Watanori, Fukusaka, Monoi and Sasanuma ('90) compared confrontation naming performance of equal number of dementic and aphasic patients. Analyses of error types revealed similarities

and differences between the two groups. The most frequent error type for both groups consisted of semantically related responses. The dementia subjects, frequently showed substitution type errors, by substituting a word that was visually similar and the most familiar exemplar of the category for the target word.

Another common error was the "description of attributes", which suggests an error at the semantic and/or label retrieval stage. Other error types observed were "personal comments" and "uncertainty", thought to reflect coping behavior associated with general cognitive difficulty.

Nicholas, Obler, Albert and Goodglass ('85) compared healthy young adults, healthy elderly, mild and moderate senile dementia of the Alzheimer type (SDAT) subjects and found that while healthy, elderly subjects showed much more circumlocutory responses when compared to young adults, the SDAT subjects showed significantly more such errors than the healthy elderly. According to the authors, circumlocutory and perseveration errors are thought to represent compensatory responses used when older adults or dementics are unable to access the target word in the lexicon.

Another study by Bowles, Obler and Albert (87) analyzed naming errors for groups of healthy younger and older adults and patients with dementia. This study documented different patterns of error for all three groups. Near synonyms and adequate circumlocutions, thought to be the result of lexical access difficulties were seen more in the normal elderly. Semantically

unrelated naming errors viewed as failures in concept identification were far greater in the dementia groups.

Kirshner, Webb and Kelly ('84) presented objects at four levels of perceptual difficulty : an actual object, a colour photograph, a line drawing of the object and a line drawing masked by superimposed lines. AD subjects and healthy, elderly age-matched controls were compared and perceptual difficulty was found to influence performance to a greater degree in the AD subjects.

Attempts to explain the confrontation naming failure in demented patients proceeds along three lines :

- a) Errors result from an impaired visual perception.
- b) Confrontation naming deficit results from impaired access to, or loss of semantic information.
- c) Finally, a third possible cause of impaired confrontation naming in Alzheimer's disease could be a **word retrieval deficit**, which is characterized by an inability to name an object that has been successfully identified.

ii. Variation in naming performance with word frequency

Sommers and Pierce ('90) investigated the performance of AD subjects on a naming task of low frequency versus high frequency words. The material used for the task was an adaptation of the naming task devised by Goodglass and Baker ('76). Results

indicated that naming accuracy in AD is influenced by word frequency. Mild to moderate AD subjects had significantly greater difficulty in naming low frequency pictures but not high frequency ones. These findings were consistent with the results of other studies by Huber et al ('88) and Diesdfelt ('89).

iii. Consistency of the naming deficit in Alzheimer's disease

Response consistency is thought to be one means of evaluating the locus of naming impairment. Huff, Mack, Mahlmann and Greenberg ('88) compared patients with aphasia (consequent to left hemisphere stroke) and patients with Alzheimer's disease with respect to consistency of performance on a naming task. Patients with either disorder performed poorly, when asked to name pictured objects. However, patients with aphasia (due to stroke) make errors on different items on different occasions, when they are asked to name a set of objects, while AD subjects tend to error on the same items on successive trials. This result can be explained by the hypothesis that lexical - semantic information required for naming objects is lost in AD and is therefore, consistently unavailable, whereas in patients with aphasia, this information is intact but access to it is impaired in a way that led to different items being named on different occasions.

iv. Category and attribute knowledge in dementia :

Semantic memory deterioration in Alzheimer's disease has been theorized to proceed from a loss of object specific attribute knowledge to a more general loss of category knowledge. In other words, AD subjects lose their knowledge of the features that distinguish items within a conceptual category before more general categorical knowledge (Martin and Fedio '83).

In a recent study, Bayles, Tomoeda and Trosset ('90) attempted to test the validity of this theory (based upon the precept that naming is a computational process requiring object attribute knowledge) by administering naming and category knowledge tasks to AD and normal elderly subjects. Thirteen line drawings from the Boston Naming Test were used as the test material and the tasks which subjects were required to do were :

A) Confrontation Naming :

Errors were classified as semantically related, semantically unrelated or 'don't know'. Semantically related errors were classified as **superordinate, same category member or an attribute.**

B) Category Recall :

Subjects were asked to specify the larger group of objects to which the stimulus objects belonged, eg : Harmonica - musical instrument.

c) Category Recognition :

Subjects were asked to identify the larger *category* to which each stimulus object belonged.

When the results were analyzed theoretically unexpected outcomes emerged as follows : Erroneous naming responses in the form of superordinate naming were virtually non-existent. Normal controls more commonly tended to name another object of the same category than an object attribute. However, the reverse was true of AD subjects. This finding, no doubt challenges the theory that attribute knowledge is lost while *category* knowledge is maintained.

2. GENERATIVE NAMING :

A generative naming task involves producing as many words as possible, corresponding to a given lexical frame (- a category, an alphabetical cue, etc.) in a time constraint context- According to Miller et al ('75), a quantitative deficit on a word fluency or generative naming task is a rough but ready index of lexical - semantic deterioration. The reason for the sensitivity of a generative naming task is that it employs divergent, semantic retrieval and depends upon the structure of semantic knowledge, which deteriorates in Alzheimer's disease.

Martin and Fedio ('83) made use of the "**supermarket task**" where subjects were asked to name everything on sale in a

supermarket. It was observed that AD patients produced significantly fewer responses than normal controls and these responses also were from fewer categories. Similarly, Bandera et al ('91) found that based upon performance on a generative naming task, two groups of AD patients could be identified :

- a) Those who produced words which were conventionally lesser known and produced a greater number of idiosyncratic responses and perseverations.
- b) Those who gave more conventional responses, largely in the hierarchical category relationships. These were considered to be a result of semantic breakdown, while those of the former group seemed to correspond to a disrupted access to a few spared semantic abilities.

Monsch et al ('92) compared dementia of the Alzheimer type (DAT) patients with normal elderly controls on four verbal fluency measures - category, letter, first names and supermarket fluency tasks. Receiver operating characteristic curves were plotted to determine each fluency tasks sensitivity and specificity. Category fluency demonstrated the greatest degree of discrimination between patients with DAT and normal control subjects and letter fluency was the least accurate. This demonstrated superiority of category fluency over letter fluency is consistent with the notion that patients with DAT endure a significant deterioration in the structure of semantic knowledge relatively early in the disease process.

3. WORD ASSOCIATION TASKS

Word association tasks and the study of responses produced on these are a recent and interesting approach to the study of lexical - semantic organization. In a word association task, the subject is given a stimulus word, to which he has to respond as quickly as possible with the first word occurring to him/her by free association. On completion of the task, responses are generally classified as **syntagmatic, paradigmatic, multi-word repetitions, unassociated responses, no responses, repetitions,** etc. Gewirth et. al '84 showed that the number of paradigmatic associations decreased markedly with the severity of dementia or aphasia. Santo Pietro and Goldfarb ('85) observed a decline in the proportion of paradigmatic responses in normal, elderly subjects who had been institutionalized. These authors used the Goldfarb - Halpern Word Association Test ('81) and observed that subjects with dementia exhibited marked reduction in paradigmatic responses and an increase in the idiosyncratic and multi-word responses. Similar results were found in a study comparing word association responses between normal young and healthy, elderly subjects by Mahendra, N. and Raksha, H.R. ('95). It was observed that the normal elderly subjects produced significantly more idiosyncratic responses than younger controls. Gewirth et al ('84) examined the responses of Broca's, Wernicke's and anomic aphasics, and observed that both syntagmatic and paradigmatic responses were reduced in all typeB of aphasia, but there were significantly greater number of paradigmatic responses.

Wernicke's aphasics showed a marked deviation from a paradigmatic word association strategy, probably due to an inability to access semantic markers or a true loss of semantic abilities. Broca's aphasics made a high amount of null responses and fewer paradigmatic responses than normal. However, unlike the AD patients, they retain sufficient self-monitoring mechanisms and so idiosyncratic and perseverative responses are very less.

4. SENTENCE DISAMBIGUATION :

Goldstein ('52) suggested that the cerebral atrophy categorizing senile dementia results in a disturbance of abstract orientation or categorical behavior. A language task, likely to reflect difficulties with abstracting and sustaining sequences of related thought is **linguistic disambiguation**. Such a task evaluates linguistic reasoning ability and disambiguation of sentences with different types of linguistic ambiguities requires different cognitive processes. For instance, while lexical ambiguity requires a lexical analysis, structural ambiguity requires evaluation of grammar, and logical ambiguity requires evaluation of the relations between subject, verb and object.

Bayles and Boone ('82) used a **Sentence Disambiguation Task** with three sets of sentences containing lexical, surface structure and deep structure ambiguities. Along with each ambiguous sentence, were three unambiguous sentences. Subjects were instructed telling them that some of the sentences had more than *one* meaning and to paraphrase the meanings perceived. The subject score was the number of ambiguous sentences for which two

correct paraphasias were provided. The task was administered to SDAT patients and normal senescents and was found to be a challenging task for both groups. It was sensitive in identifying SDAT. Of the three types of ambiguities, lexical ambiguity was easiest to perceive - an anticipated finding since they have been shown to be the easiest to process (Mackay '66). Also deep structure ambiguities were detected more easily than surface structure.

Bayles et al ('89) used a sentence disambiguation task (oral and non-oral) to differentiate between patients with AD, stroke patients with aphasia and normal elderly controls. Results indicated that performance on the task helped to differentiate both mild and moderate AD from the healthy elderly, as well as fluent and non-fluent aphasias from the healthy elderly. The two main results were that :

- a) Fluent aphasics performed better than non-fluent aphasics.
- b) Fluent aphasics performed better than Just mild AD subjects on oral and non-oral versions of the task.

5. SEMANTIC PRIMING EFFECTS :

Semantic priming is one of the components of lexical processing, which has been central to recent developments concerning the architecture of the cognitive system. What the semantic priming effect refers to is the finding that subjects are faster and more accurate to recognize (make a lexical decision, read a word aloud) a target word when it follows a

related word than when it follows an unrelated word. This effect has been at the center of considerable work in word recognition research and has been one of the hallmark indicators of spreading activation within a semantic memory network (Anderson'83). Several recent studies have indicated that DAT individuals produce similar or larger semantic priming effects compared to healthy young and old adults (Chertkow et al '89, Hartman '89; Margolin '87, Nebes et al '89; '86).

The fact that SDAT individuals have larger semantic priming effects compared to healthy young and elderly subjects is expected, when considering their global deficit in word recognition. This finding can be explained by the reasoning that 'Context' may well facilitate a damaged word recognition system. A recent study by Balota and Duchek ('91) attempted to examine semantic priming effects, lexical repetition effects (to determine if lexical processing in SDAT patients will be facilitated by a prior exposure to the stimulus word) and contextual disambiguation effects (determining the extent to which semantic context may control the selection of meaning) for ambiguous three word strings, which the patient had to say out. To assess the lexical repetition effects, the first two target words were repeated (eg : kidney-organ-piano). Analyses of naming latencies revealed that semantic priming and lexical repetition effects are larger in SDAT individuals than in healthy, age-matched control subjects.

6. PHRASE REPETITION :

Repetition ability, is in part dependent upon the intactness of semantic memory. If the conceptual contents of semantic memory are believed to be lost as a function of Alzheimer's disease or other dementia pathology, then meaningfulness of stimuli should have progressively lesser effect on the ability to repeat (as the disease worsens). Bayles, Tomoeda and Rein ('95) conducted a study to compare mild and moderate Alzheimer's and healthy elderly on repetition of 6-9 syllable phrases, arranged as ranging from meaningful to improbable in meaning to meaningless. Cross-sectional and longitudinal data analyses failed to show any support for the semantic memory loss theorization. Results indicated that all groups - mild AD, moderate AD and normal controls had most difficulty in repeating meaningless, 9 syllable phrases.

IV. PRAGMATIC ASPECTS :

Relationship between thought and language has long been debated by researchers and this debate has fostered numerous investigations into language breakdown in dementia. Theoretical views of language have shown a dramatic move from a formalist linguistic perspective to a functionalist pragmatic perspective (Bates and MacWhinney '79; Bayles and Kaszniak '87; Terrell and Ripich '89). The implications of this shift to a functional perspective requires that we view pragmatics as central to and regulative of the language system. With this focus, communicative competence is more basic than linguistic competence. This

perspective is of immediate relevance to the study of DAT subjects, since the decline in pragmatics appears to be critical to the loss of functional communication in these patients.

Pragmatic knowledge refers to an individual's ability to use language effectively and represents a speaker's ability to judge contextual effects, perceive and express emotions, and use conversational conventions. Obviously, since these tasks require complex integrations of higher cortical processes, they are likely to be affected in AD patients. BAYLES et al ('82) were of the opinion that pragmatics appears to be the area of linguistic knowledge most dependent upon cognition which shows a gradual deterioration in AD, thus explaining why pragmatic deficits are more apparent than phonologic or syntactic deficits in dementia. The tasks that have been studied under the aegis of pragmatic aspects in DAT include the following :

1. Story re-telling :

Bayles and Boone ('82) designed a story re-telling task to study differences between AD subjects and normal elderly controls. The rationale for the development of this test was that the ability to retell a story depends upon the capacity to store new linguistic information for subsequent retrieval, a classic difficulty seen in AD subjects. Subjects were scored, based upon their ability to reproduce all major information units in the story. Results indicated significantly poorer performance by AD subjects.

Ulatowska et al ('88) also studied discourse performance of DAT adults and normal elderly controls on a story retelling task and observed that compared to the normal elderly, DAT adults were more prone to :

- a) include fewer target propositions
- b) producing more incomplete sentences
- c) demonstrating an abundance of reference errors - use of higher proportion of pronouns than nouns.

However, no difference was observed in amount of language used but severe limitations in the use of cohesion and expression of meaningful content were noted.

Story retelling was also used in yet another study by Bayles et al ('89) to differentiate between AD patients, the normal elderly and the stroke patients with aphasia. In this study, both **immediate** and **delayed** (story to be retold after 60-75 minutes) story recall were employed with the following results :

- a) Both fluent and non-fluent aphasics were poorer than the normal elderly.
- b) Both groups of aphasics also performed better than mild AD patients on delayed story recall task.
- c) Fluent aphasics were superior to mild AD subjects on the immediate story recall task-

d) Finally, the greatest difference observed was between the healthy elderly and mild AD patients on the delayed story recall task. While the normal elderly only forgot **4%** of the information, mild AD patients forgot over **98%**.

2- Descriptive discourse :

Discourse can be defined as naturally occurring language that extends beyond the sentence level or across sentences. Descriptive discourse refers to verbal expression, directed towards a visual stimuli around which discourse is produced. Bayles et al ('82) used a **verbal expression task** to distinguish between AD and normal elderly subjects. This task was adopted from the Illinois Test of Psycholinguistic Abilities (ITPA - Kirk, McCarthy and Kirk '68). Subjects were asked to handle four common objects and were asked to tell everything they knew about these objects. The task required subjects to retrieve previously learned information from long term memory and was found to be a useful measure, as it required subjects to use language creatively. Significant differences were observed between dementias and normal senescents.

Hier ('85) reported that on picture description tasks, dementia patients demonstrated a marked impairment in **lexical diversity** (total words and different types of words used); generated fewer relevant observations and produced significantly more perseverations than normal controls. Bayles, Tomoeda and Trosset ('95) also found similar findings. They observed that

increased dementia severity was associated with a decline in the number of relevant observations but without decrement in the total number of words used. This, naturally contributed to decrease in the conciseness of observations. Hier ('85) had used the Cookie Theft picture from the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan '83). Other features observed in this study were that lexical deficits were more pronounced than syntactic ones; use of fewer propositional phrases and subordinate clauses and more sentence fragments.

Decreased conciseness of expression, in the face of greater verbosity has also been noticed as a hallmark of the discourse of the normal elderly in a study by Bayles, Rao, Tomoeda and Trosset ('95) and this was seen to become especially apparent in individuals in their late '70's.

3. Dyadic exchange

Under this heading, we will refer to verbal expression by a subject, when engaged in a dyadic interaction with an examiner. There have been reports in the literature that the discourse in case of dementia is confusing and lacks coherence (Appell, Kertesz and Fisman '82). There are many elements that characterize normal discourse : turn taking, sentences specifying ideas/propositional content, expression of these propositions in a manner consistent with listener requirements. According to Clark and Clark ('71), when any or all of these are not met, discourse breaks down.

Ripich and Terrell ('88) compared the discourse patterns of elderly adults versus SDAT patients, elicited on topic-centred interviews. They observed that :

- a) SDAT patients used more words and took more conversational turns. Interviewers also used more words when interviewing SDAT patients, making those interviews, more lengthy and more interactive.
- b) A pattern of cohesion disruption was seen consistent in dementia patients.
- c) Coherence judgments by four listeners showed significant difference between the two groups : in favour of the normal elderly. Breakdown in coherence was related to a specific cohesion disruption i.e. **missing element**. This refers to a loss in the dementics ability to take the listeners perspective in developing thematic structure during conversation.

In yet another later study by Ripich et al ('91) in which discourse abilities of the normal elderly and SDAT patients were compared, results indicated that :

- a) SD cases used more requestives and less assertives.
- b) They also had significantly more unintelligible utterances.
- c) SDAT subjects spoke in shorter turns and often relied upon non verbal responses.

V. OTHER ABILITIES : reading, writing, drawing and praxis

1. Reading abilities :

Reading abilities of dementia patients have been studied less exhaustively, but preliminary research seems to indicate a dissociation between reading aloud and reading comprehension, with relative preservation of the ability to read aloud, even when reading comprehension is severely impaired (Schwartz et al '79; Cummings and Benson '83; Obler '84; Cummings et al '85). Cummings et al examined the pattern of reading deterioration in DAT using various reading tasks :

- a) Tests of Reading Aloud : Letter reading, word reading and reading obscured words.
- b) Reading Comprehension : Word vs. non-word recognition, understand written commands and sentences.

The New Adult Reading Test (NART) by Nelson and O'Connell ('78) was also used. NART consists of irregular words (like naive, psalm, facade) that can be pronounced correctly only if the subject is familiar with the words since they do not obey the usual grapheme-to-phoneme conversion rules. The DAT patients showed a consistent pattern of reading impairment. All tests of reading aloud, though failed by patients in advanced stages of dementia, were relatively preserved through most of the range of intellectual impairment. Reading comprehension, however showed no such selective sparing and on all subtests, performance declined systematically with advancing dementia.

Bayles et al ('89) in their study to differentiate AD from normal elderly and post stroke aphasics used reading comprehension of words, sentences and paragraphs. Result obtained were as follows :

- a) Moderate AD patients were much poorer than the mild AD patients on all tasks of reading.
- b) No significant difference between fluent aphasics and normal elderly on reading tasks.

2. Writing deficits :

Agraphia or writing disorder would reflect disturbances in multiple cognitive domains in case of dementia. According to Benson ('79), agraphia simply refers to a loss or impairment of the ability to produce written language, consequent to brain damage.

Horner et al ('88) analyzed brief writing samples of patients with mild to moderate dementia. A writing proficiency score was compared with results of cognitive function testing as well as ratings on severity of dementia. She observed a significant correlation between narrative writing ability and dementia severity and suggested that a similar writing assessment could be useful to rate severity of dementia in Alzheimer's diseases.

Similarly, Rapcsak et al ('89) studied the spelling abilities of SDAT patients and contrasted it with that of normal controls. A consistent and specific pattern of linguistic agraphia in SDAT population was seen. They spelt both regular words and non-words as well as controls, but became significantly poorer at spelling irregular words. Rapcsak's findings suggested that SDAT patients may have an impairment of the lexical spelling system. It could also be hypothesized that they suffer from a loss of word representations in the orthographic lexicon or an inability to access these representations. Phonological spelling, however was found to be largely spared.

3. Drawing impairment :

Ajuriaguerra ('60) had first made the observation that deficits in constructional abilities, including drawing, are often early signs of degenerative dementia. Bayles et al ('89), attempting to distinguish between AD, post-stroke aphasics and the normal elderly, included a drawing task as a measure of visuo - spatial conceptualization and constructional abilities. Results observed were :

- a) Significant differences between mild and moderate AD patients.
- b) Non-fluent aphasics different significantly from normal elderly while fluent aphasics, that a nearly comparable output to that of the normal elderly.

c) Fluent aphasics were better than mild AD subjects on drawing tasks.

Kirk and Kertesz ('91) compared spontaneous drawings of equal number of dementics and normal elderly subjects and observed the following differences after analysis. Drawing of patients with Alzheimer's disease displayed :

- a) fewer angles
- b) impaired perspective and spatial relations
- c) simplification
- d) overall distortion

They found the drawing impairment to be relatively independent of language or memory impairment, but drawing performance was related to perceptual and executive dysfunction in the visuo-spatial domain.

4. Praxis :

Rapcsak et al ('89) studied apraxia in patients with DAT and observed that on tests of ideomotor and ideational apraxia, SDAT subjects were considerably impaired, compared to age matched controls. Limb transitive movements were especially vulnerable, while limb intransitive, buccofacial and axial movements were relatively spared. There was no significant difference between performance on verbal command and imitation, but the DAT subjects showed considerable improvement with the use of actual objects. The authors found disordered skilled movement in DAT to be qualitatively similar to apraxic syndromes following left

parietal damage. Apraxia in DAT suggests posterior, left hemisphere, cortical involvement and may be apparent even in patients with good language functions.

To summarize the findings at the end of this linguistic level specific discussion of the language impairment in Alzheimer's disease, it can be stated that the picture is one of a core semantic and pragmatic breakdown with more or less intact phonology and syntax. Of late a large amount of research is being directed towards assessing reading and writing deficits in AD to find further support for the semantic memory deficit in this population.

DIFFERENTIATING DEMENTIA FROM OTHER LANGUAGE DISORDERS

While there is little doubt that dementia can be differentiated from other disorders, the means by which this can be accomplished are rather varied. For instant, Alexander ('73) and Crooke's ('74) found that dementia patients have a typical performance on psychological tests which points towards a decline in intellectual functions, while the aphasic has a language disturbance in the face of a largely unaffected intellect. Along similar lines, Werts ('82) stated that by the administration of a variety of measures, probing their results, utilising the patients 'history and neurological data, all this information can be integrated to differentiate dementia from aphasia.

In the past decade or so, several researchers have probed into the potential areas of differential diagnosis in elderly

patients. Appell, Kertesz and Fisman ('82) compared the language skills of patients with senile dementia of Alzheimer type (SDAT) with that of aphasics of various types using the (WAB) Western Aphasia Battery and found significant differences in fluency and comprehension. Blanken, Dittman, Haas and Wallesch ('87) contrasted the spontaneous speech of SDAT patients and patients with Wernickes aphasia and a group of normal elderly subjects and they observed a characteristic breakdown in the pre-linguistic formulation process in the SDAT group. More recently, Bayles, Boone, Tomoeda and Slauson ('89) used a battery of neuropsychological tests to assess differences between people with mild or moderate SDAT, normal age-matched controls and stroke patients with fluent and non-fluent aphasics. Comparison of fluent and non-fluent aphasics and mild SDAT patients revealed that :

- a) Aphasics performed better on delayed spatial and verbal recognition memory tasks, and also on delayed story recall tasks.
- b) The most discriminatory measures were related predominantly to language skills and these were the sentence disambiguation and phonemic word fluency tasks. On both these tasks, SDAT subjects and non-fluent aphasics had overlapping scores, with fluent aphasics scoring much higher.

Stevens ('89) found that a short confrontation naming test, using coloured photographs and black and white line drawings of common objects had the potential to discriminate between groups

of elderly subjects with dysphasia and dementia, particularly when using a weighted scoring system.

Currently, clinicians lack a validated test battery for differentiating the communication impairments in patients with dementia from either the normal elderly or the patients with aphasia. Consequently, the popular trend is to assess communicative function in dementia patients using one of the standardized test batteries for aphasia (Appell, Kertess and Fisman - '82; Cummings, Benson, Hill and Read '85; Horner '85). However, Tikofsky ('84) and Bayles and Kaszniak ('87) pointed out a major pitfall of use of aphasia tests to evaluate the status of language deficits in dementia. They observed that aphasia batteries have been developed on the assumption that a typical aphasic subject will manifest with a marked discrepancy between language and other cognitive functions. Indeed then, such batteries may be entirely inappropriate for the dementic whose communication deficit is directly related to generalised intellectual deficits.

To date, no comprehensive language test is available, which is specifically aimed at discrimination between dysphasia, language breakdown in dementia and the effect of healthy aging on linguistic capabilities. Such a test or language tool could be of immense practical benefit to all speech and language pathologists. In a preliminary attempt in this direction, S.J. Stevens ('92) devised a screening test with a differential diagnostic application, which consisted of subtests of naming, matching, description and reading. Specifically, the subtests consisted of :

1. Naming line drawings of common objects
2. Written word to picture matching
3. Written sentence to picture matching
4. Action picture description (colored photographs and black and white line drawings)
5. Verbal description of the object
6. Reading of sentences (presented singly and in pairs; sentences were of the simple construction: subject-verb-object (SVO)).

The test showed itself to be an efficient discriminator between elderly subjects with dysphasia and those with dementia. The best discriminatory effect was highlighted best in the areas of naming line drawings, description of actions using pictorial stimuli and description of an objects use. Stevens ('89) commented that she found the test useful to confirm initial diagnosis and to monitor the type and speed of change in aspects of language function. The test was also easy to administer and granted economy in test time. Steven's attempt can well be seen as a cornerstone in assessment and differential diagnosis of dementia, which paved the way for more extensive investigation towards construction of such a tool.

Prior to Stevens, Ann Philips ('84) had also devised a "Dysphasia/Dementia Screening Test", the aim of which was to help the speech and language pathologist to make a differential diagnosis between dementia and dysphasia and was intended for use with people having severe communication difficulties. The test consisted of five subtests :

1. Auditory comprehension
2. Verbal expression
3. Reading
4. Writing
5. Problem solving.

However, the test remains to be standardized and the scoring system may be more useful as a diagnostic tool if the subjects responses including facilitatory cues given and differential time taken to complete the test are recorded.

The most recent attempt at test construction to assess linguistic communication deficits in AD patients, has been made by authors Kathryn A. Bayles and Cheryl K. Tomoeda ('95) at the University of Arizona at Tucson. The test is called the Arizona Battery of Communication Disorders in Dementia (ABCD). ABCD is a research - based, standardised battery which gives a comprehensive evaluation of linguistic communication processes in dementia. The test is presently used to :

- a) identify and assess functional communication skills
- b) differentiate mild from moderate dementia patients.
- c) document disease effects over time for longitudinal studies.

ABCD helps to assess the clients abilities to :

- | | |
|-------------|---------------------|
| 1) read | 7) answer questions |
| 2) name | 8) retell a story |
| 3) describe | 9) recall words |
| 4) repeat | 10) recognize words |

- 5) define
- 6) follow commands
- 11) copy figures
- 12) and draw.

Scoring these subtests would enable the clinician to establish a performance profile for

- a) Mental status
- b) Episodic memory
- c) Linguistic expression
- d) Linguistic comprehension and
- e) Visuo-spatial construction

Undoubtedly, looking back, it can be unequivocally stated at the present time that current literature and ongoing research more than support the fact that myriad tasks have been used both to detect dementia per se', to stage its severity and to differentially diagnose dementia as a syndrome from other subject populations - the fluent aphasics, non-fluent aphasics and the normal elderly. A test such as the one being proposed, as a result of this study attempts to dissociate dementia of the Alzheimer type with normal senescents on one hand and with aphasics on the other hand.

A widely advocated approach to designing a test is essentially an eclectic one, by incorporating those tasks that have emerged as significant in differentiating the dementics from the aphasics or the normal elderly populations. Clinically, the greater attention would certainly be devoted to tasks that help to dissociate dementia and aphasia; two populations encountered frequently in routine clinical observation.

Focussing on the current status of the speech and language pathologist vis-a-vis assessment and management of dementia in India, no doubt we have a long way to go. Given that the demands on the speech-language-pathologist to deal with diagnostic and therapeutic issues in dementia, will only escalate in the near future, it seems timely to initiate the move towards developing a language test that will have the potential to dissociate the lesser known language profile of Alzheimer's disease from the very well known and researched into aphasias. It was precisely with this objective, namely to set the ball rolling, with regard to Indian research on the language profile in Alzheimer's disease and how this profile can be distinguished from that of the aphasics, that the present study was undertaken.

Besides the proposal of a language test to aid differential diagnosis between dementia and aphasia, the expected fall-outs of this study would also be in terms of :

- a) Directing valid research attention to an area which promises to be exciting and dynamic, yet has been largely ignored.
- b) Establishing the role of the speech-language pathologist in the assessment and management of yet another hitherto medically known disorder with renewed fervour.

METHODOLOGY

METHODOLOGY

AIM :

The aim of the present study was to design a language test in Hindi which would aid in the differential diagnosis of dementia from aphasia. A secondary aim was also to compare and contrast language profiles of normal elderly subjects, subjects with Alzheimer's disease and aphasics on the designed language test.

SUBJECTS :

21 adults subjects, 7 in each of the following groups and with the following specific subject selection criteria were taken for this study.

GROUP I : NORMAL ELDERLY SUBJECTS

The subject selection criteria were :

- a) Age should be 60 years or more
- b) Education, at least upto primary level
- c) No significant history of neurological or psychiatric problems.
- d) Subjects should have Hindi as the first or second language.

GROUP II : ALZHEIMER'S DISEASE SUBJECTS

Subject selection criteria employed were as follows :

- a) All subjects should have a neurologically confirmed diagnosis of senile dementia of the Alzheimers type based upon radiodiagnostic evaluations (CT scan, MRI or SPECT reports needed for validation).
- b) All AD subjects had complete records of scores obtained on cognitive tests. The cognitive tests that had been administered were the Mini-Mental Status Examination, the Elderly Cognitive Assessment Questionnaire (ECAQ) and the Weschler Adult Intelligence Scale or Weschler Memory Scale.
- c) Subjects should not have major psychiatric symptoms.
- d) Education at least upto primary level.
- e) Should know Hindi as the first or second language.

GROUP III : SUBJECTS WITH APHASIA

- a) All subjects should have aphasia, with neurologically (based upon CT scan findings) confirmed site of lesion.
- b) All subjects should be taken, at least one month after the onset of aphasic symptoms.
- c) Education at least upto primary level.
- d) should know Hindi as the first or second language.

TOOLS :

The language test constructed and used in the present study, consisted of the following six subtests and was designed to tap the semantic and pragmatic abilities, known to differentiate the dementics and aphasic populations :

- I. Real Object Naming
- II. Picture Naming
 - Object Naming
 - Action Naming
- III. Generative Naming
 - Animals
 - Fruits
 - Vegetables
- IV. Word Association Test
- V. Picture Card Sequencing and Delayed Story Recall
- VI. Descriptive Discourse

Before any comment on the test procedure and response scoring system, a brief description of each subtest and its contents follows.

SUBTEST I : CONFRONTATION NAMING :

Ten real objects were chosen as part of this subtest, based upon a similar section in the Western Aphasia Battery (WAB). For every correct naming response that the subject provided, a score of 2 was given. If the subject was unable to name, a score of 1 was given if the subject named the object correctly but with a phonemic cue. If the subject was still unable to name the object, the score was zero.

SUBTEST II : CONFRONTATION NAMING :

The stimuli chosen here were black-and-white line drawings of 10 items : 5 common objects and 5 common actions. The stimuli for this section were chosen from similar subtests existing in the WAB and BDAE test versions in Hindi. The scoring system was identical to the previous subtest.

SUBTEST III : GENERATIVE NAMING :

Also otherwise referred to as the word fluency task, this test was conceived to assess the differences in divergent semantic retrieval across the three subject groups. Three common semantic categories of animals, fruits and vegetables were taken as part of the test. Subjects were given a time constraint of 1 minute (60 seconds) to respond with as many members of a specific category that they could recall within the given time. Subjects were scored based upon the number of correct responses they gave after eliminating repetition and perseveration errors as well as incorrect responses eg : naming "banana" as a vegetable.

SUBTEST IV : WORD ASSOCIATION TEST

The material used for this subsection was a list of 18 words : 6 nouns, 6 verbs and 6 objectives. Within each category, a scaling of abstraction levels from high through medium to low was done, 2 words being present for each abstraction level. Of these 2 words, one was a high-frequency word and one a low-frequency

word. The design of this test was adopted from Halpern's ('65) word list (a list of 72 words chosen from the Darley, Sherman and Siegel ('59) list of single words, scaled according to abstraction levels).

Subjects were instructed to carefully hear the stimulus word and respond with the first word that they thought of as soon as they heard the stimulus word. To illustrate this, a typical example was given before the start of the test :

"If I say the word sky, you may say blue, clouds, birds, etc." Subjects were specifically instructed to give single word responses.

The word association responses were classified into six response categories - syntagmatic (S), paradigmatic (P), unassociated (UA), multiword responses (MWR), repetitions (R) and no response (NR). This classification system was adapted from the Gewirth et al ('84) and Santo Pietro et al ('85) response classification system. The number of responses for each category, within one subject group were calculated and expressed as percentages.

SUBTEST V : DELAYED STORY RECALL

This subtest has two parts to it. The subject was provided with four picture cards depicting parts of a story in random order and was asked to study the four pictures and sequence them in order of progression of the story. Following this, the tester

narrated the story to the subject and after a delay of nearly 10 minutes - 15 minutes (during which time, the next subtest was completed), the subjects were asked to recollect the story. Subjects were quantitatively scored on the picture sequencing part of the test and the story recall part of the test had a descriptive assessment, with no numerical score being assigned. Key features in the story recall, of each subject group were analyzed and explained.

SUBTEST VI : DESCRIPTIVE DISCOURSE :

The stimulus used in this subtest was a picture card, taken from the Linguistic Profile Test (Karanth '80), depicting the scene of a busy market place. Subjects were instructed to carefully study the picture provided and describe all that they observed in the picture. Similar to the earlier subtest, each subjects responses were tape recorded and analysed later, more in a descriptive style, listing out similarities and dissimilarities in discourse style across the three subject groups.

GENERAL COMMENTS :

All subject responses were tape-recorded, for each subtest on audio cassettes (Meltrack) using a National Cassette recorder (Model No : 1822), which had a built-in, high sensitivity microphone.

PROCEDURE :

Initially, each subject was asked a few routine questions before beginning the test. Subjects were seated comfortably, in quiet rooms and the entire test was administered in one sitting. Data collection was done at the Department of Medicine in the Geriatric Clinic, Department of Neurology and the Rehabilitation Unit of Audiology and Speech Pathology (RUAS) in the Department of Otorhinolaryngology (E.N.T.) at the All India Institute of Medicine Sciences (AIIMS) at New Delhi.

The results are presented and discussed in detail in the following chapter.

STATISTICAL ANALYSES DONE :

The mean scores and standard deviations on all subtests, for all 3 subjects groups were computed. Next, the one factor ANOVA was carried out to determine significance of difference between groups. On completion of one factor ANOVA, a post-hoc test, the Fisher's PLSD was done to precisely identify exactly where the difference was, when a significant between groups difference was observed. The Friedman's one way ANOVA was used to determine within group differences. Additionally, the performance of the 4 Wernicke's aphasics (out of a total of 7 aphasics) was compared to that of the AD subjects. For this, an unpaired t-test was employed.

The results thus obtained are presented and discussed in the next chapter.

RESULTS & DISCUSSION

CHAPTER IV

RESULTS & DISCUSSION

The aim of the present study was to design a language test in Hindi to differentially diagnose dementia from aphasia, using the profile of the normal elderly population to compare them. Following the design of the test, it was administered to all three subject populations. The scores were compiled and statistically analyzed to determine which subtests in the language test were sensitive to the differences across the three groups. The study was conducted on a small sample of 21 subjects, 7 in each subject group as the data collection was time bound. Moreover, in the present study, only one specific subtype of cortical dementia (i.e, the Alzheimer's disease) was taken up for detailed study and all subjects were required to have neurological confirmation of site-of-lesion in aphasics and nature of pathology in the Alzheimer's disease subjects. Both these factors precluded data collection on a larger sample. Several cases of subcortical dementias, severe grade dementias with psychiatric problems and cases without neurologically confirmed diagnoses (lack of CT scan/MRI information) could not be taken up for the study.

Before administration of the test, every subject was questioned regarding time since onset of disease, history of

onset, educational background and different languages known. In addition, each subject's clinical record file was studied in detail and information on cognitive testing (in case of Alzheimer's disease) and neurological and radiodiagnostic testing in aphasias and AD subjects was also compiled. This information appears in TABLE 2 for AD subjects and TABLE 3 for aphasics. Basic subject demographic data is given in TABLE 1.

TABLE 1 : SUBJECT DEMOGRAPHIC DATA

GROUP I : NORMAL ELDERLY	GROUP II : ALZHEIMER'S DISEASE	GROUP III : APHASICS
(1) Total no - of subjects : 7	Total no : of subjects : 7	Total no : of subjects : 7
(2) Male/Female ratio : 4 : 3	Male/Female ratio : 4 : 3	Male/Female ratio : 4 : 3
13) Age range of subjects : 60 - 73 years	Age range of subjects : 60 - 82 years	Age range of subjects : 53 - 76 years
14) Mean age : 63.71 years	Mean age : 67.71 years	Mean age : 62.71 years

SL NO	AGE/SEX	LANGUAGES KNOWN	EDUCATION	COGNITIVE TESTS		RADIOLOGICAL TESTS			OTHERS	
				MMSE	ECAQ	WAIS/WMS	CT SCAN	MRI		SPECT
1	82/M	Hindi, Punjabi, English	B.A.	21/30	5/10	-	1) Widening of bilateral cortical sulci, basal cisterns and sylvian fissures. Vascular dilatation of ventricular system, bilateral cerebellar foliae prominent. Ventricular septum in midline.	1) Evidence of global cerebral atrophy Diagnosis: Senile Dementia of Alzheimer type (SDAT)	-	1) Disturbed gait; loss of memory for recent and past events, bladder incontinence, visual-perceptual deficit, frequently loses temper highly irritable.
2	75/M	Hindi, English, Tamil	M.A.	16/30	5/10		2) Widening of bilateral cortical sulci, prominent cerebellar foliae, prominent basal cisterns and sylvian fissures. Ventricular system - generalized dilation; septum in midline.	2) Global atrophy with left putamenal and anterior limb internal capsule lacunar infarcts.	-	2) High-stepping gait, loses balance while walking; tremors observed in upper extremities, extreme forgetfulness, speech beginning to slur.
3	60/M	Hindi, Punjabi, English	XIth	14/30	3/10	-	3) Secondary ventriculomegaly, diffuse cortical atrophy, especially of bilateral temporal lobes. No focal lesions in brain parenchyma - posterior fossa and basal cisterns - normal.	3) Old left temporal infarct with generalized cerebral atrophy	3) Bilateral hypoperfusion in the parietal area - left side larger than right side.	3) Rapid deterioration of cognitive functions since past 1 year. Increased suspiciousness since past 1 year.

SL	AGE	LANGUAGES	EDUCATION	COGNITIVE TESTS		RADIOLOGICAL TESTS			OTHERS		
				MMSE	ECAR	WAIS/WMS	CT SCAN	MRI		SPECT	
4	60	M	Hindi, Punjabi, English	B.A.M.S.	27/30	8/10	80	(4) Post. Fossa - Ventricular septum moderately dilated; sylvian fissures have low convexity and sulci widened. No focal abnormality observed in parenchyma.	(4) -	(4) Complete cortical band not seen. Decreased regional blood flow in the temporo-parietal area. Diagnosis : Alzheimer's Disease.	(4) Slightly impaired orientation to time and to general information
5	70	F	Hindi, Bhojpuri, Pahari.	Primary level	9/30	4/10	-	(5) Ventricular enlargement seen; basal cisterns are widened; prominent atrophy in temporal lobes. Inference : Cerebral atrophy consistent with Alzheimer's disease. Old infarct in left temporal lobe.	(5) -	(5) -	(5) Impaired orientation to place, general weakness, forgetfulness, loss of memory (often forgets family members names) and confabulations in reporting information (imprecise articulation, often gives unintelligible responses)
6	65	F	Hindi, Punjabi	VIIth	16/30	6/10	WMS : MQ = 61	-	(6) Mild cerebral atrophy	(6) Left temporo-parietal hypoperfusion; normal finding on right side	(6) Slight disorientation to place and time, increasing feeling of insecurity. Social withdrawal, sleeplessness. Comment : Early dementia of Alzheimer Type
7	62	F	Hindi, Punjabi,	VIIIth	23/30	5/10	WMS : MQ = 58	- Mild Cerebral Atrophy Global mild cerebral volume loss, compatible with age. - No pronounced regional atrophy No significant periventricular white matter lesion seen. Prominent perivascular spaces	(7) Mild cerebral atrophy - Near normal scan for chronological age. Brain parenchyma normal. Diagnosis : Early Alzheimer's Disease	-	(7) Impaired memory recall for past events. No behavioral changes. Decreased appetite reported

TABLE 3 : GROUP III : APHASICS

S. NO.	AGE/SEX	LANGUAGES KNOWN	EDUCATION	TIME ELAPSED POST LESION	CT SCAN FINDINGS	DIAGNOSIS
1	76/F	Hindi, Urdu, Punjabi	Vth	8 Months	Left frontal hematoma	Broca's aphasia
2	69/F	Hindi, Kashmiri, Urdu.	VIIIth	10 Months	Left MCA - bifurcation aneurysm.	Wernicke's aphasia
3	53/M	Urdu, Hindi.	VIIIth	4 Months	Large intra cerebral hematoma in the left sylvian fissure	Broca's (motor) aphasia
4	62/M	Hindi, English	B.Com.	9 Months	Mature infarct in the right temporo-occipital region; calcified dot lesion in left parietal region. Generalized cerebral atrophy.	Wernicke's aphasia
5	64/M	Hindi, Marathi, English	B.A.	1 Yr. 2 Mths	MCA territory : Lacunar infarct	Wernicke's aphasia
6	56/M	Hindi, Punjabi, Pahari.	XIIth	7 Months	Atrophy of frontal lobe; frontal lobe infarct (Left) side.	Broca's aphasia
7	59/F	Hindi, Punjabi	Xth	11 Months	MCA territory of left side : multiple infarcts	(Wernicke's resolved) Anomic aphasia

After obtaining this preliminary information, the test was administered to each of the subjects in a single setting. The detailed scores, obtained by each subject group, on the various subtests have been compiled. Additionally, the performance of Alzheimer's disease subjects was also compared selectively with the Wernicke's aphasias across subtests.

TABLE 4 ; MEAN SCORES AND STANDARD DEVIATIONS OF THE THREE
SUBJECT GROUPS ACROSS SUBTESTS

SUBTESTS	GROUP I (n=7) NORMAL ELDERLY		GROUP II (n=7) {ALZHEIMER'S DISEASE		GROUP III (n=7): APHASICS	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
I. Confrontation Naming (Real objects)	20	0	13.714	5.908	7	5.972.
II. Confrontation Naming (Line drawings) Objects	10	0	4.571	3.552	3.714	2.690
Actions	9.714	0.488	2.714	2.498	3.857	3.185
Total	19.714	0.488	7.286	5.282	7.571	5.472
III. Generative Naming Animals	13.714	2.752	4.286	2.870	3.571	3.552
Fruits	9.857	1.773	4.429	4.650	2.571	2.572
Vegetables	14.143	3.338	3.429	3.207	2.714	2.812
IV. Word Association Test Syntagmatic response(S)	2	1.155	1.143	0.900	2.857	3.185
Paradigmatic response(P)	7.857	3.288	3.571	0.900	1.571	1.902
Unassociated (UA)	0.571	1.134	1.714	1.604	0.286	0.756
Multiword responses (MWR)	6.286	3.904	6.571	5.062	1.857	2.193
Repetition (R)	0.429	0.535	5.714	5.090	1.714	1.496
No Response (NR)	1.000	0.816	6.143	5.984	9.714	6.651

TABLE 5 : MEAN SCORES AND STANDARD DEVIATIONS OF THE ALZHEIMER'S DISEASE vs. WERNICKE'S APHASICS ACROSS SUBTESTS

SUBTESTS	ALZHEIMER'S DISEASE (n = 7)		WERNICKE, S APHASIC (n = 4)	
	MEAN	S.D.	MEAN	S.D.
I. Confrontation Naming (Real objects)	13.714	5.908	10.75	4.992
II. Confrontation Naming (Line drawings) Objects	4.571	3.552	5.5	1.0
Actions	2.714	2.498	5.75	2.872
Total	7.286	5.282	11.25	3.403
III. Generative Naming Animals	4.285	2.870	5.75	3.096
Fruits	4.429	4.650	4.0	2.582
Vegetables	3.429	3.207	4.25	2.872
IV. Word Association Test Syntagmatic response(S)	1.143	0.900	4.75	2.986
Paradigmatic response(P)	0.857	0.900	2.5	2.082
Unassociated (UA)	1.714	1.604	0.5	1.0
Multiword responses (MWR)	6.571	5.062	3.25	1.893
Repetition (R)	5.714	5.090	2.0	1.826
No Response (NR)	6.143	5.984	5.0	4.082

Results indicated that the real object naming, word association, descriptive discourse and narrative discourse subtests were highly sensitive for the differential diagnosis between dementia and aphasia. The other two subtests - picture naming (objects and actions) and generative naming (category -

specific) successfully dissociated the normal elderly and the Alzheimer's disease. Though these two subtests were not sensitive to the dementia vs. aphasia language profile differences; the fact that the normal elderly subjects could be differentiated is nevertheless, an important finding, particularly when one considers that 6 out of our 7 AD subjects were diagnosed as early AD with only mild dementia. Also, each of the subtests in the language test was sensitive to the normal elderly-Alzheimer's disease group differences, suggesting that the test may indeed be of value in an early detection of Alzheimer's disease, since it so clearly demarcates it from the subtle language changes that occur in the normal elderly.

GENERAL COMMENT :

Commenting on the differential sensitivity of the six subtests, the results indicate that all the subtests effectively distinguish between the normal elderly and AD subject populations. On all these subtests, the AD subjects demonstrate a more concrete pattern of language deficits, when compared to the subtle changes in the linguistic capabilities of the normal elderly subjects. Though stated with caution, these results do seem to provide empirical evidence for the "Alzheimer's disease or dementia of the Alzheimer type (DAT) is a form of an exaggeration of the normal aging process" hypothesis, specifically with regard to their performance on this language test.

For differentially diagnosing DAT from aphasics, the real object naming, word association, delayed story recall and descriptive discourse subtests proved to be highly sensitive while the picture naming and generative *category* naming subtests were not as sensitive. Comparing the mean score differences, it was observed that the AD subjects performed better than the aphasics on the generative naming task across all categories chosen. On the other hand, Alzheimer's disease subjects performed almost similar to the aphasics on the picture naming task. The difference emerged in the fact that AD subjects performed relatively better on object picture naming than actions, while aphasics performed almost similarly across both types of picture naming tasks. Again, the fact that these subtests failed to show

significant differences could be due to the variability in performance of both the AD and aphasic subjects, as evidenced by the high standard deviation scores (Refer table 4). Most reports available in literature suggest that there is a considerable overlap in language characteristics of the AD and the Wernicke's aphasics. Hence, this was taken up as an additional analysis in the present study to determine if this overlap of characteristics was reflected in the scores obtained by these two groups on the various subtests.

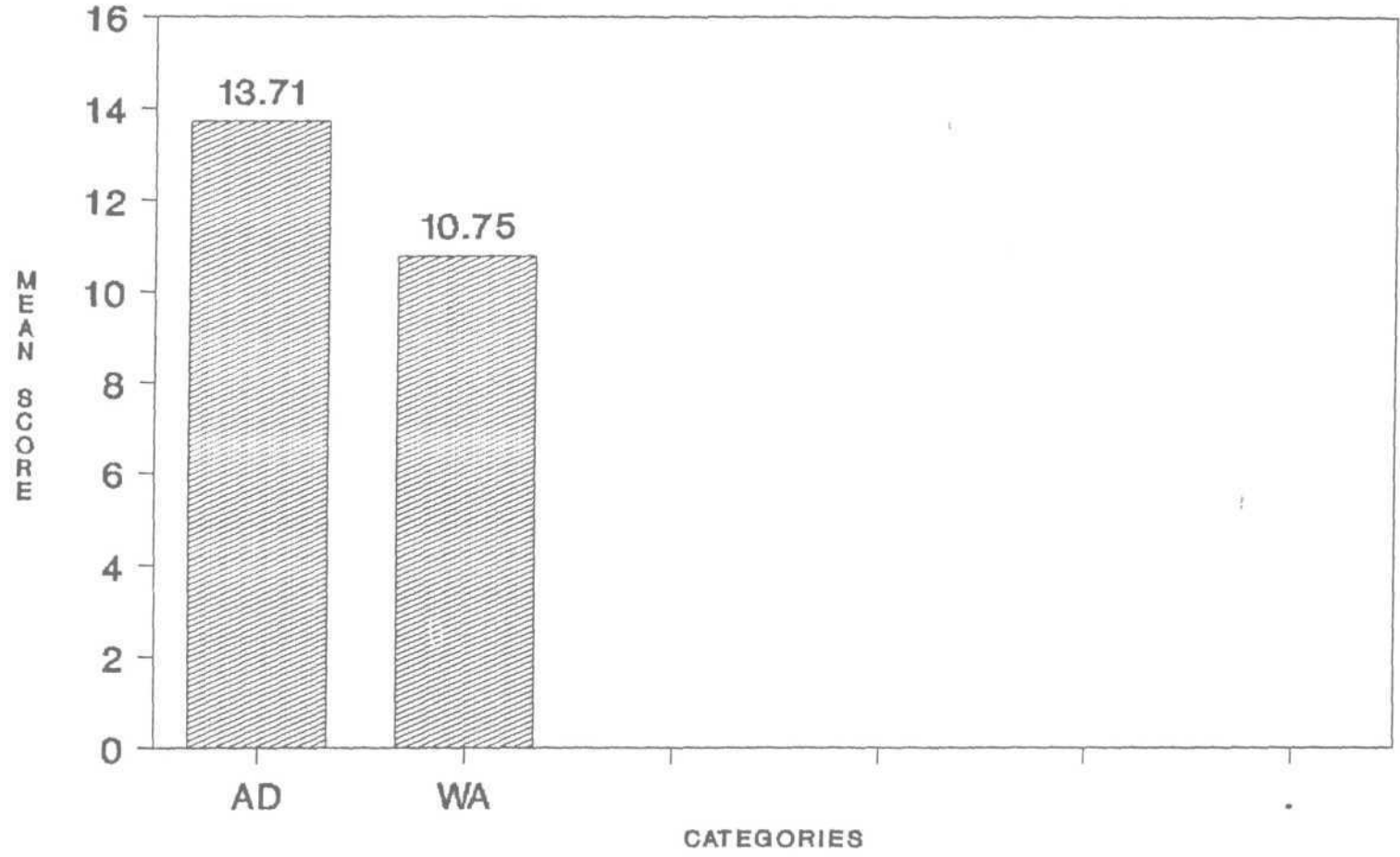
On comparing the AD and Wernicke's aphasic subjects, the word association test and the narrative and descriptive discourse subtests revealed differences while the generative naming and the two confrontation naming subtests did not reveal differences, probably indicating that both groups have a nearly similar naming deficit in severity, though the underlying mechanisms responsible for the deficit could be different. The differential diagnosis between these two subject groups, no doubt is a more challenging task that any language test should seek to achieve, since the groups are acknowledged to be highly similar.

What follows is a discussion of the within and between group differences obtained on the various subtests and a comparison of these results with existing reports in the literature reviewed.

1. SUBTEST I : CONFRONTATION NAMING OF REAL OBJECTS

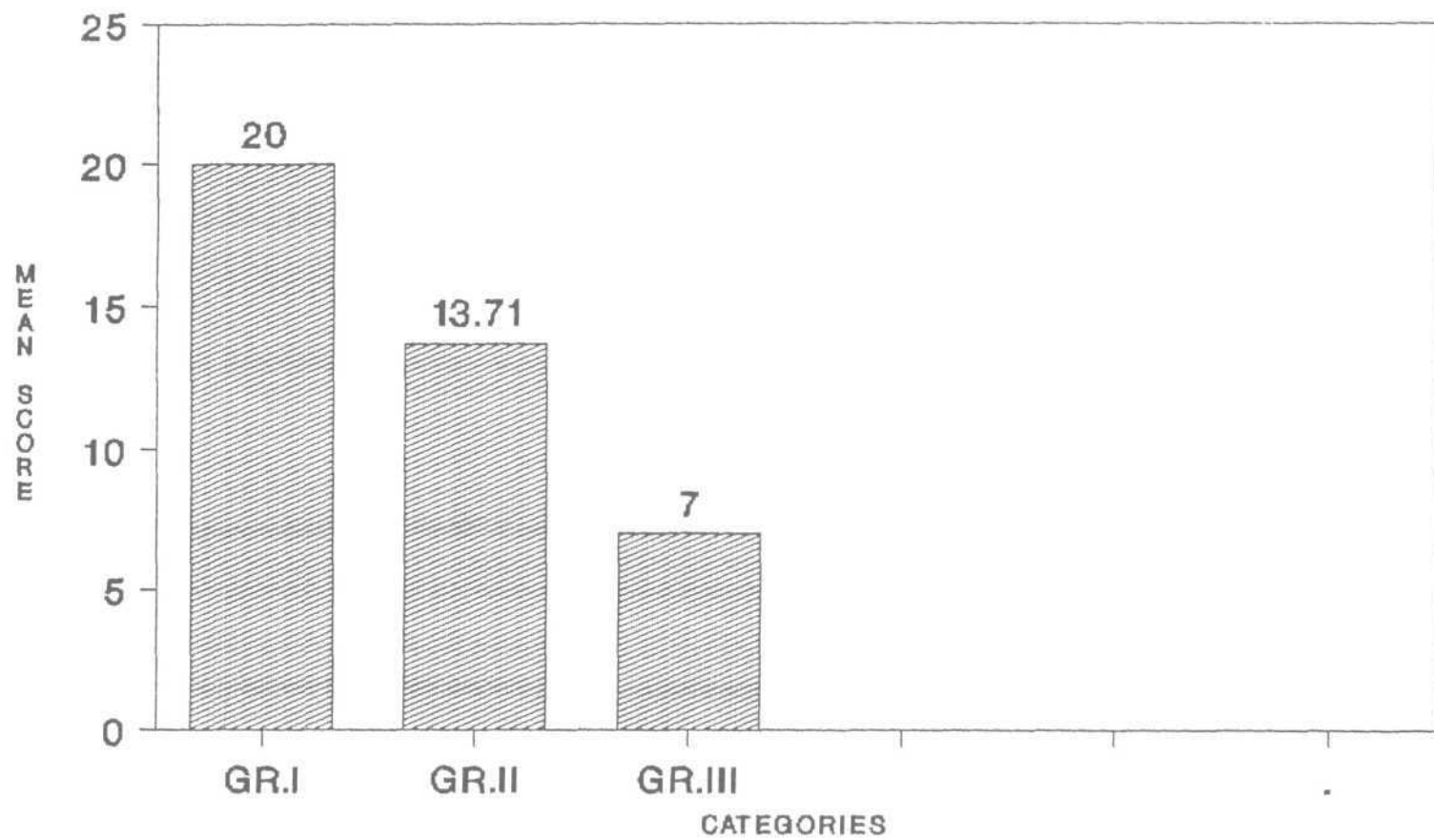
Our results indicate that confrontation naming of real objects successfully discriminated between all three subject groups. The trend observed was that the normal elderly performed better than the AD subjects, who in turn performed better than the aphasics (see Fig. 1a). On comparing the AD subjects to Wernicke's aphasics, no significant difference emerged, but the AD subjects had a better mean score than the Wernicke's aphasics, indicating that naming deficits or word retrieval difficulties are a core part of both groups (see Fig 1b). The results obtained regarding the statistically significant differences between the normal elderly and the AD subjects are in accordance with those obtained by Shuttleworth and Huber ('88) which was the only study using real objects as stimuli in a confrontation naming task. Another interesting aspect in the AD subjects performance was the demonstration of object use or elaborating on a single feature of the object when unable to name. Benefit in terms of naming, when a phonemic cue was given remained inconsistent. An example of single feature elaboration was commenting on the colours of the 'pencil', uses of the object 'knife', etc. Another instance where the subject demonstrated the object use was taking the object "cup" to the lips, combing his hair with the comb but failing to name in both examples, even when given the phonemic cue.

FIGURE 1b
CONFRONTATION NAMING (real objects)
AD vs. WERNICKE'S APHASICS



AD - ALZHEIMER'S DISEASE
WA - WERNICKE'S APHASIA

FIGURE 1a
CONFRONTATION NAMING ACROSS GRP.
DIFFERENCES



I - Normal Elderly;
II - Alzheimer's Disease;
III - Aphasics.

2. SUBTEST II : CONFRONTATION NAMING OF LINE DRAWINGS

Results obtained on this subtest indicated that this subtest successfully dissociated the normal elderly and the AD subjects, as well as the normal elderly and aphasics but did not differentiate between the dementics and aphasics (see Fig 2a). The difference between AD subjects and Wernicke's aphasics also did not emerge to be significant (see Fig 2b). The line drawings consisted of 5 objects and 5 actions. Analysis of scores obtained was done for object and action naming separately as well as for combined naming. The normal elderly vs. AD subjects performance difference, obtained on the picture naming task in the present study is in agreement with earlier results of Bowles, Obler and Albert ('87) as well as those of Shuttleworth and Huber ('88).

Further, the fact that the mean number of correctly named pictures did not differ for the dementia and aphasia groups is in concord with similar results obtained by Watamori et al ('90). The total means (for action and object naming) for dementia and aphasia groups were 7.286 (SD = 5.282) and 7.571 (SD = 5.473) respectively. However, even though quantitative differences do not exist, there is sufficient evidence from the study quoted to suggest that qualitative differences between the two groups do exist, and probably a detailed analysis of error patterns on a naming task may potentially serve as clinical markers to distinguish aphasics from AD subjects.

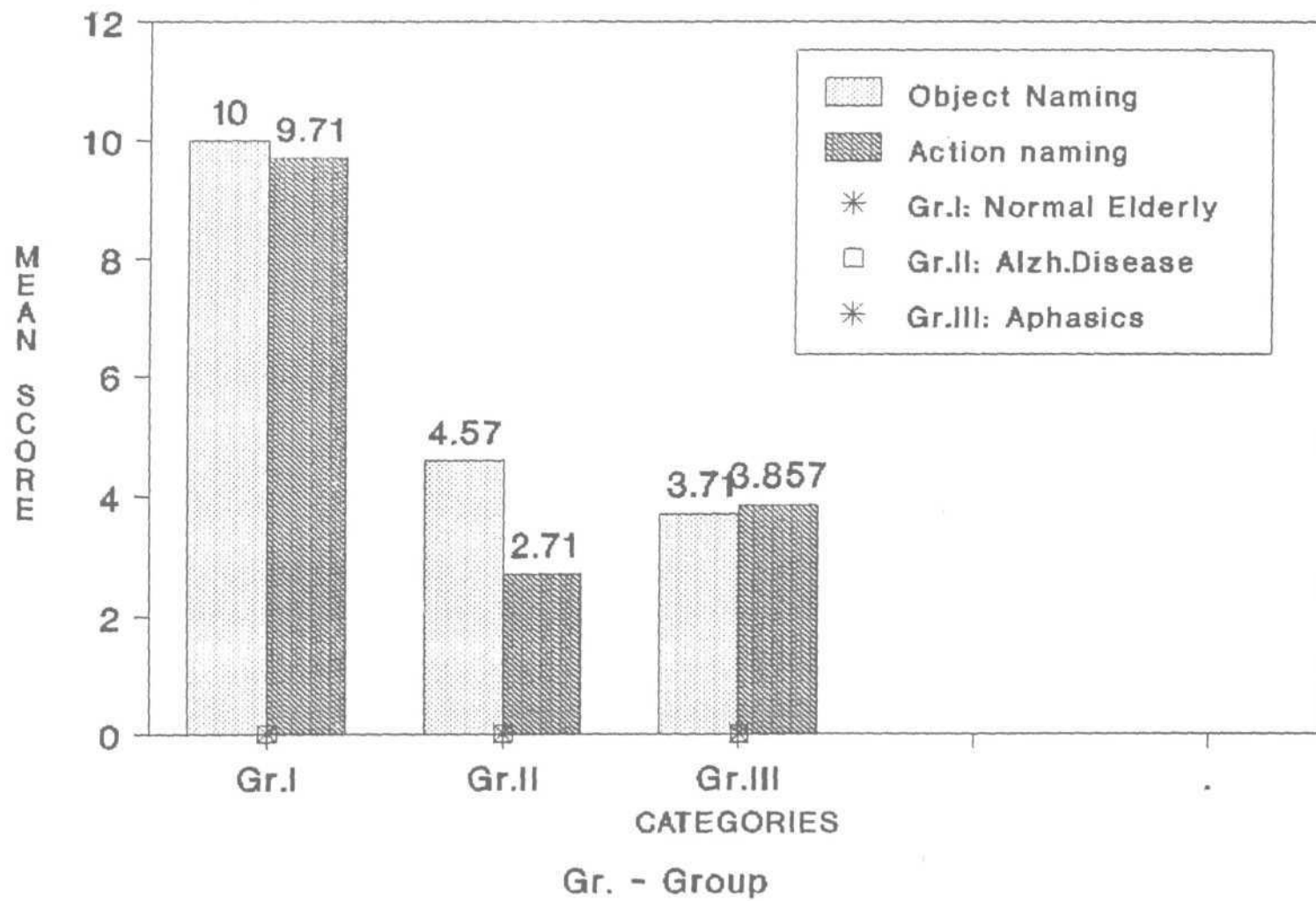
In the current study, both AD and aphasic groups made largely semantically related responses. However, AD subjects

frequently named a semantically related and visually similar word for the stimulus word. For example, naming the picture of a "tree" as a "flower", or that of an "umbrella" as a "cap". Another interesting feature was the inability to perceive the entire stimulus and focusing on one aspect or feature of the stimulus. For example, instead of naming the picture of a "house", the subject pointed to a window and named it, going on to count the number of windows, etc. For AD subjects, a description of attributes was common. For example, saying "It looks like a gulmohar" for the picture of a "tree" or "The roof is made of tiles" for the picture of a "house", etc. Both these patterns are consistent with the findings of Watamori et al ('90), suggesting that there may well be a close interaction between perceptual acuity and semantic abilities in AD patients i.e, errors may occur at both the perceptual stage and/or semantic retrieval stage of naming. This data also supports the findings of Kirshner et al ('84). In aphasics, besides semantic paraphasias, phonemic paraphasias were also observed more commonly than in the AD group. The absence of perceptual difficulties in the aphasics could also reflect upon relatively intact cognitive processes or in other words, could be suggestive a naming deficit being restricted to the linguistic sphere.

Finally, another interesting aspect that was observed when comparing real object versus picture naming tasks, was that normal elderly subjects and aphasics did not show much difference when comparing mean scores across the two naming tasks, but the AD subjects showed a substantial difference across the two tasks,

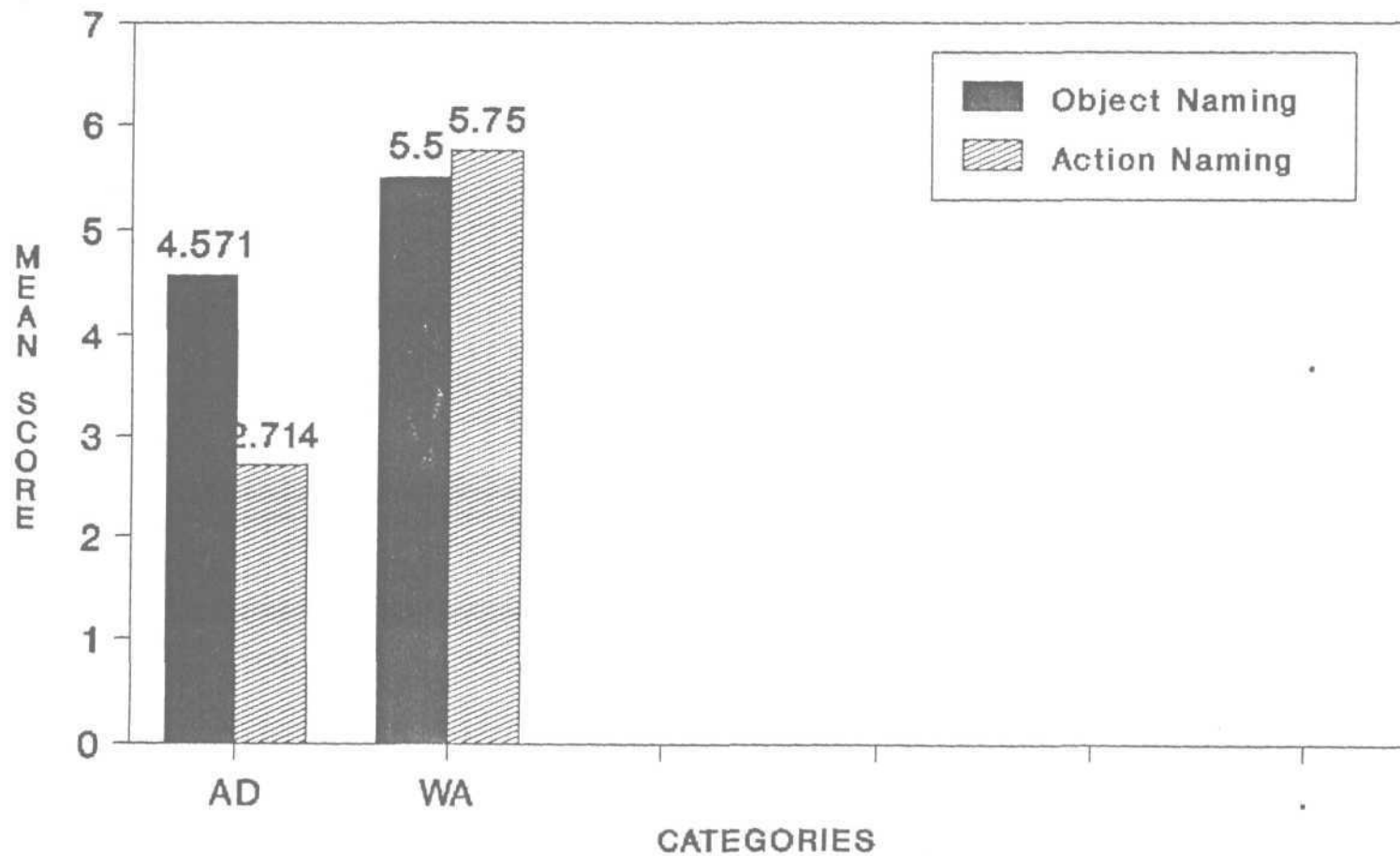
performing better with real objects than with pictures as stimuli. The mean scores for naming of real objects and pictures were 13.714 (SD = 5.908) and 7.286 (SD = 5.282) respectively. Quantitatively, there were fewer perceptually related errors in naming real objects as compared to naming pictures in the AD group. This seems to suggest that improving the quality of the visual image may facilitate better performance on naming tasks by subjects with dementia. A similar response trend has been noted by Shuttleworth and Huber ('88). AD subjects in the present study, also revealed near adequate descriptions of object use or gross features of object appearance and occasionally demonstrated use of the object, similar to observations made by Bayles and Tomoeda ('83).

FIGURE 2a
PICTURE NAMING (OBJECTS & ACTIONS)
ACROSS GROUP PERFORMANCE



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FIGURE 2b
PICTURE NAMING (OBJECTS & ACTIONS)
AD vs. WERNICKE'S APHASIA



AD - Alzheimer's Disease
WA - Wernicke's Aphasia

3. SUBTEST III : GENERATIVE NAMING

In this subtest, subjects were compared across the three groups on category naming (animals, fruits and vegetables) in a time constraint setting. Results obtained indicated that the task was not sensitive to detecting differences between dementia of Alzheimer's type (DAT) and aphasics, though it clearly differentiated the normal elderly controls from both DAT subjects and the aphasics (see Fig 3a). Similar results have been observed in a study conducted in Kannada (a Dravidian language, spoken in Southern India) by Raksha, H.R. ('96). In the case of AD subjects and aphasics, there were no within group differences observed on naming across the three categories. On the other hand, in normals, the number of animals named was significantly more than fruits, and the number of vegetables named was also more than fruits. The fact that such differences in performance across the three categories were not observed in either the AD subjects or the aphasics could indicate that there is a general decline in naming abilities in both these groups which is not necessarily specific to the categories chosen for the task.

The differences observed between performance of normal elderly subjects and AD subjects are consistent with those found by Monsch et al ('92). Some of the typical errors made by the AD group were perseveration errors, overlap between categories particularly while naming fruits and vegetables, personal comments (for instance, "I eat fruits; I like them", etc.),

idiosyncratic responses, (for instance - "Ask my wife about vegetables; I don't know what she makes").

The difference in mean responses of Wernicke's aphasics vs. AD subjects was found to be insignificant and is well-illustrated by studying the bar chart (see Fig 3b).

FIGURE 3a
GENERATIVE NAMING :
ACROSS GROUP PERFORMANCE

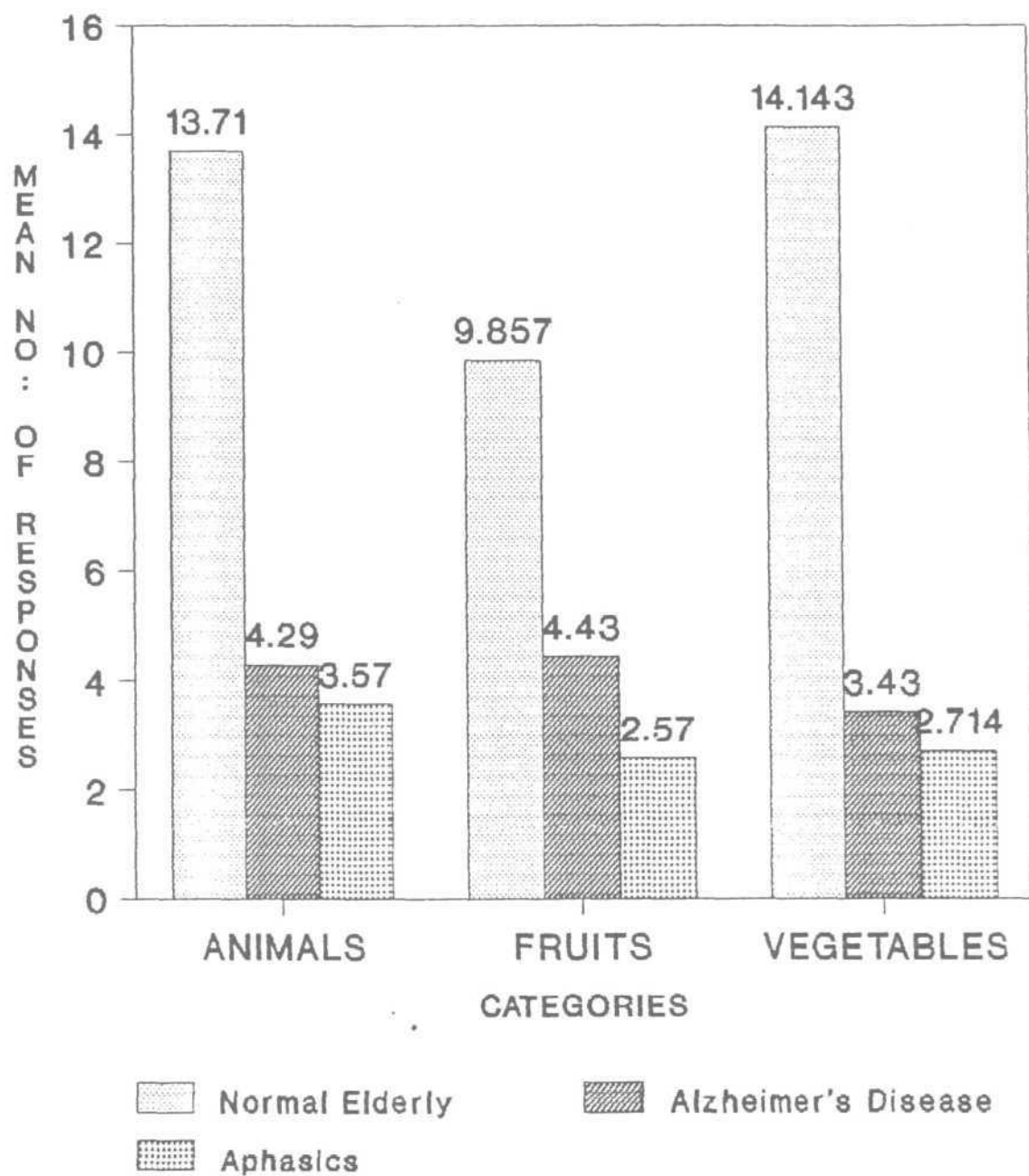
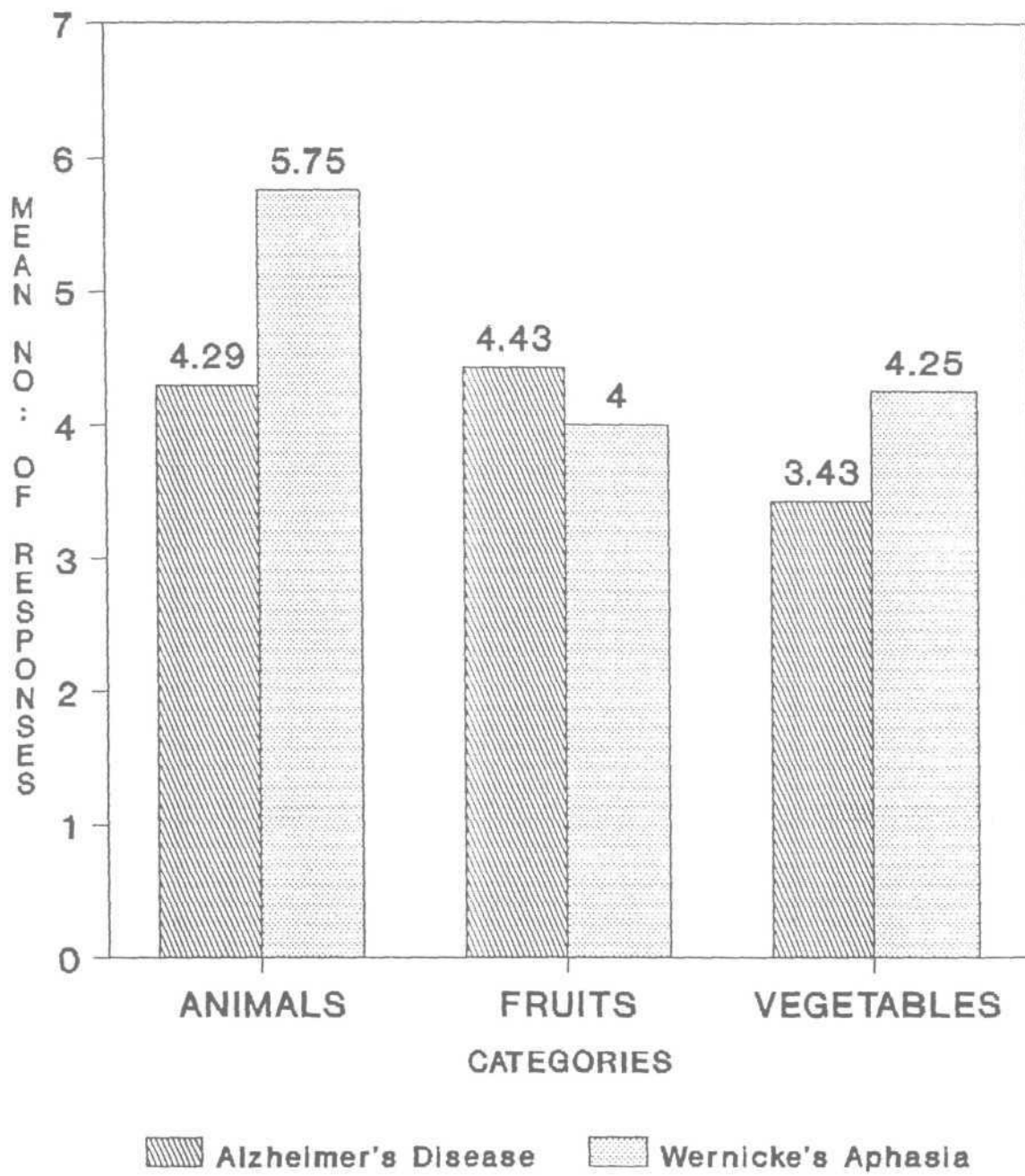


FIGURE 3b
GENERATIVE NAMIGN RESPONSES :
ALZHEIMER'S Vs. WERNICKE'S



4. SUBTEST IV : WORD ASSOCIATION TEST

A word association task, as mentioned earlier helps to assess degree of lexical disintegration and the responses on such a test may help to differentiate between dementia and aphasia. Results obtained on this subtest indicated that the unassociated, multi-word and perseverative (repetition) response differences helped to dissociate the dementics and aphasics. The normal elderly and the Alzheimer's disease subjects could be distinguished based upon the number of paradigmatic and perseverative response differences (see table 4).

On analysis of within group differences, it was observed that the normal elderly and the aphasics had significant differences. Within the normal elderly group, maximum paradigmatic responses and minimum unassociated responses were observed. On the other hand, AD subjects produced minimum paradigmatic responses and maximum multiword responses. Aphasic subjects had a maximum of null responses and a minimum of unassociated responses. Syntagmatic response differences were observed only in the additional comparison between AD subjects and Wernicke's aphasics (where the latter produced more such responses - see Table 5). This difference, however was not observed in the comparison between AD subjects and the aphasic group (as a whole)- The proportion of paradigmatic responses is considerably lesser in both dementia and aphasia, when compared to the normal elderly (this difference being significant between the normal elderly and AD subjects). This decrease in paradigmatic responses points to the fact that in both groups

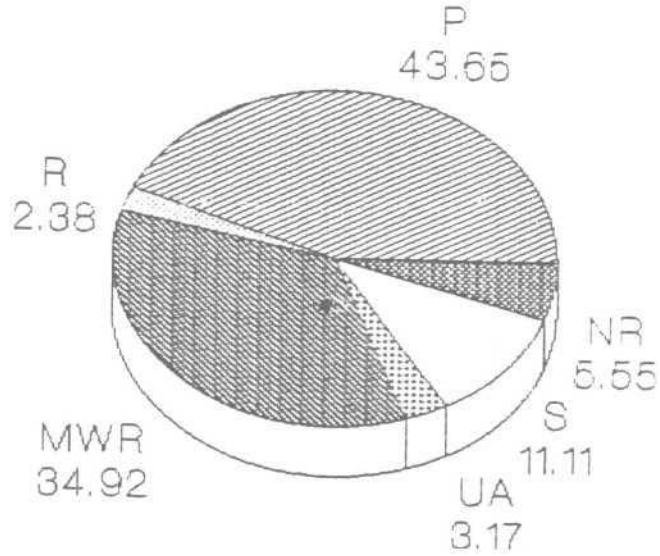
aphasics and AD subjects, there is a tendency to shift away from a paradigmatic response strategy, being more pronounced in the AD subjects. Again, the mechanism effecting this decrease is proposed to be different, because in aphasics, this may be due to either an inability to access these semantic markers or a true loss of these markers. While in dementia, it is thought to be a possible loss of semantic markers and not an access problem.

This shift away from a paradigmatic response strategy could also explain the increase in the number of idiosyncratic responses in case of the AD subjects, as compared to the aphasic subjects. Also, perseveration responses, which were rather infrequent in the normal elderly subjects were more prevalent in dementia and probably resulted because of lack of, or disrupted self-monitoring mechanisms in dementics. Goldstein ('43) explained that perseverations occur when a subject has exceeded his capacity level, yet wishes to avoid failure. As expected, most of the null responses came from the aphasics, followed by AD subjects. Most of these results are in concord with the findings of Gewirth, Schindler and Hier ('84).

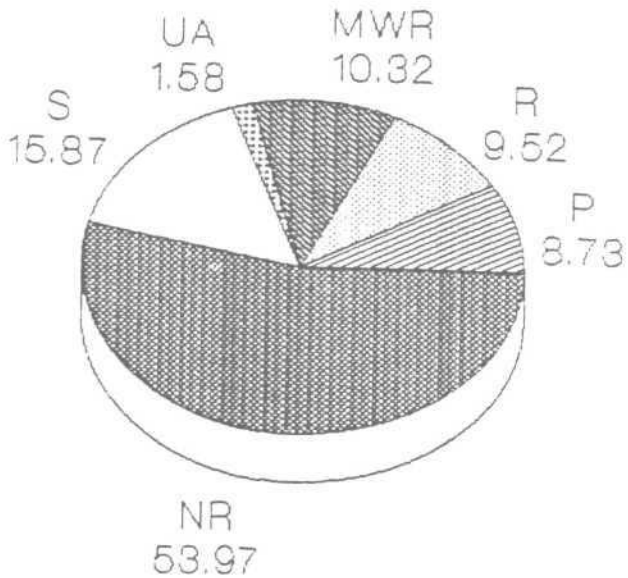
FIGURE 4a

Word Association Test :
Across Group Performance

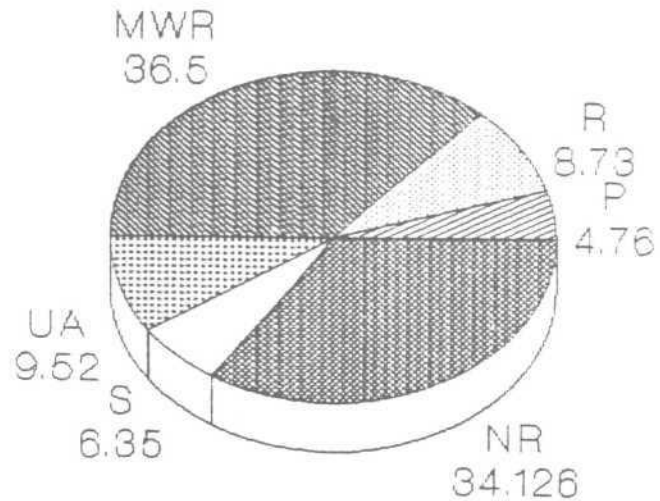
GROUP I : NORMAL ELDERLY



GROUP III : APHASICS



GROUP II : ALZHEIMER'S



5. SUBTEST V : VISUAL SEQUENCING OF PICTURES DEPICTING A STORY

Results indicated that most subjects in the study were able to order the picture plates with sequential progression of the story. Data were as follows :

GROUP I : NORMAL ELDERLY - All 7 subjects performed the sequencing task without error.

GROUP II : ALZHEIMER'S DISEASE - 5 out of 7 subjects were able to sequence the pictures correctly. Of the two subjects that couldn't; one revised the error and made a self-correction spontaneously. The other subject interchanged the order of pictures 2 and 3, placing picture 3 before picture 2.

GROUP III : APHASICS - 6 out of 7 subjects were able to do the task correctly.

Though relative response latencies were not measured across the three groups, a mention needs to be made of the delayed response latency observed across the AD group for this particular task.

6. SUBTEST V AND VI : DISCOURSE

Both measures of discourse - narrative and descriptive were thought to be sensitive in distinguishing between the groups, on a detailed analysis. While the delayed story recall was thought to be a test of episodic memory, the picture description task was more a measure of attentive observation and spontaneous utterances.

Discourse measures in the proposed language test showed a progressive degradation in pragmatics along the **normal elderly-mild AD - moderate AD** continuum. However, as expected, there was an overlap in the type of features observed between the moderate AD and Wernicke's aphasic. However, discourse of the Wernicke's group had more meaningful propositions and was more coherent. Also the number of personalized comments and idiosyncratic, utterances were far more in the moderate Alzheimer's disease subject. The number of repetitions was more in the Wernicke's and based upon these features, these two groups could be differentiated.

The discourse analysis is presented for each representative sample, with examples to illustrate each typical feature.

TABLE 6 : RESULTS OF ANALYSIS OF VARIANCE (ANOVA) FOR WITHIN AND BETWEEN GROUP DIFFERENCES

SUBTEST	ONE FACTOR ANOVA BETWEEN GROUP DIFFERENCE	FISHER'S PLSD (POST-HOC)			UNPAIRED t-TEST ALZHEIMER'S vs. WERNICKE'S APHASICS	FRIEDMAN'S ONE WAY ANOVA WITHIN GROUPS
		NORMALS vs. AD	NORMALS vs. APHASICS	AD vs. APHASICS		
1. Real Object Naming	**	**	**	**	NS	—
2. Picture Naming	**	**	**	NS	NS	—
a) Object Picture Naming	**	**	**	NS	NS	—
b) Action Picture Naming	**	**	**	NS	NS	—
3) Generative Naming						
a) Animals	**	**	**	NS	NS	NORMALS : Animals vs. Fruits,* Fruits vs. Veg.]
b) Fruits	**	**	**	NS	NS	Alzheimers and Aphasics] NS
c) Vegetables	**	**	**	NS	NS	
4) Word Association Test						
a) Syntagmatic responses	NS	NS	NS	NS	*	

* Significant at 95% level
NS Not significant

SUBTEST	ONE FACTOR	FISHER'S PLSD (POST-HOC)			UNPAIRED	FRIEDMAN'S ONE
	ANOVA BETWEEN	NORMALS vs.	NORMALS vs.	AD vs.	t-TEST	WAY ANOVA
	GROUP DIFFERENCE	AD	APHASICS	APHASICS	ALZHEIMER'S	WITHIN GROUPS
					vs.	
					WERNICKE'S	
					APHASICS	
b) Paradigmatic responses	*	*	*	NS	NS	
c) Unassociated responses	NS	NS	NS	*	NS	
d) Multi-word responses	NS	NS	*	*	NS	
e) Repetitions	*	*	NS	*	NS	Normals & Aphasics: Significant within group differences. AD: Not significant within group differences.
f) No responses	*	NS	*	NS	NS	

* : Significant at 95% level
 NS Not significant

DISCOURSE ANALYSIS

Discourse of one representative sample from each of the different subject groups was analysed; these groups being the normal elderly, mild AD, moderate AD and Wernicke's aphasia. Discourse was not analysed for the Broca's aphasics as it was almost negligible with occasional effortful |ba| or |ma| syllable production and largely grunting and meaningful vocalizations with an obvious difficulty in speech production.

For ease of understanding, the features of discourse have been illustrated using the English translation of the sample utterance (the original utterance in Hindi appears in Appendix I).

ANALYSIS OF SAMPLE I : NORMAL ELDERLY

DELAYED STORY RECALL

This sample showed good intra and inter-sentential cohesion. The overall discourse was well connected and the story format was well structured. However, there was an increased elaborateness and verbosity, noted throughout the sample. Key aspects and features, noted in this sample were :

1. ELABORATION PROPOSITIONS :

A tendency to elaborate on certain details not directly relevant to the story line.

For eg : . . . because the fox is known to be extremely cunning.

2. REPETITIONS :

Verbatim repetitions were observed in two instances, which seemed to contribute to the overall impression of verbosity and occasional redundancy.

eg : 1 -> ... 'so she went upto the crow and began to praise it a lot saying that "Crow, O Brother crow; you sing so well".....in this way she began to praise the crow's voice a lot'.

... 'I am really feeling that I should listen to your, that you sing so well, so I am really feeling that you should sing me a song'.

3. REFERENCES :

Appropriate uses of demonstrative references (here); anaphoric references (this, that) and pronominal references (his, her) were noted. Exophoric references and collocations remained absent.

4. USE OF PRONOUNS WITHOUT ANTECEDENT

Though pronominal *cohesion* was noted across most of this sample, there was one instance in which pronouns were used with a lack of referential specificity.

eg : ... and after this, she said to it that 'I.....

5. EMPTY SPEECH :

Excessive use of the semantically empty phrase "that is" was seen throughout the sample. This phrase was used a total of 7 times, without contributing to the meaning or content aspect, but serving to maintain fluency.

6. EXCESSIVE CONJUNCTION REPETITION :

The conjunction "so" has been used excessively throughout the discourse sample.

7. WORD FINDING DIFFICULTY :

This was evident clearly in only one instance in the sample, eg : 'so, from this story what we what the moral of this story is that'.

8. SELF-CORRECTIONS :

Revisions in sentence construction were observed in four instances -

eg : 1 'a person should always know to what limits . . . that is what one's limit is, one should always keep this in mind'.

eg : 2 'so I am really feeling that you ... that I should listen to your song'.

PICTURE DESCRIPTION :

Both inter and intrasentential cohesive ties were well maintained and all major features in the picture have been observed and described. Appropriate use of pronominal cohesion (it had) and demonstrative references (there) have been made. However, excessive use of the co-ordinate conjunction "and" has been observed throughout the description, with almost every new sentence beginning with 'and ...'

ANALYSIS OF SAMPLE II : MILD AD

DELAYED STORY RECALL

The story format and sequence of main events in the story are maintained but there is a substantial increase in use of pronouns without antecedents, information errors and empty speech instances. There is poor intrasentential cohesion with significantly more unfinished phrases (APOSIOPOISIS). Other features seen are use of more than one tense in the same sentence and frequent instances of self corrections, during sentence construction attempts. Word finding difficulty can also be clearly seen.

1. INFORMATION ERROR :

Indicating that cohesion was disrupted in mild DAT patients, eg : 'A crow and a fox met outside in the jungle'.

2. POOR USE OF PRONOMINAL REFERENCES :

Without clearly specifying the antecedent, pronouns tend to be excessively used,

eg : 'for that, she thought of her plan

3. PERSEVERATION :

Unnecessary repetition of phrases is noted which contributes to the overall emptiness of speech and the decrease in informational content.

eg: '..... and on doing that from its mouth, that is; on doing that from its mouth fell.....'

4. WORD RETRIEVAL DIFFICULTY :

Word retrieval difficulties as seen in the anomic aphasic are also observed.

eg : 'so she said that Crow, crow brother, this ... that is, you are very good at ... that is ... your ... what do you call it ... your voice is very sweet'....

This example also serves as an instance of aposioposis, which is the tendency to begin one sentence, and to stop without completing and go on to the next sentence.

eg : 2 'and the fox takes it and runs away and she enough, thats it...'

In this example also, the subject has been unable to decide how to go ahead and complete the sentence. Therefore, the subject has abruptly left the sentence mid way, leaving it unfinished and gone on to the next phrase.

5. UNCERTAINTY :

In two instances the subject expressed uncertainty about the two main characters involved in the story, probably indicating an inability to retrieve recently acquired information from long term memory.

eg : ... 'one ... I guess crow ... or bird and a fox ... is it alright?'

SELF CORRECTIONS :

eg : 'and she saw the roti, and ... she wanted to eat it ... and she played a trick ... and she got it ... the roti that she wanted to get from it' .

It is interesting to note that both corrections have been made in instances of erroneous pronoun use.

PICTURE DESCRIPTION :

The sample shows more evident deterioration than the subtle changes seen in the discourse of the normal elderly. Personalized comments and several 'empty' speech instances are noted. Repetition of information and word retrieval difficulty is also more marked. The description gives the impression of circuitous discourse where informational content is sacrificed but fluency is maintained.

1. WORD RETRIEVAL DIFFICULTY :

eg : 'and this is for reading a school or city or ... some library like thing'.

Here, not only is the struggle for the word "library" evident, but also the fact that the library has been referred to as a "thing" rather than a place.

2. PERSEVERATIONS :

eg :- And these are children, some are going into the house this I mean child that is, they are entering into the house'.

3. **PERSONALIZED COMMENTS :**

eg : 'in these matters, you can just keep talking - you never know about people ... all the time just passes away'.

Here, not only is this a personalised comment, but it is lacking in coherence and does not appear to convey any proper meaning.

4. **EXOPHORIC REFERENCES :**

The subject has speculated that there may be crowds, with no such inference available from the picture.

eg :- ... 'there must be crowds also, as in ... our Delhi ... what we see in our big cities'.

This is also an example of the self corrections and re-phrasing of utterance that the subject seems to do.

5. **EMPTY SPEECH**

eg : ... 'these children, some are going into the house ... and nearby one ... for some work .. - whatever it is. ... this child I mean, they are entering into the house'.

The underlined phrase conveys information about nothing in the picture in particular and is not referring to any event.

6. **MISSING INFORMATION :**

The subject has failed to note all major observations in the picture given and report them.

SAMPLE III : MODERATE AD

DELAYED STORY RECALL

A similar pattern of findings, as seen on the picture description task were observed here. An extreme kind of breakdown in the discourse pattern was seen with errors in basic information conveyed in the story and a very high proportion of idiosyncratic utterances with low informational content were noted. Again, irrelevant comments and information errors are frequent in the sample.

1. PERSONALIZED COMMENTS

eg : "From somewhere, flew and came ... a foolish who had no brains and he had to repent one day for being so dumb' .

Here the subject is obviously referring to the crow, but the word crow has not been mentioned even once and the subject has commented upon the foolishness of the crow, not directly referable from the story.

eg : 'These kind of false things, we see each day I have found ... these days its not truth but falsehood which leads ... whatever you do, don't change anything'.

2. INFORMATION ERROR :

The subject initially said "roti", but towards the end repeatedly substituted "bread" for "roti".

3. EXCESSIVE USE OF DIRECT NARRATIVE :

In some instances where the subject wanted to say something that the fox thought in the story, he switched to a direct narrative without any referential specificity. For eg :- ... "and there it went ... the bread went down ... there is no need; the wish that I had; I fulfilled it ... now, *no arguments*'.

The subject also failed to produce any moral unlike that seen in all other samples and ended with a slightly bizarre conclusion that went as follows 'Its a story, for children if you can learn it, you can listen to it. If you don't feel like, then forget it what can you do about cunningness'?

It is of importance to note that this extreme deviancy in performance on the discourse subtests by this case is in fact, well correlated with his MMSE score (3/10; lowest in the Alzheimer's disease group), probably indicating greater cognitive deficit.

PICTURE DESCRIPTION

Marked deterioration in the meaningful content conveyed and in the relevant observations were reported. A significantly greater number of idiosyncratic and personalized comments, extreme digression from the topic and typical empty speech pattern with rambling discourse and exophoric references. Very limited observation of events in the picture has been made by the subject. Aposioposis is seen in many instances and in a much more deviant way.

1. **EMPTY SPEECH INSTANCES :**

eg : How am I I am doing kind of alright; its because of that reason, only ...

eg : "look . . . then, here you have all of different - different types ... if no one is looking, I will show' .

Here, it is difficult to imagine what the subject could possibly be referring to. The feature of leaving sentences and phrases unfinished also comes across rather well in this example.

2. **EXOPHORIC REFERENCES :**

eg : "this can be only the Lajpat Nagar Market area : only there it is like that' .

The subject has compared the picture to a real, existing market place, with no such information available from the picture .

3. **IDIOSYNCRATIC EXPRESSIONS :**

eg : ... 'I'll do it but I don't want it, whatever it is you got mine point. . . . meaning, its the same as always' .

This is conveying no meaningful information about anything in the picture stimulus and is just a personalized comment made by the subject.

Many such expressions were present in this particular subject's sample. Anaphoric and demonstrative references are present. There is an unintelligible utterance as follows "... |ma ç iniz| are kept".... Here, the subject was pointing to the tape recorder being used for recording and probably meant to say machine - |maçin| .

On the whole, this was the poorest discourse sample with reference to amount of information conveyed and relevant observations made. It also contained the highest number of empty speech instances and idiosyncratic utterances and this performance did seem to correlate with the subjects MMSE score which was the least in the AD subject group being 3/10.

SAMPLE IV : WERNICKE'S APHASIA

DELAYED STORY RECALL :

In this task, the subject had several repetitions and word retrieval difficulties along with semantic paraphasias. Information errors and instances of jargon speech were also noted.

1. REPETITION :

This is seen both in the word and phrase context

eg : ... 'she started praising the crow . . . now, then she praised the crow'

2. WORD FINDING DIFFICULTY :

... 'a black ... black ca ... crow found a roti'
-> "she began to criticize . . . no, no praise the koel . . . koel ... black ... ca ... crow...'.
-> 'and why don' t you sing some song ... of songs . . . some hymn or song sometime?'

3. SELF CORRECTIONS

.... 'and the crow came and went ...uff will come will sing. . . . got convinced by her flattery' .

4. INFORMATION ERRORS :

The fox was mistaken for a cat while the piece of "roti" was erroneously referred to in plural form - rotis (|rotiya|).

5. JARGON :

An excellent example of the tangentiality seen in Wernicke's aphasia is the following sentence :

... 'some one else's ... who feels hunger how can someone not see ... it is but sensible, no one thinks of others'.

There is a fragmentation of ideas which is also characterized by discontinuous phrases, making it difficult to interpret this utterance.

PICTURE DESCRIPTION

As expected, the overall discourse of Wernicke's aphasia showed characteristic verbal paraphasias, tangential responses, overuse of indefinite terms and repetition of information; both semantic and phonemic paraphasias and personalised comments. However, on the whole discourse seemed to be substantially more meaningful, particularly when compared to the moderate AD patients.

1. PERSONALIZED COMMENTS :

... 'this man is sitting, just staying where he is, he doesn't understand that by just sitting in the middle of the road, what a wrong thing it is'.

2. REPETITION :

After mentioning about the man sitting in the picture, the same information was repeated at the end as : 'He is selling, sitting in the middle, selling snacks or whatever he is trying to sell, he is selling'.

Here also the phrase "is selling" has been repeated twice.

3. PHONEMIC PARAPHASIAS :

For eg :- ... "It is possible he is selling books or the lib...lete...it could be a library'.... Here, the errors made before the word "library" is correctly produced, are evident.

4. ERRONEOUS SENTENCE CONSTRUCTION :

'This here is a book sort of shop'. Though it can be inferred what the subject is trying to say, the sentence itself is not correctly constructed.

5. The subject even showed one instance of a severe word finding difficulty as can be seen in the following example :

b . . . 'Further, this is some village ... no, or a fun fair . . . No, this is that . . . were you get all those items, that is ma ma ... market, . . . seems to be a market' .

SUMMARY & CONCLUSION

CHAPTER V

SUMMARY AND CONCLUSIONS

The present study was undertaken to develop a language test in Hindi, the primary objective of which was to differentially diagnose Alzheimer's disease from aphasia on one hand, and the effects of normal senescence on the other hand. An auxiliary aim was to note the pattern of language deficit in cases of Alzheimer's disease.

The review of literature essentially covered Western studies due to the paucity of research conducted in India, with regard to language deficits in dementia. The major findings indicate that phonology and syntax are relatively well-buffered linguistic levels, resistant to the ravages of dementia and normal aging. In both these groups, there appears to be a core deficit in the semantic and pragmatic functions of language. This indeed, served as the rationale for focusing the test towards a detailed assessment of semantic and pragmatic tasks.

The test was administered to a total of 21 subjects, 7 in each subject group of normal elderly, Alzheimer's disease (AD) and aphasic subjects. The AD and aphasic subjects were selected for the present study only after neurological and radiological confirmation of site-of-lesion and nature of pathology.

The test developed consists of six subtests which are - real object naming, picture (objects and actions) naming, generative naming, word association test, delayed story recall and picture

description. A subjective analysis was done for performance on discourse subtests. On all other subtests, scores were analysed for significant between and within group differences using ANOVA, following which a post-hoc Fisher's PLSD test was done.

Results indicated that the test designed, on the whole was very sensitive to detecting language performance differences between the normal elderly and AD subjects. Regarding AD vs. aphasics; the real - object naming, word association and the two discourse tests appeared to be highly sensitive. Thus, it can be concluded with confidence that language testing does indeed help to differentially diagnose AD from both, normal senescece and aphasia. Hence, the use of language tests and a detailed evaluation of language deficits in dementia is warranted for both early detection of AD and as a step further towards their better rehabilitation.

Taking into account the findings and results of the present study, we conclude the almost universal truth that Alzheimer's disease has an irreversible and slowly progressive effect on the language abilities of patients. It is earnestly hoped that this study sheds new light upon the clinical importance and diagnostic relevance of language testing to differentially diagnose dementias like Alzheimer's disease from aphasias. Inherent to this finding is also the new-found but empirically valid role of the language pathologist in the relatively virgin territory of dementia assessment and management from the clinical and research points of view.

LIMITATIONS

The limitations of the present study are as follows :

1. Limited sample size
2. The fact that different severities of Alzheimer's disease were not taken.
3. The test could have been more extensive with greater number of subtests to specifically tap semantic deficits.
4. The fact that conversational discourse was not assessed.
5. Only Broca's and Wernicke's aphasics were taken.

SUGGESTIONS

The study could be done on a larger sample size, preferably taking mild, moderate and severe types of Alzheimer's disease and comparing them with the different aphasic types of anomia, transcortical aphasia, etc. Also the test could be made more extensive, with a greater number of tasks to assess semantic abilities. Response time latencies, across the groups for different tasks could be recorded and compared.

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APPENDICES

APPENDIX I

APPENDIX I : DISCOURSE TRANSCRIBED IN IPA

NORMAL ELDERLY : DELAYED STORY RECALL

ek bar bahut pehle ki: bat hæ - ek k a tha, usko kahi: se ek roti: ka tukra mil gaya to vo roti: ka tukra lekar bahut khuḥ hua r jakar per ke u:par use khane ke lie baeth gaya.

itne me ek lomri: ki: nazar us k e par pari: r lomri: din bhar ki: bhu:khi: thi: r uska man bahut lalca raha tha ki roti: ka tukra jo hæ, kæ.se bhi= karke uske hath lag jae - kioki lomri: to hoti: hae bahut zyada calak to vo dhi:re dhi:re ye socne lagi= ki kis tarah mæ : æ.sa kya upay karu, ki roti: ka tukra jo hæ vo mujhe mil jae. to vo k e ke pas gai: r uski: bahut tari:f karne lagi: ki, "k e , o k e bhai:, tum to bahut accha gate ho, r tumhari: ava:z bahut hi: suri:li: hae, jisko sun kar sab log bahut hi: mugdh ho jate hæ r tarah_tarah ki: jise kahte hæ caplu:si, jaese karte hæ, is tarah se uski: a:va:z ki bahut zyada ta:ri:f karne lagi:

to khar a pahle to sunta raha r use sacmuc aesa laga ki va:kai: me vo bara ta:ri:f ke layak hæ. r phir uske ba:d usne kaha usse ki, jo hæ, mera bahut man kar raha hæ ki tum, tumha:ra mae ga:na sunu:, r tumha:ri: jo madhur a:va:z hæ , vo mere ka:no me pare, to k a to jo hæ,apni= ta:ri:f sun kar itna khuḥ hota hæ ki use is cl:z ka eh-sa:s hi: nahi: hua ki vo ga:na ga:ne ke lie muh kholega r roti: ka tukra jo hæ, gir jaega. to vo usne apni: a:va:z, jo apni: k - k ki: a:va:z me apna ga:na gauna ḥuru: kia r vaese hi: roti: ka tukra jo hae ni:ce gir

gaya. r vahi: jo lomri: thi: uski: jo iccha thi:, vo pu:ri:
hui: kioki usne, roti: ka tukra, jo gira, vo lekar usi: taim bhag
gai:.

to is stori: se jo hame, jo moral jo hæ is stori: ka ye hae
ki kabhi: bhi: hame apni: jo jhuti: caplu:si: jo hæ, usme kabhi:
bhi: viḷva:s nahi: karna cahie r insaun apni: kitni: had tak
matlab, uski: apni: kia si:ma hæ, iska use hameḷa dhyan rakhna
cahie.

PICTURE DESCRIPTION

ba:zar ka si:n hæ. ek rat tokri: lekar, sabzi: khari:dne ja
rahi: hæ. or ek admi: patri: par baetha kuch pu:ri:ya bana raha
hæ. or ek kitabõ ki: dukan pe jo hæ ek rat kitab khari:dne ke
lie bat-ci:t kar rahi: hæ. or ek du:sri: dukan me ek orat apni:
bacci: ko lekar ja rahi: hæ. du:sri: jagah, gubbare vala khara hæ
, dher se gubbare hæ uske pas, sarak par khara bee raha hæ or
bacca khari:dna rah raha hæ . a:ge do log khare dekh rahe hæ
duka:ne; ek dadhi: va:la, ek du:sra. du:r par ek halva:i: ki:
duka:n hæ, vaha par mitha:i:ya rakhi: hui: hæ. or a:ge du:sri:
dukane hae, ghar hæ, ba:zar ki: vahi: sab cehal-pehal has or
bijli: ka khamba hæ - balb laga hua hæ, lait hæ | samne phalo ki:
dukan hæ - phal tange hue hæ- kelõ or angu:r ke khu:b sa:re
gucche.

MILD AD : DELAYED STORY RECALL

ek ζayad . . . koa ya ciriya or ek lomri : - thi:k hæ vo ba:har jangal me mile or lomri: ne dekha ki uske, uske jo hæ - koa tha, uske jo muh me jo hæ roti: hæ . vo roti: ko dekhkr, apne, usko kha:na cahti: thi" uske lie usne apna upay su:jha, ki bhai, kæ.se mæ is roti: , ko mæ prapt kar sakti: hu : .

to vo boli: hæ ki k a, k a bhaiya - ye, vo ap, to bahut accha, apki: , kya kahte hæ - mi:thi: a:vaz hæ; suri:li: hæ, ap sara ga kar ke, alap kar ke sunaie. to k a usse bahut, kaese kahe, jo hæ prasann ho jata hæ uski: khu ζ i: Be, jo hæ. , man me, vo apna alap gana ζuru: kar deta hæ . or vo karne par uske muh se jo hæ, vo karne par jo uske muh se zara hi: cu:-cu: karti: hæ or pu:ri: ni : ce hi: gir jati: hæ or lomri: lekar ke bha:g jati; hæ or usko - bas yahi: hæ .

kahani: se ek to ye hæ ki jhu:th nahi: bolna cahie or jo sacci; bat hæ , usko sun kar ke jo hæ , manana cahie. vo apna dhokha de kar ke usne prapt kar ke li:, usse jo vo roti: prapt karna cahti: thi: .

PICTURE DESCRIPTION :

ye ledi: hæ , apne phal, fru:t vagærah, sabzi: vagæ rah, lekar ke ja rahi: hæ ya parcez kar ke ja rahi: hæ or ye hæ bacce, kuch ghar me Ja rahe hæ - or kari:b, ek kuch kam dhandha ke lie, kaese bhi: hæ - ye matlab, caild jo hæ vo entr ho rahe hæ ghar ko. or ye padhne ke lie sku:l ya ... ya ζahar, ya kuch laibrari: Jæ si: ci:z hæ . or ye bacca, phal, kuch, pata nahi: kuking kar raha hæ , sabzi: - roti: ka.

in kamo me to bs bolte raho, kuch pata nahi: logo ka, Bab taim pas ho jata hæ . sarke si: lag rahi: hæ , raste me bahut si: ci:ze hæ, bhi:r bhi: hoti hogi, jaese dilli: hamare Jaese, ham jo dekhte hæ - bare çahro me. bolne ko to bahut hæ jaese ki bs , ab mere pas kuch or nahi: hæna batane ko.

MODERATE ALZHEIMER'S DISEASE

PICTURE DESCRIPTION

maḷi:ni:z rakhi: h æ; doktor sab-kuch bhi: pata nahi:, mae to bas apka rder hæ, or ye mera kam hi: samajhne ka vakt hæ . kar denge par. . . . ai: dont vjnt it - kaese bhi: - yu: g t mai:n p int - mi:ns hameḷ a ka hi: pura:na hæ .

ghro ke bahar hæ; jo cahe kar lo - kisi: ki: majal hæ jo u:ci: a:va:z me pu:ch kar to dekhe ... oy, tune ye kam kaese nahi: kiya? par ghr to apna hæ, dekho phir yaha par - lg- lg tarh ke hæ sab, koi: dekh raha nahi: to dikhau:nga. mæ kæse thi:k sa kar raha hu: ; usi: ka hi: karan hæ.

ab to ḷayad hama:ra taim hæ bætha hæ age, apne pakaune ke ka:m me hæ . u=par lait lakri: par tang rahi: hæ

idhar ki; mammi: ji: ka dhya:n, ja nahi: raha udhar. vaha pr bacce ji: apni: kartu:te karva cuke, or phir yahi: ake mar khate hæ sabhi:, jaese yaha ke . . . drying ke chutke bacce, abhi: jo mammi: se khaenge pahuc kar mar. ye ho sakta hæ, bas ek hi: lajpat nagar markit ka eria - vaha par hi: aesa hæ. phal hæ , saman hæ or kya-kya ; pata nahi:, kya-kya bhara hua hæ.

MODERATE AD

DELAYED STORY RECALL

ek samay ki:.... jasi: baccho ko sote samay bata dete hae ki rat ke taim choti: bat.... kaha:ni hæ . a pahuca, kahi: se ur kr ek bevaku:f, dimag uske tha nahi: , bhugatna to ek din tha hi: usne, apne gadhe hone ke karn.

ek din mehnat kar krakar, din bhr kari: mehnt, phir ja kar to mili: apne hisse ki kamai:. lekr pahuca apne pedho r per par to dekha use kisne ek lomri; ne jo Jal - bhun gai: ki ye kase ki ise roti: mil gai:,dekhti: hu; kase, mere hote hue roti: jaegi iske pas. plan bnati: hæ tu: bahut accha ga:ta hat kya sur hæ, sangi:t bhari: tu hæ .

is jasi: jhu:thi: ci:ze to har din dekhte hæ : mae ne paya hæ a:jk3 l truth nahi:, jhu:th hi: age hæ, jo kar lo ; kuch nahi: cenj karna. jhu:thi: kahaniya sun kar k a has utha or ga:na furu: karta hæ. . b3s, vo gai: bred ni:ce, koi: z3ru:rat nahi: , bas mere man ki: bat mane kar li: pu:ri: - ab koi: bahas nahi: , li: bred, pna cal pri;, duniya ko dikha kr.

kahani: hæ; baccho ki: - si:kh lo to sun lo. nahi: hæ man to choro - ca:la:ki: ke ba:re me kya kar sakte ho.

WERNICKE'S APHASIA : DELAYED STORY

RECALL

kya kha:ni: sunani: hæ - ek kale.... kale.... k...k... k e ko- ek
roti: mili.-.vo ek du:r ko Ja kr ghas pr , per par bæth gya. ek
lomri: ne dekha ... dekhna to tha hi:. kisi: or hæ ; jo bhukh
hogi:, vaha se koi: dekhta: nahi: matlab ki: ba:t hæ , koi: nahi:
socta du:sre ka.

usko dikha, to vo ζuru: hui: apne ka:m par, koyal ko, koyal
ko...• kale kOe ki burai:, nahi: nahi: bdhai: karne lagi: phir
b usne k e ki: praζa nsa ki: r k e ko kaha ki "tum b hut accha
ga:te ho." ζuru: to kar, or kuch ga:no ka gi-"t; koi: bhajan ya
ga:na to kabhi: bata kar d ikha. k a jo ho gya ullu: , pht aya
gaya . . . uf. . aega. . . . gaega, a gaya, uski: mithi: , m@dthur, mi:thi:
batõ me, or usne usse Jyo hi bolna, bate btana, b tate hue
ga:ya, roti, nahi: sa:ri: rotiya pahuc kar gir pari: , to billi:
g usko lekar, vo lomri: usko lekar cl pari:. ζikζa ye mili: ki

kahi: bhi:, koi: . . . kisi:bat me nahi: ana cahie.

PICTURE DESCRIPTION

accha, isme ji: ek hæ rat, age ye lrki: hæ, jo nahi: rat hæ,
jo ja rahi: hæ, bacce ke sath. ye admi: bætha, hæ , b s vohi
rh raha hæ; smjhta nahi: hæ ki, bs s rk ke bi:c me bæ thne
se kitni: galti: bat hæ . bæ tha hæ, r kuch tal, bana raha hæ .
ye yha. hæ , kisi: kita:b jæ si duka:n hæ - likha hua hæ "buk-
haus" pr pta nahi: cl raha. ho skta hæ kitabe bee rha ho ya
lib ... lete... laibrari: ho sakti: hæ - khti: nahi: hu: mæ .
age, ye hæ to kisi: gav, nahi ye mele, nhi: ye to vo koi:, jha

se vo sabhi: ci : ze milti: hæ , vāse vo ba...baza:r, baza:r ka
lg raha hæ, par kuch nahi: kah sakte. bahut sari: ci:ze ho r
hi: hæ kis pr dhya:n de.

ye gubba:re vala, ye bcca gubara lerha hæ. is orat ne
phal khari : de hæ r ye bec rha hæ , bātha bi:c me pakore, ya jo
bhi: becna cahta hæ, bec rha hæ .

APPENDIX II

APPENDIX II : TRANSLATION OF DISCOURSE SAMPLES IN ENGLISH

NORMAL ELDERLY : DELAYED STORY RECALL

It is an incident of long ago - there was a crow, he found a piece of roti. So he took the piece of roti and went to sit on top of a tree to eat it.

Just then, a fox saw the crow and the fox had been hungry the whole day and she felt greedy, wishing that she somehow gets the piece of roti, ... because the fox is very cunning. So she slowly began to think "How can I what plan should I make so that the piece of roti, that is ... gets to me. So she went upto the crow and started praising it saying that "Crow, O, brother crow, you sing very well, and your voice is very melodious, hearing which all people get very absorbed and began to flatter the crow in different ways; the way people flatter and in this way she began to praise its voice very much.

So, at first the crow kept listening and it really started feeling that "I actually am deserving of so much praise". And then after this she said to it that ... that is, I am really feeling that I ... that you sing so well so I am really feeling that you ... I should hear your song and I should keep hearing your melodious voice.

So the crow that is, on hearing its praise became so happy that it didn't realize the fact that once it opens its mouth to sing a song, the piece of roti, that is; will fall down. So it in

its voice; that is in its caw-caw like voice, began to sing and just then the piece of roti fell down.

And the fox that was, the wish she had - was fulfilled because the piece of roti, which fell, took it and at the same time, ran away.

So in this story, what we, what the moral of this story is this that sometimes we do our,.... the false praise that is, we should never believe that and the depth to which a person ... that is *one* should know what one's limit is, and this we should always keep in mind.

PICTURE DESCRIPTION

It is the scene of a market place. One lady is taking a basket, and she is going to buy vegetables. And one man is sitting on the pavement and making some puris. And at one shop of books, that is, one lady is talking about buying a book. And at another shop, a lady is taking her child and going.

At another place, a balloon - seller is standing, lots of balloons are with him, he is standing on the road and selling and the child wants to buy. Further ahead, there are two people standing and watching the shops - one has a beard and one other person is there. Still ahead there is a sweet shop and lots of sweets are kept there. And ahead there are other shops, houses and the hustle-bustle of a market place. And there is a lamp post, with a bulb, there is light. Right in front, there is a fruit shop : fruits are hanging, many bunches of bananas and grapes.

MILD AD : DELAYED STORY RECALL

One ... I guess crow or bird and a fox - that's right, they met. out in the jungle and the fox saw that he . . his that is, the crow, in his mouth was a roti. With this in mind, he thought of his plan that, some how I should be able to get this roti. So she said that, "Crow, O brother crow - this...b that you are able t: very well ... your. . . . what do you call it - voice is sweet, it is melodious, so would you please sing and, ... rehearse and sing to me .

So the crow was too pleased with her. He happily, that is, in his mind he began to rehearse and started to sing. And on doing that, from his mouth - that is, on doing that, from his mouth, ... he had hardly uttered a few sounds and it completely fell down an; the fox takes it and runs away and she only ... this is it.

From the story, firstly we realize that lies should not be tol: and only what the truth is, we should hear it and accept it. She deceived and she got it, the roti she wanted to get from him.

PICTURE DESCRIPTION

This is a lady, she is taking fruits, fruits and all, vegetables and all and going or she has purchased and is going. -And these are children, some are going into the house and nearby one for some work, whatever it is this, I mean child that is they are entering into the house. And this is to read - a school or city or some library like thing. And this child has some

fruits - I don't know, is cooking, some vegetables and roti.

In these things, you just keep talking : one never knows anything about people, all the time just passes away. They appear to be roads; lots of things in the way, there must be crowds also, as in our Delhi, what we see, in our big cities. There is so much to say, I guess, like, that's it . . . now I don't have anything more to tell you.

MODERATE AD : DELAYED STORY RECALL

Once upon a time, like you tell kids at bed time, during the night time, its a small incident ... its a story. It flew from somewhere and reached ... a foolish; he had no brains and he had to repent one day for being so dumb.

One day after working hard, worked hard the whole day and finally got his share of earning. He took it and reached the plants and on his tree, so who saw him ... a fox who got extremely jealous thinking "how is this possible that he got the roti? Let me see ... how, with me being here, he is able to eat it?

She makes a plan: decides to flatter him and says - "you sing so well - what melody, your voice is so musical". We see false things like these each day : I have found : these days its not truth, but falsehood which is appreciated; whatever you do, don't change anything. Hearing the false stories, the crow began to laugh and started singing. As he did so, down went the bread : there is no need; that's all, she had a wish and she fulfilled it ... Now no arguments. She took the bread and went off showing it to the world.

Its a story . . . for kids - if you learn it, you can listen to it. If you don't feel like it, then forget it: what can you do about cunningness?

PICTURE DESCRIPTION

| ma {iniz| are kept ... doctor, I don't know anything ... I'm

only ... its your order and this is the time for me to understand the work. I'll do it but I don't want it, however. You got mine point .. means, like always, its the same old thing.

Its outside the houses ... do whatever you want, does anyone have the guts to raise his voice and try asking ... Hey, why haven't you done this work? But the house is ours. See then, here they are all of different - different types ... if no one is seeing, then I will show them. How am I ... I'm doing OK, the reason is that only.

I guess now it's our time ... he's sitting in front, he's involved in his cooking work; above there is a light hanging on a pole- Here, this mother is not paying attention there. Here the kids are upto their tricks and it is here, that they will get spanked, all such kids like here ... these small kids in the drawing, who will get spanked by Mummy when they reach home. This could be, the only one; the area of Lajpat Nagar market, only there it is like this. There are fruits, there are various things and what all, I don't know, what all can be seen here..

WERNICKE'S : DELAYED STORY RECALL

What story do I have to tell - one black. . . black, b. . . crow, crow found one roti and took it far on the grass, on the tree and sat - one fox saw, and she had to see.

Someone else's hunger that is ... how could someone not see, its a sensible thing, no one thinks of the other. She saw, so she set to her work, began to criticise, no, no... praise the koel, koel, b.. black c...crow. Then now she praised the crow and told 'he crow that 'you sing very well. Get started, on some song; :f songs some hymn or song you should sing and show me'.

The crow who got fooled, immediately came; went ... no, uf .. will come and will sing got tricked by her sweet talks and as soon as he started speaking, telling things, singing while telling . . . the roti, no all the rotis reached and fell down, so the cat took them ... the fox took them and went off.

The teaching we got is that wherever someone is, one should not be fooled by anyone's smooth talking.

PICTURE DESCRIPTION

Okay, in this, there is one lady, or she is a girl, who no she is a lady who is going with a child. This man is sitting just staying where he is, he doesn't understand, that ... by just sitting in the middle of the roads, its such a wrong thing. He's sitting and making, frying something. This here is a a book type

of shop. Its written "Book house" but one can't make out. Its Possible, he's selling books or the lib ... lete... it could be a library; I am not saying that, however.

Again, this is some village, no ... some fun-fair, no... this is, that some, there where you get all items, that is that m... market, it appears to be a market but one can't say anything. There are too many things happening - what to pay attention to? This balloon seller, this child is taking a balloon. This lady has bought fruits and he is selling, sitting in the middle, selling snacks or whatever he wants to sell.

APPENDIX III

TEST MATERIAL

SUBTEST I

REAL OBJECT NAMING

INSTRUCTION

निम्नलिखित क्रम में वस्तुएँ प्रस्तुत कीजिए और मरीज से उनका नाम बताने को कहिए। यदि मरीज कोई भी उत्तर ना दे या गलत उत्तर दे, तो शब्द का प्रथम अक्षर संकेत के रूप में दीजिए। यदि सही उत्तर दिया जाए या केवल उच्चारण की गलती हो, तो दो अंक दीजिए। यदि मरीज संकेत देने के पश्चात सही उत्तर दे, तो एक अंक दीजिए।

Present objects in the order listed below and ask the patient to name them. If no response or incorrect responses are made, present a phonemic cue (first letter of the word). Score two (2) points if named correctly or with minor articulatory error and one(1) point if a phonemic cue is required.

LIST OF OBJECTS USED IN SUBTEST I

1. CUP
2. MATCHES
3. COMB
4. KNIFE
5. PENCIL
6. FLOWER
7. SCISSORS
8. KEY
9. RING
10. TOOTHBRUSH

SUBTEST II

PICTURE NAMING

INSTRUCTION

पहले पाँच वस्तुओं के चित्र और उसके बाद पाँच क्रियाओं के चित्र प्रस्तुत कीजिए। मरीज से वस्तु / क्रिया का नाम बताने को कहिए। यदि मरीज कोई उत्तर ना दे या गलत उत्तर दे, तो शब्द का प्रथम अक्षर संकेत के रूप में दीजिए। यदि सही उत्तर दिया जाए या केवल उच्चारण की गलती हो, तो दो (2) अंक दीजिए। यदि मरीज संकेत के पश्चात् ही सही उत्तर दे, तो एक (1) अंक दीजिए।

Present pictures of the five objects followed by the five actions and ask the subject to name them. If no response or incorrect responses are made, present a phonemic cue (first letter of the word). Score two (2) points if named correctly or with minor articulatory error and one (1) point if a phonemic cue is required.

OBJECTS

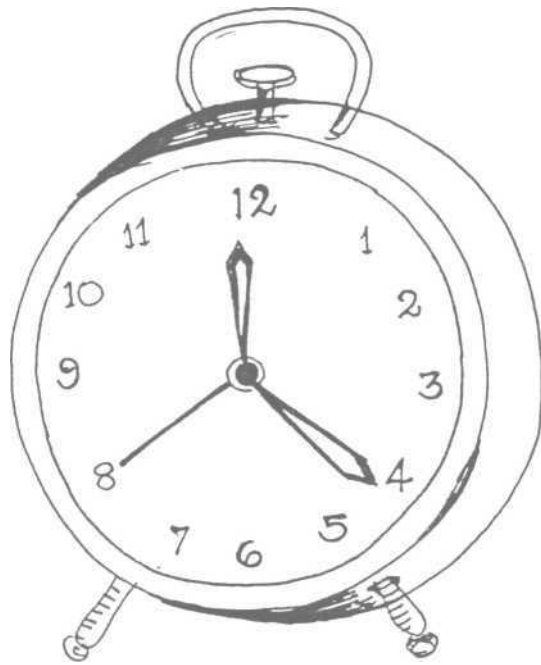
1. HOUSE
2. TREE
3. CLOCK
4. LOCK
5. UMBRELLA

ACTIONS

1. DRINKING
2. CRYING
3. RUNNING
4. SLEEPING
5. READING

















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SUBTEST III

GENERATIVE NAMING

INSTRUCTION

मरीज से कहिये कि उसे एक मिनट में जितने 'जानवरों' के नाम याद आएं, उनके नाम बताएं। हर सही बताए गए जानवर के नाम के लिए मरीज को एक (1) अंक दीजिये। इसी तरह मरीज से एक मिनट के समय में 'फलों' तथा 'सब्जियों' के नाम बताने को कहिये और हर सही नाम के लिए एक पूरा अंक दीजिये।

Ask the patient to name as many ANIMALS as possible in 1 minute. The patient if hesitant, may be prompted. Score 1 point for each correctly named animal, even if distorted by literal paraphasias. Similarly, proceed with FRUITS and VEGETABLE naming tasks.

SUBTEST IV

WORD ASSOCIATION TEST

INSTRUCTION

मरीज को ये क्रिया इस तरह समझाइए - 'अब मैं एक शब्द आपको बताऊँगा। उस शब्द को सुनते ही आपके मन में जो शब्द सबसे पहले आए, वो बताइए। जो भी शब्द हो जो सबसे पहले आपके ध्यान में आए, वो बताइए। कोई भी उत्तर गलत नहीं होगा।' इस क्रिया के लिए मरीज को इस तरह उदाहरण दिया जा सकता है - 'यदि मैं "आसमान" शब्द बोलूँ, तो आपके मन में बादल, नीला, आदि शब्द आ सकते हैं।'

Instructions given to the patient are as follows : "I am going to say a word and I want you to say the first word you can think of when you hear this word. Just say the first word you think of, whatever it is. There aren't any wrong answers. The patient may be given an example - If I say the word sky . you may say blue', clouds' etc.

WORD LIST USED (HINDI)

ABSTRA- CTION LEVEL	NOUNS		VERBS		ADJECTIVES	
HIGH	मुसीबत कला	(Trouble) (Art)	हारना सौचना	(Losing) (Thinking)	खुश डरावना	(Happy) (Frightening)
MEDIUM	समाचार बचपन	(News) (Childhood)	पूछना खीना	(Asking) (Losing)	सूठ आधा	(Lies) (Half)
LOW	कैला लाठी	(Banana) (Stick)	काटना चिल्लाना	(Cutting) (Shouting)	अंधा कमजोर	(Blind) (Weak)

SUBTEST V

PICTURE SEQUENCING AND DELAYED STORY RECALL

INSTRUCTION

मरीज को चारों चित्र देकर कहिये - 'इन चार चित्रों द्वारा एक कहानी का वर्णन किया गया है। इनको ध्यान से देखिये और कहानी के अनुसार, उचित क्रम में लगाइय।' चित्रों को क्रम में लगाने के पश्चात् मरीज से कहिये - 'अब मैं आपको चित्रों में दिखाई गई कहानी बताऊँगा। ध्यान से सुनिये; कुछ समय बाद आपको यही कहानी दोहरानी होगी, जैसी भी आपको याद हो।'

Present the four test pictures (in random order) patient and say : "These four pictures represent a story. Look at them carefully and arrange them in the order of events of the story".

After the patient sequences the pictures, say to the patient : "Now I will tell you the story represented in the pictures. Listen carefully and after some time, you will have to repeat the same story as you remember it".









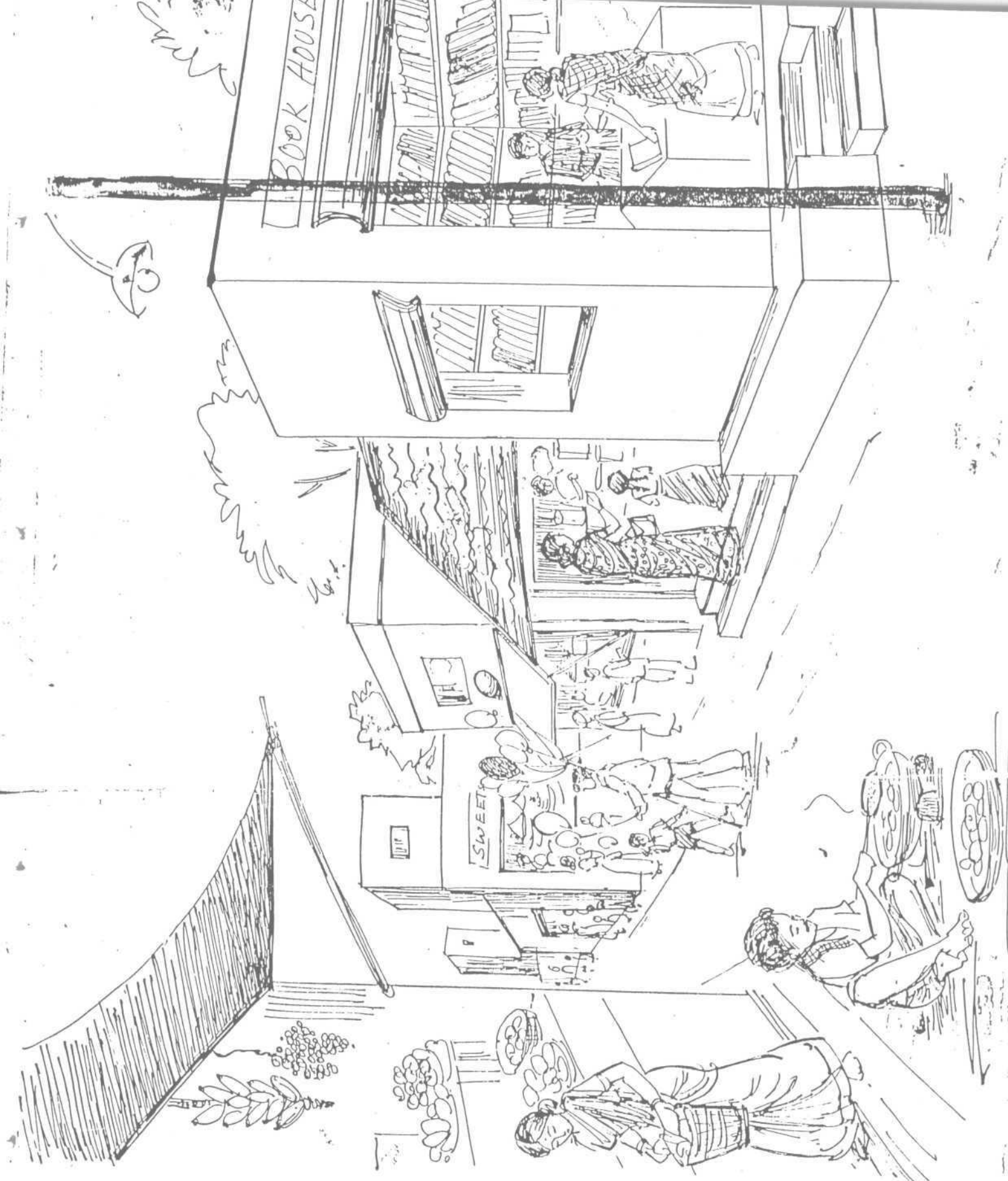
SUBTEST VI

DESCRIPTIVE DISCOURSE

INSTRUCTION

मरीज को चित्र दिखाकर कहिये - 'इस चित्र को ध्यान से देखिये और जो भी दिखाई दे, उसका वर्णन कीजिये। चित्र के हर भाग को देखिये और पूरे वाक्यों में चित्र के बारे में बताइयें'। यदि मरीज केवल कुछ वस्तुओं के केवल नाम लें, तो उसे पूरे वाक्यों में बोलने को कहिये।

Present test picture to the patient and say : "Tell me what you see in this picture. Try to talk in sentences and carefully observe all parts of the picture". Ask for a more complete response if the patient produces just a few words.



APPENDIX IV

SCORE SHEET

RESPONSE SHEET

SUBTEST I : OBJECT NAMING

SL. NO	STIMULUS	RESPONSE (WITHOUT ANY CUE)	RESPONSE (WITH A PHONEMIC CUE)	SCORE
1	कप			
2	माचिस			
3	कंघी			
4	चाकू			
5	पेन्सिल			
6	फूल			
7	कैची			
8	चाबी			
9	अँगूठी			
10	दूधब्रश			

MAX. SCORE = 20; PATIENT'S SCORE = _____

SUBTEST II : PICTURE NAMING

A) OBJECT PICTURES

B) ACTION PICTURES

SL. NO	STIMULUS	RESPONSE (WITHOUT PHONEMIC CUE)	RESPONSE (WITH PHONEMIC CUE)	SCORE
1	घर			
2	पैड़			
3	घड़ी			
4	ताला			
5	दूतरी			

MAX. SCORE = 10; PATIENT'S SCORE = _

SL. NO	STIMULUS	RESPONSE (WITHOUT ANY CUE)	RESPONSE (WITH PHONEMIC CUE)	SCORE
1	पीना			
2	शैना			
3	भागना			
4	सौना			
5	पढ़ना			

MAX. SCORE = 10; PATIENT'S SCORE =

TOTAL SCORE = 20; PATIENT'S TOTAL SCORE = _
(A + B)

SUBTEST III : GENERATIVE NAMING

SL. NO.	A) ANIMALS	B) FRUITS	C) VEGETABLES
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

SUBTEST IV : WORD ASSOCIATION TEST (WAT) :

SL. NO.	NOUNS		RESPONSE CATEGORY	VERBS		RESPONSE CATEGORY	ADJECTIVES		RESPONSE CATEGORY
	STIMULUS	RESPONSE		STIMULUS	RESPONSE		STIMULUS	RESPONSE	
1	मुन्नीबत			छारना			खुश		
2	कला			सौचना			डरवनी		
3	समाचार			पूछना			झूठ		
4	बचपन			सौना			साधा		
5	कैला			काटना			अंधा		
6	लाठी			चिल्लाना			कमजोर		

RESPONSE CATEGORY KEY :

- S - SYNTAGMATIC
P - PARADIGMATIC
UA - UNASSOCIATION
O - OTHERS

(MULTIWORD RESPONSE, REPETITIONS, NO RESPONSE)

SUBTEST V : PICTURE SEQUENCING AND DELAYED STORY RECALL

PICTURE SEQUENCING : (MARK OR X)

PICTURES 1 2 3 4

COMMENT :

SUBTEST VI : DESCRIPTIVE DISCOURSE

COMMENT :