

University of Montana

## ScholarWorks at University of Montana

---

Graduate Student Theses, Dissertations, &  
Professional Papers

Graduate School

---

1987

### Communication appraisal in dementia of the Alzheimer's type

Raelene A. Hall

*The University of Montana*

Follow this and additional works at: <https://scholarworks.umt.edu/etd>

**Let us know how access to this document benefits you.**

---

#### Recommended Citation

Hall, Raelene A., "Communication appraisal in dementia of the Alzheimer's type" (1987). *Graduate Student Theses, Dissertations, & Professional Papers*. 1833.

<https://scholarworks.umt.edu/etd/1833>

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

COPYRIGHT ACT OF 1976

THIS IS AN UNPUBLISHED MANUSCRIPT IN WHICH COPYRIGHT  
SUBSISTS. ANY FURTHER REPRINTING OF ITS CONTENTS MUST BE  
APPROVED BY THE AUTHOR.

MANSFIELD LIBRARY  
UNIVERSITY OF MONTANA  
DATE: 1987



COMMUNICATION APPRAISAL IN DEMENTIA OF  
THE ALZHEIMER'S TYPE

By

Raelene A. Hall

B. A., University of Montana, 1984

Presented in partial fulfillment of the requirement

for the degree of

Master of Communication Sciences & Disorders

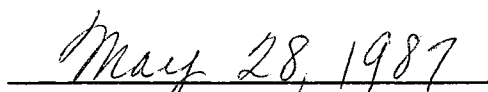
University of Montana

1987

Approved by:

  
Chairman, Board of Examiners

  
Dean, Graduate School

  
Date

UMI Number: EP34707

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent on the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI EP34707

Copyright 2012 by ProQuest LLC.

All rights reserved. This edition of the work is protected against unauthorized copying under Title 17, United States Code.



ProQuest LLC.  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106 - 1346

### Acknowledgements

I would like to sincerely thank those individuals who offered their support and advice which made this professional paper possible. To Michael Wynne, who has dedicated himself to encouraging my progress as a clinician and who has contributed greatly to increasing my self confidence. His support has given me the insight needed to write this paper. And to the other committee members, Dr. Barbara Bain and Dr. Randy Weirather, thank-you for your helpful comments and for the stimulating debate raised in my oral examination. Additionally, I would like to thank Dr. Robert Miller and Dr. George Larsen for their teachings which have greatly broadened my understanding of adult communication disorders. Through writing this paper I have added to my clinical competence and confidence. Again, a thank-you to all who have contributed to this growing process.

## TABLE OF CONTENTS

I.	Introduction .....	4
II.	Dementia in General .....	4
	A. Definition: Dementia .....	4
	B. Prevalence and Incidence .....	6
	C. Definition: Dementia of the Alzheimer's Type (DAT) .....	8
	1. Clinical Characteristics .....	9
	2. Pathophysiological Characteristics .....	11
	D. Etiology .....	12
	E. Genetic Linkage .....	13
	F. DAT Subtypes .....	13
	G. Diagnosis .....	16
	H. Intervention .....	24
	1. Drug Treatment .....	24
	2. Behavior Therapies .....	26
	3. Management Plans .....	26
III.	Communication Model .....	27
	A. Defining the Model .....	27
	B. Applying the Model to DAT .....	28
IV.	Typical Language Characteristics Associated with DAT .....	34
	A. Pragmatics .....	34
	B. Semantics .....	35
	C. Syntax .....	40
	D. Morphology .....	42
	E. Phonology .....	42
V.	Protocol for DAT .....	43
	A. Orientation Assessment .....	47
	B. Language Assessment .....	47
	C. Abstract Reasoning Assessment .....	51
	D. Perceptual Assessment .....	51
	E. Memory Assessment .....	52
	F. Management Plan .....	52
VI.	Conclusion .....	56

## LIST OF TABLES

Table 1.	Generalized Mental Status Characteristics of Cortical/Subcortical Dementia	19
Table 2.	Generalized Mental Status Characteristics of Dementia of Alzheimer's Type and Pick's Disease	19
Table 3.	Clinical Dementia Rating (CDR)	21
Table 4.	Mental Status Characteristics According to Severity of DAT	23
Table 5.	Pragmatic Act Deterioration in DAT (predicted)	36
Table 6.	Dementia of the Alzheimer's Type (DAT) Communication Evaluation Protocol	45
Table 7.	Communication Situations for Dementia of Alzheimer's Type	54
Table 8.	Management Plans for Dementia of Alzheimer's Type	55



## LIST OF FIGURES

Figure 1	Communication Model	29
----------	---------------------	----

The speech/language pathologist in a medical setting is frequently called upon to assist in the diagnosis and plan of intervention for the patient with chronic dementia. In order to make reliable diagnostic decisions the clinician needs to have a working knowledge about the disease or syndrome of dementia itself including an accurate definition, the prevalence and incidence, the clinical and physiological characteristics, the clinical course, and the etiology and the genetics of the disease. Accordingly, these decisions and subsequent intervention suggestions must be based upon a strong theoretical framework of communication applied specifically to dementia. Additionally, carefully documented descriptions of typical speech/language behaviors of dementia need to be utilized to make accurate diagnostic inclusion/exclusion decisions. Following the consideration of the above parameters, a diagnostic and intervention protocol may be designed. Thus, the intent of this paper is to outline such a language protocol for dementia based upon discussion of general knowledge about dementia, a theoretical communication model of dementia and the typical language characteristics of dementia. However, for reasons detailed in a later section, discussion will be limited to dementia found in Alzheimer's Disease.

### DEMENTIA IN GENERAL

#### Definition: Dementia

Chronic dementia is an acquired, gradually progressive impairment of mental abilities resulting from a generalized atrophy of cerebral brain

tissue. Chronic dementia is specified in order to differentiate permanent brain impairment from reversible brain dysfunction. Decreased mental abilities may result from drug intoxication, metabolic disturbance, or depression which are treatable. When medically treated, the intellectual impairment associated with these disorders usually reverses to some degree (Cummings & Benson, 1983). Thus, the role of the speech/language pathologist is minimal for the reversible dementias and efforts of diagnosis and intervention should be concentrated on the chronic dementias resulting in permanent impairments.

The word "acquired" is used in this definition to distinguish the intellectual impairment found in dementia from that of congenital disorders (Cummings, 1985). The clinician must be assured that the diagnostic results represent a decrease of mental abilities within the patient, instead of a comparison with the normal population alone.

The terms "gradually progressive" and "generalized atrophy" are used in this definition to exclude the type of dementia resulting from specific or focal infarctions called multi-infarct dementia (MID). With MID, the progression of the disease is stepwise in nature and thus not considered gradual. The atrophy in MID consists of multiple focal lesions (Cummings, 1985); whereas generalized atrophy is not hemispheric - specific or focal in nature. Generalized cerebral atrophy implies that both hemispheres are involved and degeneration occurs over a broader spectrum of neuronal tissue (Reisberg, 1983; Cummings & Benson, 1983).

The term "impaired mental abilities" is used in this definition of dementia to imply impairment of both thought and language processes.

Traditionally, impaired language skills were not a requirement for the diagnosis of dementia. Language impairment was thought to occur only in later stages of the disease (American Psychiatric Association, 1980; Cummings & Benson, 1983; and Reisberg, 1983). However, recent research (Appell, Kertesz, & Fisman, 1982; Bayles, 1982; Bayles & Boone, 1982; Emery & Emery, 1983; and Kirshner, Webb, Kelly, & Wells, 1984) has provided data which indicates language deficits are present in even the mildest cases of dementia. The premise of this paper is that thought and language rely on the same mental processes. Thus, if thought processes (abstraction, memory, visual-spatial perception) are impaired, language functions involving the same degree of mental complexity will also be impaired (Bayles, 1985).

Thus, this limited definition of dementia is restricted to those acquired degenerative neurological diseases which affect the cerebral area of the nervous system. Two categories exist among these diseases: cortical and subcortical dementias (Cummings & Benson, 1983). Chronic cortical dementia consists of Alzheimer's Disease (AD) and Pick's Disease. Several extrapyramidal syndromes comprise the chronic subcortical dementias such as: Parkinson's Disease (PD), Huntington's Disease (HD), Progressive Supranuclear Palsy, Wilson's Disease, Spinocerebellar degeneration and Idiopathic Basal Ganglia Calcification.

### Prevalence & Incidence

Since a unified definition of the population of dementia has not been agreed upon, the prevalence and incidence rates have become

clouded. One reason for this ambiguity is some investigations define dementia as senile dementia which is usually equivalent to AD (Mortimer in Reisberg, 1983). Other studies consider dementia in general including cortical, subcortical, and MID types of dementia. A second dilemma in prevalence studies is age of the population. In general, the prevalence of dementia increases with increasing age. Some prevalence studies are further divided by severity of dementia, with a greater prevalence of mild versus severe dementia (Cummings and Benson, 1983; Reisberg, 1983; Bayles, 1986). In general, an estimated range of 1% to 6.2% of total U.S. population suffer from severe dementia, while approximately 10 to 15.4% of the total population is afflicted with mild dementia (Reisberg, 1983; Cummings, 1983; Emery & Emery, 1983; Wang, 1981). In a 1973-74 survey, the National Center of Health Statistics (1978), reported that 58% of the residents in American nursing homes are afflicted with dementia. The impact of the dementia problem facing the U.S. becomes more evident when looking at the growing percentage of elderly (65 and over) in our population. In 1970 it was estimated that 9.8% of the population or 20.16 million people were over age 65, which was a 123% increase since 1940 (Wang, 1977). However, the percentage of 65+ population is expected to continue to grow by another 32% by the year 2000 reaching approximately 32 million elderly people (Bayles, 1986).

To date, very few reports have been cited describing the incidence of dementia. The U.S. Department of Health & Human Services (USDH & HS, 1984) reported an incidence rate of 110 new cases of dementia each year per every 100,000 individuals aged 29 or over in Rochester,

Minnesota. One research group found the highest incidence of dementia to occur around age 70 (Heston, Mastri, Anderson, & White, 1981).

What do these prevalence and incidence figures mean to the health professional? First, they indicate that a considerable percentage of our elderly population currently has dementia. Second, we are currently managing a large portion of the demented elderly in Nursing homes. And finally, since the prevalence and incidence of dementia increases with increasing age and as the percentage of elderly individuals is predicted to continue to increase, the nation will be faced with an even larger population of demented individuals to manage. Which brings up two questions: Who will manage these individuals, and how can they best be managed? Analysis of communication problems of the demented patient suggests the speech/language pathologist can provide possible solutions to these questions.

Definition: Dementia of the Alzheimer's Type (DAT)

A substantial body of knowledge about the characteristics of communication problems of dementia in general does not currently exist, as the research in this broad area is essentially only being conducted by one investigator (Bayles, 1982; 1985; 1986). Research has centered upon communication deficits of those with Dementia of the Alzheimers Type (DAT), primarily because DAT is the most prevalent of the dementias. Again, dependent upon the population under study (e.g. sampling biases) the prevalence of DAT among total cases of dementia has ranged from 39% to 75% (Cummings, 1983; Martimer, 1981 in Chui, Teng, Henderson &

May, 1985). However, Bayles (1986) estimated the prevalence of DAT to be 42% of all dementia cases, which is probably a more reliable estimate considering the sampling procedures. Due to the higher prevalence rates of DAT and lack of data concerning communication deficits of dementia in general, this paper will focus specifically on DAT.

Technically, the diagnosis and assignment of the label Alzheimer's Disease (AD) can only be done upon autopsy when the neuropathology of the brain is analyzed (Chui et al., 1986; Martin, Lowenstein, Kaye, Ebert, Weingartner & Gillin, 1986; Mayeux, Stern, and Spaton, 1985; Reisberg, 1983). Therefore, the term Dementia of the Alzheimer's Type (DAT) is commonly used to denote the clinical characteristics associated with the post-mortem pathological findings of AD (Chui et al., 1985; Cummings, 1984; Heston et al., 1981; Mayeux et al., 1985). In a literature review Mayeux and colleagues (1985) found that the diagnosis of DAT is usually confirmed at autopsy in 75-90% of all cases. Likewise, Sulkava and associates (1983) confirmed 82% of DAT cases at autopsy. These figures suggest that the current diagnostic techniques are fairly sensitive for identifying AD by clinical characteristics, although clinical diagnosis of DAT is currently not considered conclusive, there is evidence for AD.

Clinical characteristics. An exact definition of DAT cannot be made since diagnosis of DAT is one of exclusion (Chui et al., 1985; Cummings, 1984; & Fuld, 1982) and symptomatology changes throughout the course of the disease. However, DAT is initially characterized by a generalized cognitive deficit with impairment in short-term memory, visual-spatial

perception, abstract reasoning, and language skills (Semple, Smith & Swash, 1982; Foster, Chase, Folio, Patronas, Brooks, & diChiro, 1983; Bayles, 1986; and Cummings & Benson, 1983). Motoric skills are usually intact until the later stages of the disease (Cummings & Benson, 1983). DAT patients have a reduced attention span and reduced judgement. They tend to omit details (Semple et al., 1982) and their affect is usually unconcerned or disinhibited (Cummings & Benson, 1983). Finally, DAT patients generally tend to be unaware of their deficits.

Initially, these deficits are seen by caregivers as forgetfulness (Reisberg, 1983). However, as the disease progresses these deficits are manifested in the patient's functional activities such as an inability to organize dressing (putting shoes on before socks) (Weintraub, Baratz & Mesulan, 1982), an inability to cook for self, a tendency to forget medicines, an inability to manage simple finances, a tendency to get lost in their own house (Bayles, 1986) and an occasional incontinence of bladder. As Bayles (1982) indicated, patients with DAT rely more and more upon stereotypical behaviors. At the most severe stage of the disease, patients with DAT are characterized by disorientation to time, place and person; global memory failure; echolalia or mutism; total dependency in activities of daily living (ADL), inability to coordinate walking and routine incontinence of bladder and bowel (Reisberg, 1983; Cummings, 1983; Bayles, 1986). Specific characteristics of both linguistic and nonlinguistic mental behaviors will be outlined according to severity in a later section.



Pathophysiological characteristics. The positive diagnosis of AD is made at autopsy, contingent upon the pre-mortem history of mental degeneration and the presence of two specific histological findings, senile plaques (SP) and neurofibrillary tangles (NT) (Brun, 1983; Semple et al., 1982; and Tomlinson, 1982). Senile plaques or neuritic plaques are spherical lesions which consist of a central mass of protein material or amyloid fibrils, surrounded by a ring of clustered nerve processes and terminals (Brun, 1983; Tomlinson, 1982). These nerve terminals and processes include lipid granules, paired helical filaments (PHF), lysosomes, dense bodies, and degenerating mitochondria (Brun, 1983; Reisberg, 1983). These plaques are found in superficial cortical structures with primary distribution in the amygdaloid and hippocampus (Brun, 1983). Although SP are found in elderly brains without dementia, the presence of SP in greater concentrations becomes morphologically significant for AD.

The morphological feature more typical of AD are neurofibrillary tangles (NT), which are twisted or sometimes straight, thickened neurofibrils shaped in hairlike loops in the neuronal cytoplasm (Cummings & Benson, 1983; Brun, 1983). The NT are localized in the pyramidal neurons of the neocortex, the hippocampus and the amygdala (Cummings & Benson, 1983). Like senile plaques, NT are not specific to AD, with occurrence in normal elderly brains and brains with other dementia syndromes. However, the frequency of occurrence in AD is greater than the normal brain and they must occur in conjunction with SP for positive diagnosis of AD.

Other authors also cite a third criterion for histologic confirmation of AD, the presence of granulovacuolar degeneration (Cummings, 1985; Reisberg, 1983). Granulovacuolar degeneration (GVD) is isolated to the pyramidal neurons of the hippocampus and is associated with the occurrence of NT lesions (Reisberg, 1983; Tomlinson, 1982). When intracytoplasmic vacuoles develop containing a granular debris, GVD is said to exist.

In general, brains with AD are characterized with gross brain atrophy and reduced brain weight. Atrophy predominates in the temporoparietal and anterior frontal regions. Also, ventricular dilation is evident in the lateral ventricle (Bird, 1987). However, the occipital and primary motor/sensory areas are relatively uninvolved, except in the most severe cases (Reisberg, 1983).

### Etiology

Alzheimer's disease is currently of unknown etiology. However, recent research supports the hypothesis that reduced acetylcholine (Ach) production is, in part, responsible for the disease. The neurotransmitter Ach is known to be involved in new learning and memory (Rosenberg, Greenwald, & Davis, 1983). Production of Ach is severely diminished in AD subsequent to reduced activity of the enzyme choline acetyltransferase (ChAT) (Reisberg, 1983). ChAT activity is normally prevalent in the septal and hypothalamic nucleus (i.e. nucleus basalis of Meynert). However, the neuronal degeneration of AD is thought to severely inhibit this activity (up to 80% reduction), thus lowering Ach production

(Summers et al., 1986). Thus, neuronal degeneration inhibits ChAT activity and thereby reduces Ach production, subsequently new learning and memory abilities become impaired.

### Genetic Linkage

The AD literature has debated the genetic transmission of the disease. Chui et al. (1985) presented data which suggested a 45% overall prevalence rate of familial AD, while Spence, Heyman, Marazitta, Sparkes, and Weinberg (1986) did not find evidence in support of a genetic linkage in an 18 family pedigree. This apparent discrepancy may be partially due to sampling biases. Heston et al. (1981) found that those with early onset AD were much more likely to have an affected family member with AD than those with late-onset DAT. Mayeaux et al. (1985) also found that a higher prevalence of familial AD existed among patients who had extrapyramidal signs. Regardless of differences among prevalence studies, the majority of research suggests that family members who have a direct relative (sibling or parent) with early onset AD with extrapyramidal signs are at risk for AD.

### DAT Subtypes

Historically, DAT was divided into two categories, pre-senile (PSDAT) and senile (SDAT), purely accidentally. According to Reisberg (1983), physicians traditionally assigned the label of dementia only to those with decreasing intellect who were under age 65, and considered all cases of decreasing mental status with age of onset over 65 to be part of

the normal aging process. Thus, when research indicated that decreased mental status was not typical of normal aging and was indeed dementia, the dichotomy of PSDAT and SDAT was created arbitrarily according to the previously established age limits (Reisberg, 1983). Some authors (Cummings & Benson, 1983; Reisberg, 1983) indicate insufficient evidence exists to warrant a distinction within the syndrome according to age of onset. As Reisberg (1983) points out:

"This dichotomy is probably archaic: current knowledge does not indicate major differences in the syndrome, either clinically, neuropathologically, or physiologically, reflective in anyway upon age of onset"

However, other authors argue that DAT is indeed heterogeneous. Chui et al. (1985) suggest that extrapyramidal or myoclonic signs, severity of language deficits and early onset of DAT may help to separate the syndrome into subtypes. Subjects with early onset DAT were found to have more severe language deficits as well as more frequent extrapyramidal or myoclonic signs which were indicative of a more severe dementia. Age of onset was not associated with familial history of DAT in the Chui et al. (1985) investigation. However, Heston and colleagues (1981) in a more thorough retrospective study, found that early age of onset was indeed correlated with higher familiar risk for DAT than for those with late-onset DAT. Thus, Chui et al.'s results suggested an early/late distinction within DAT, which would also be supported by research from Seltzer & Sherwin (1983).

Mayeux et al. (1985) differentiated four types of DAT from a large sample of DAT patients which were followed longitudinally: 1. extrapyramidal DAT, 2. Myoclonic DAT, 3. benign DAT, and 4. typical DAT. Extrapyramidal DAT is characterized by rapid progression of intellectual decline, more reduced functional ability and psychotic symptoms. Myoclonic DAT is distinguished by early onset, the most rapid intellectual decline and mutism. Little progress of mental deterioration is noted in benign DAT. In typical DAT, mental status deterioration is gradual. Thus Chui et al. (1985) and Mayeux et al. (1985) found clinical data suggestive of subtypes of DAT.

Neuropathological evidence also exists for the distinction of subtypes in DAT. Results of an investigation of ChAT activity by Bird, Stranahas, Sumi & Raskind (1983) provide support for the distinction of presenile AD (PSAD), senile AD (SAD) and myoclonic AD (MAD) with more severe involvement apparent in PSAD and MAD. Additionally, the patients with myoclonus were found to be significantly younger than other AD patients. Patients with PSAD were found to have significantly lower ChAT activity in the temporal area than SAD patients, while MAD patients had significantly lower ChAT activity in the cortex, hippocampus and cerebellum than those AD patients without myoclonus. Rosser, Iversen, Reynolds, Mountjoy & Roth (1984) also found neurochemical evidence which may suggest a separate disease process in PSAD and SAD. Autopsy of brains of those with late onset AD revealed a relatively pure deficit of cholinergic agents isolated in the temporal lobe and hippocampus, while the early onset brains had a more widespread

(nonspecific) and severe cholinergic deficit. Additionally, research indicates that the nucleus basalis of Meynert, which is primarily responsible for the cholinergic deficits of AD, is less deteriorated in the brains of those with SAD than in those with early-onset AD (Whitehouse, Hendreen, White, Clark & Price, 1983; and Tagliavini & Pilleri, 1983).

Clinical and neuropathological data exists which is suggestive, but presently inconclusive of DAT subtypes. Therefore, DAT will be referred to as one disease entity for purposes of this paper. However, the realization that subtypes of DAT probably exist is critical in the planning of DAT diagnosis and remediation.

### Diagnosis

The diagnostician of DAT needs to consider three basic areas of diagnosis. First, DAT must be differentiated from other dementing illnesses. Next, the severity or stage of the dementia must be established. Finally a management plan must be determined.

Differential diagnosis of DAT is based upon both laboratory and psychometric results, combined with a thorough history. Although specific laboratory tests do not presently exist which identify DAT in vivo, various lab workups are necessary to exclude other dementia syndromes. In a 1984 report on AD the U.S. Department of Health & Human Services (USDH & HS) recommended the following lab studies: 1) complete blood/urine analysis, 2) examination of cerebrospinal fluid (CSF), 3) computerized tomography (CT scan), 4) electroencephalogram (EEG), 5) regional cerebral blood flow (CBF), 6) brain imaging with

positron emission tomography (PET), and 7) evoked potential studies. Blood and urine analysis provides the examiner with data to exclude toxic or metabolic deficiencies. Analysis of CSF is helpful in ruling out hydrocephalus or inflammatory and demyelinating disorders (Bird, 1987; Cummings & Benson, 1983). CT scanning is conducted to exclude focal lesions and to assess overall brain atrophy and third ventricle width (Leon & George, 1983). Sleep EEGs, if abnormal with diffuse slow waves (Buse, 1983) and significantly reduced delta sleep (Martin, et al., 1986), would support the diagnosis of DAT. Lab studies of CBF are useful as they correlate with cognitive assessments, to further validate the diagnosis of DAT (USDH & HS, 1984). PET scans have demonstrated differences in abnormal metabolism patterns of the cortex for different types of dementia (Benson, Kuhl, Hawkins, Phelps, Cummings & Tsai, 1981). Analysis of evoked auditory potentials may further aid the diagnosis of DAT, since far-field and early near-field evoked potentials have longer latencies in patient's with PSDAT (Harkins, 1981). In addition to evoked potentials, which may be specific to brainstem abnormality, Grimes, Grady, Foster, Sunderland & Patronas (1985) have found central auditory testing using dichotic listening tasks to correlate with temporal lobe findings in PET scans. Patients with DAT demonstrated a marked impairment on dichotic listening tasks when compared to normal elderly controls. Impaired dichotic listening skills paralleled a decline in intellectual skills. Thus, dichotic listening tests may also be of use in the diagnostic battery for DAT.

As Cummings & Benson (1983) indicated, the laboratory tests are necessary for exclusion of acute or MID dementia, but are not as accurate or as important as the psychometric examination, for the diagnosis and management of DAT. Psychometric evaluations should assess all areas of higher cerebral function including perception, ideation, language and memory. Evaluation results from these areas can be used two-fold: 1) for differential diagnosis among other dementias, and 2) for staging the severity of the disease. As may be seen in Tables 1 and 2, those patients presenting with DAT may be distinguished from subcortical dementias and Pick's disease, by their psychometric test descriptions. However, these symptomatology are representative of the disease at well-established stages. The most difficult differential diagnosis is distinguishing normal aging from mild DAT. Is the patient in the earliest stage of DAT or is he aging normally? In order to answer this question the diagnostician must be familiar with the symptoms or clinical features of mild dementia.

Identification of clinical features associated with later stages of the disease is also important for two reasons 1) to provide homogeneity of research subjects (Levin & Peters, 1982) and 2) to provide prognostic implications. Several attempts have been made to distinguish the mild through severe stages of DAT. One such system developed by Reisberg, Ferris, DeLeon & Crook (1982), identifies three major clinical stages: "1) forgetfulness phase, in which the deficit is primarily subjective but is verifiable with objective cognitive testing ... 2) confusional phase, in which the deficit is readily apparent to an objective observer, and 3)



**Table 1. Generalized Mental Status Characteristics of Cortical/  
Subcortical Dementia**

<b>Characteristic</b>	<b>Cortical Dementia</b>	<b>Subcortical Dementia</b>
<b>Speech</b>	<b>Normal</b>	<b>Hypophonic, dysarthric</b>
<b>Language</b>		
<b>Comprehension</b>	<b>Abnormal</b>	<b>Normal</b>
<b>Expression</b>	<b>Abnormal</b>	<b>Normal</b>
<b>Memory</b>	<b>Learning deficit</b>	<b>Retrieval deficit</b>
<b>Attention</b>	<b>Normal</b>	<b>Slow</b>
<b>Perception</b>	<b>Reduced, distorted</b>	<b>Slow processing</b>
<b>Ideation</b>	<b>Concrete</b>	<b>Concrete</b>
<b>Affect</b>	<b>Unconcerned or disinhibited</b>	<b>Apathetic or depressed</b>

(Adapted from Cummings & Benson, 1983.)

**Table 2. Generalized Mental Status Characteristics of Dementia  
of Alzheimer's Type and Pick's Disease**

<b>Characteristic</b>	<b>DAT</b>	<b>Pick's</b>
<b>Language</b>	<b>Palilalia, Echolalia</b>	<b>Automatic utterance, mutism</b>
<b>Perception</b>	<b>Early disturbance</b>	<b>Late disturbance</b>
<b>Memory</b>	<b>Early disturbance</b>	<b>Late disturbance</b>
<b>Ideation</b>	<b>Early disturbance</b>	<b>Relatively spared early</b>
<b>Personality</b>	<b>Changes Late</b>	<b>Changes early</b>

(Adapted from Cummings & Benson, 1983.)

dementia phase, which begins at the point when the patient can no longer survive without assistance." They further separated these phases into very mild, mild, moderate, moderately severe, severe and very severe stages which, in totality form the Global Deterioration Scale (GDS). Each stage is defined by clinical characteristics and psychometric concomitants. (Refer to Reisberg et al., 1982 for full description.)

Hughes, Berg, Danzinger, Coben, and Martin (1982) also devised a scale for staging DAT, known as the Clinical Dementia Rating scale. This staging method is somewhat more useful than the GDS, since objective data and subjective functional observations are divided into specific areas and described for each classification (i.e. Healthy, Questionable dementia, Mild dementia, Moderate dementia and Severe dementia) (Refer to Table 3.)

For purposes of this paper, a simplified system will be used, combining the findings of Reisberg et al. (1982), Hughes et al. (1982), Cummings & Benson (1983) and Bayles (1986). The classifications of mild, moderate and severe are used to distinguish the stages of dementia (refer to Table 4). Those in the mild stage would be expected to have been affected by DAT for approximately one to three years, while those in a moderate stage of DAT have had a duration of the disease two to ten years. Progression to a severe stage of DAT usually occurs in approximately eight to twelve years, ultimately ending in death (Cummings & Benson, 1983). Familiarity with the information categorized in Table 4 is necessary not only for accurate diagnosis, but for

Table 3. Clinical Dementia Rating (CDR) - Part I

	<b>Healthy CDR 0</b>	<b>Questionable dementia CDR 0.5</b>	<b>Mild dementia CDR 1</b>
<b>Memory</b>	No memory loss or slight inconstant forgetfulness	Mild consistent forgetfulness; partial recollection of events; "benign" forgetfulness	Moderate memory loss, more marked for recent events; direct interferes with everyday activities
<b>Orientation</b>	Fully oriented		Some difficulty with time relationships; oriented for place and person at examination, but may have geographic disorientation
<b>Judgment + Problem solving</b>	Solves everyday problems well; judgment good in relation to past performance	Only doubtful impairment in solving problems, similarities/ differences	Moderate difficulty in handling complex problems; social judgment usually maintained
<b>Community affairs</b>	Independent function at usual level in job, shopping, business and financial affairs volunteer and social groups	Only doubtful or mild impairment, if any, in these activities	Unable to function independently at these activities, though may still be engaged in some; may still appear normal to casual inspection
<b>Home + hobbies</b>	Life at home, hobbies, intellectual interests well maintained	Life at home, hobbies, intellectual interests well maintained or only slightly impaired	Mild but definite impairment of function at home; more difficult chores abandoned; more complicated hobbies and interests abandoned
<b>Personal care</b>	Fully capable of self-care		Needs occasional prompting

Table 3. Clinical Dementia Rating (CDR) - Part II

	<b>Moderate dementia CDR 2</b>	<b>Severe dementia CDR 3</b>
<b>Memory</b>	Severe memory loss; only highly learned material retained; new material rapidly lost	Severe memory loss; only fragments remain
<b>Orientation</b>	Usually disoriented in time, often to place	Orientation to person only
<b>Judgment + Problem solving</b>	Severely impaired in handling problems, similarities/differences; social judgment usually impaired	Unable to attempt judgment or problem solving
<b>Community affairs</b>	No pretence of independent function outside home	
<b>Home + hobbies</b>	Only simple chores preserved; very restricted interests poorly sustained	No significant function in home outside of own room
<b>Personal care</b>	Requires assistance in dressing, hygiene, keeping of personal effects	Requires much help with personal care; often incontinent

(Taken from: Berg, Danziger, Storvandt, Coben, Gado, Hughes, Knesevich, and Botwinick, 1984.)

Table 4. Mental Status Characteristics According to Severity of DAT

	Mild DAT	Moderate DAT	Severe DAT
Orientation	some time disorientation	time/place disorientation	oriented only to name
Memory	moderate short-term memory deficit	severe memory deficit; no new material	severe long-term memory deficit also
Visuospatial	poor constructions	spatial disorientation	total visuospatial dysfunction
Ideation	moderate difficulty with complex problems	severe problem solving deficit	unable to make judgments
Language	disinhibition content inappropriate	vague, empty perseverative	verbal abilities lost, palilalia, jargon speech
Personality	flattening of affect	indifference apathy	dillusional, anxious agitated
Functional	self care with minimum assistance, abandons hobbies	reduced interest in activities, needs assistance with ADLs	loss of sphincter control, unable to ambulate

(Compiled from: Bayles, 1986; Cummings & Benson, 1983; Reisberg et al., 1982; Hugh et al., 1982.)

determining prognosis. And will subsequently aid in preparation of the intervention plan.

### Intervention

There is no current proven effective treatment to arrest the dementing process in DAT. However, much research has been conducted to find a chemical therapy. Behavioral studies have also been attempted with little success. This has left the clinician with little option for management other than changing the patients environment.

Drug Treatment. A broad range of pharmacological therapies for DAT have been investigated but significant improvement in mental status has not been observed following treatment. These chemical therapies include neuropeptides, nootropics, vasodilators, CNS stimulants, anticoagulants, chelating agents and metabolic enhancers (lecithin) (USDH & HS, 1984; Rosenberg et al., 1983; and Heymen, Logue, Wilkinson, Holloway & Hurwitz, 1982). However, recent research into the use of cholinergic agents to treat DAT has provided hope for a possible source of reducing mental deterioration.

Enhancement of cholinergic activity has been attempted by three basic methods: 1) increasing Ach precursor levels, 2) intervention in the synapse or receptor site, and 3) combining Ach precursor therapy with compounds which improve cerebral metabolism (USDH & HS, 1984). Summers, Majovski, Tachiki, & Cling (1986) investigated the effectiveness of treating DAT with one specific Ach precursor, oral tetrahydroaminoacridine (THA). Results of the study indicated that THA

produced significant objective improvement in the mental status of 12 out of 17 patients (71%) with moderate to severe DAT, over an average of 12.6 months of THA therapy. Dramatic improvement was noted in some cases, with patients obtaining independence in ADLs, where maximum assistance was previously required. These authors suggested that THA works as a potent precursor to central nervous system (CNS) CHAT activity. Additionally, THA is thought to selectively block potassium channels in the CNS which promote Ach production (Summers et al., 1986).

However, these findings need to be considered carefully. The treatment of DAT with THA is not a cure for the disease. Summers et al. (1986) cite that THA therapy is a "palliative pharmacologic treatment," suggesting that the drug relieves the symptoms (i.e. reduced mental status), but does not eliminate the disease process. The benefit of treatment was only dramatic for a minority of subjects in this study. The mental status of most subjects improved, but did not, by any means, return to normal. Summers et al. (1986) also anticipated that THA will cease to be effective with progression of the disease. Another reason for the cautious interpretation of the results concerning THA effectiveness is the reliability of the psychometric assessment used to measure improvement. Two of the measures used to evaluate mental status in the above study were subjective rating scales. Additionally, interrater reliability figures were not cited. Thus, further more carefully controlled studies need to be done before THA may be considered a viable treatment for DAT.

- Behavior therapies. Reports of behavioral management with DAT patients evidence minimal or no success. Reality orientation is one of the most frequently used therapies; however research indicates this approach is not successful, since generalization does not occur outside of the therapy environment (USDH & HS, 1984; Eisdorfer, Cohen & Preston, 1981). Also, specific techniques such as anxiety reduction therapy and teaching memory strategies are only effective in the mildest phases of DAT. Considering the hypothesized etiology of DAT (lack of cholinergic activity which is responsible for encoding of new information into memory), one is not surprised behavioral therapies, which are based upon learning theories, are not effective. If an individual does not have the ability or only has a limited biological potential to learn, that individual cannot be expected to benefit from therapies which require new learning.

Management plans. The concept of remediation of the DAT patient, without a physiological means for learning (i.e. cholinergic activity) must be redefined. Remediation in DAT does not mean teaching of functional behaviors or extinguishing undesirable behaviors. Instead, intervention for DAT needs to be oriented toward patient management. Patient management does not infer change within the patient, but instead implies managing the patient's environment. The USDA & HS's 1984 report emphasizes that DAT treatment research is currently directed toward the caretaker and their management of the DAT patient. Through the



communication evaluation, speech/language pathologists can offer key strategies for communicating with and thereby managing the DAT patient.

## COMMUNICATION MODEL

### Defining the Model

Communication may be simplistically defined as the process of receiving, analyzing and expressing ideas through a symbol system. Language may be thought of as a symbol system, in which mental representations are paired with arbitrarily assigned linguistic symbols. Language is part of the communication process or a code by which reception and expression of ideas is accomplished. Linguistic representations, however, cannot exist without the interaction of other mental representations, including perception (analysis of the stimuli) and abstract reasoning (analysis of the idea). In order for mental representations to be meaningful, they must first be encoded, then stored where they may later be retrieved. In other words, the representations must be integrated with a memory system. This combined system of mental representations and memory has been termed synthetic mental activities (Emery & Emery, 1983).

Also essential in the communication process is the channel for reception and expression. Receptively, the channel begins with attention. An individual must be able to attend to a stimulus before the stimulus will trigger sensation. Sensation is the body's mechanical and electro-chemical response to stimulation in the sensory systems (i.e. auditory,

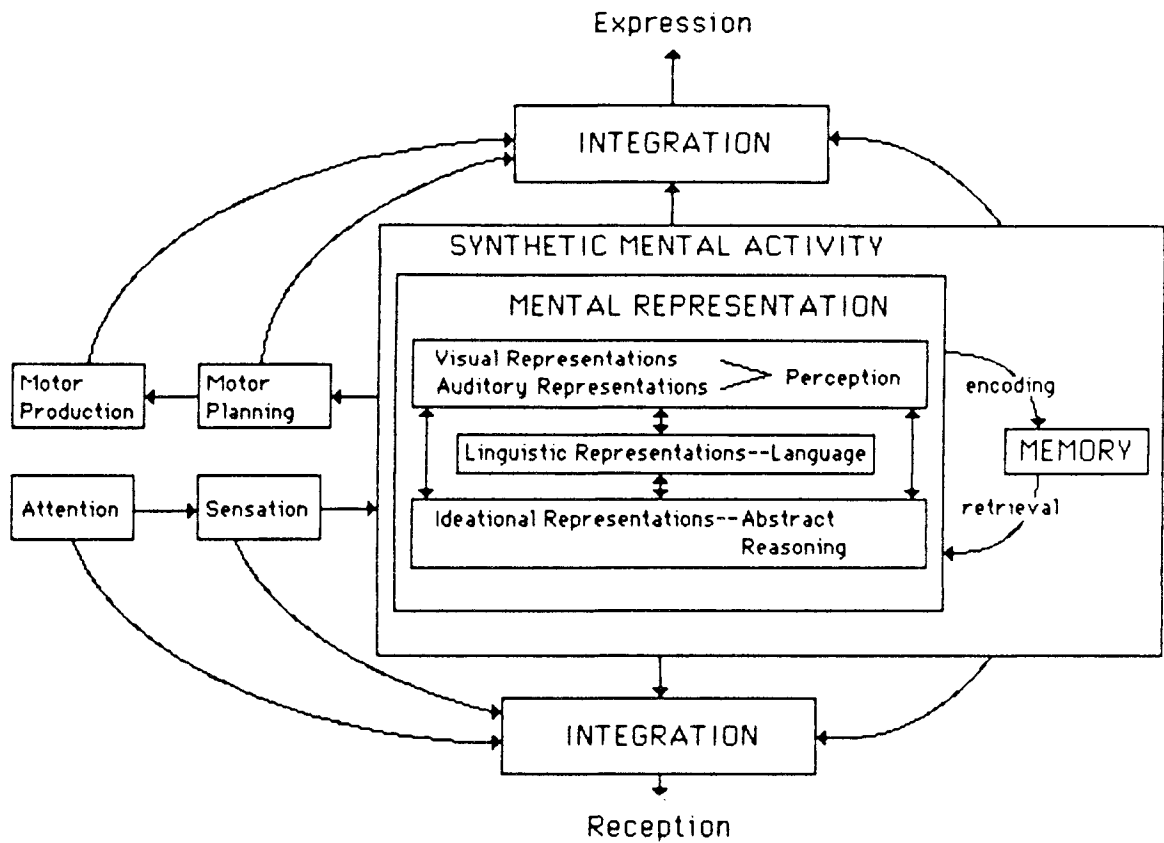
visual, tactile, olfactory, proprioceptive, and kinesthetic). After the stimuli is sensed, the nervous system propagates the stimuli into the higher cortical region. The message is then compared against memory, using mental representations for interpretation of the message.

Expressively, the channel is initiated by the interaction of the mental representations and memory. Then, the nervous system is activated to initiate, coordinate and sequence motor movements. The process is complete when actual muscle movement or motor production occurs. (Please refer to Figure 1.)

#### Applying the Model to DAT

When faced with the evaluation of a DAT patient, the speech/language pathologist must determine if and where in the communication process a deficit exists. The definition of dementia necessitates an impairment in mental abilities or in synthetic mental activities. According to the proposed communication model, communication deficits in DAT encompass the integration of mental representations and memory. Appraisal of the communication system in DAT patients should thus involve assessment of the integration of language with the other synthetic mental activities of perception, abstract reasoning and memory. Assessment of this type would require comparison of mental activities of equal complexity across all modalities of synthetic mental activity. However, several earlier investigations which analyzed language in DAT as compared to other higher mental activities did not use tasks which were of equal complexity (Alexander,

Figure 1: Communication Model



1973; Crookes, 1975; and Perez, Gay & Taylor, 1975 as cited in Bayles, 1985). The language tasks utilized in these studies generally involved a more simplistic mental activity than those required on the perceptual and abstraction tasks. As would be expected, the performances on language tasks were superior, and did not evidence any significant deficit. Conclusions were drawn without regard to the complexity discrepancy, suggesting that language abilities were unimpaired in the earlier stages of DAT. Recently, several investigators, realizing this discrepancy, designed language tasks which assessed higher level language abilities comparable to the perceptual and abstraction abilities assessed. These tasks reveal language deficits in the mildest stages of DAT (Bayles, 1982; Appell et al., 1982; and Cummings, Benson, Hill & Read, 1985).

In addition to the comparison of language abilities with other modalities, the speech/language pathologist must be conscious of the specific deficits within the language modality. The view supported by this paper is that DAT language disorders result from what will be referred to as the Encoding Deficit Hypothesis. Language is thought to be impaired, as are the other higher cortical modalities, due to a breakdown in the encoding ability of the brain, thus limiting storage of information into long term memory (Mohs, Rosen & Davis, 1982). Research results by Weingartner, Kaye, Smallberg, Ebert, Gillin & Sitaram (1981) suggested that the brain in DAT has a progressive loss of the ability to access semantic memory structures and therefore encoding and storage of new linguistic information is reduced. A research study by Nebes (1985) suggested that the overall composition and organization of semantic

memory is not deficient, since DAT subjects were able to use semantic priming as efficiently as normal subjects.

According to this hypothesis then, linguistic areas requiring access to semantic memory structures (i.e. higher level language content, language form, and language usage) will be impaired, which would then suggest that tasks requiring the least amount of integration between mental representations and memory (i.e. the least amount of encoding) or the more automatic processes would be the best preserved. Indeed, Hasher & Zacks (1979, reported in Nebes, 1985) found that automatic processes were more intact than those processes requiring effortful processing in DAT patients. Reduced access to past learned linguistic material will result in incomplete encoding of ongoing communication and lead to a reduced learning potential (Kaye, Weingartner, Gold, Ebert, Gillin, Sitaram & Smallberg, 1982).

The encoding-deficit hypothesis also coordinates with the cholinergic hypothesis. As previously explained (see Etiology section), production of the neurotransmitter Ach is reduced or absent in DAT. Achetylcholine is known to be in part responsible for the encoding of new information into memory (Kaye et al., 1982). Perhaps this may be taken one step further by suggesting Ach is responsible for the ability to access semantic memory. Following the premise of this theory, reduced ability to utilize higher level language abilities (in the initial disease phase) results from semantic memory accessing deficits, leading to impairment of encoding abilities needed for new learning and may be theoretically linked to reduced physiological production of cholinergic agents. As the

disease progresses cholinergic activity ceases, and encoding can no longer occur, creating deficits in lower level or automatic language functions as well.

The language modality may be more specifically divided into three interactive components: language use, language content and language form. These components differ in degree of complexity. Some aspects of pragmatic knowledge, or language use, require the use of the highest level of mental representations and encoding new information. For an individual to use higher level language acts appropriately, he must be able to integrate situational and social norms with all mental representations and memory.

Language content or semantic knowledge also requires a fair amount of effortful processing. Semantic knowledge is the association of the symbol with meaning requiring integration of the linguistic representations with the ideational and perceptual representations with memory. Interactionists speak of two types of semantic knowledge, referential and relational (Fey, 1986). The association of the symbol or word to an object, event or relation is referential knowledge. Relational knowledge refers to the relation between objects and the relation between objects and actions or the situation, which suggests different levels of complexity within semantic knowledge. For instance, understanding that the object with four legs and flat square surface is a table is a less complex mental activity than realizing that the table is related to a chair and belongs to the category of furniture. Both of these cases require less integration of mental representations than realizing the

word "table" can have more than one reference, as in the sentence: "Point to the table". The word "table" could mean furniture or it could mean a written table, depending upon the context.

Language form, or syntax, morphology, and phonology, is the most automatic of the linguistic components (Emery & Emery, 1983). All of these skills, except the most complex syntactical structures which utilize semantic information, are finite sets of well learned rules. When using these well learned rules of syntax, morphology and phonology, a comparison of the linguistic representations with the ideational representations is not necessary. Therefore, these skills utilize a less complex mental operation.

The language components of use, content and form function together to create linguistic abilities, but each linguistic component is hierarchical in complexity within this interaction. Ranging from the most complex linguistic ability to the least would be: 1) pragmatics 2) semantics, 3) syntax, 4) morphology, 5) phonology. Even though these components are hierarchical, there is overlap of complexity level among the components. In other words, although hierarchical in complexity, language abilities are interactional in function. The intent of the following section is to review the literature of language in DAT to demonstrate that language skills deteriorate according to the linguistic complexity hierarchy, lending support to the encoding deficit hypothesis. As Emery & Emery (1983) proposed, "there is a direct correlation between linguistic complexity and linguistic deficit in the performance of the Alzheimer elderly."

## TYPICAL LANGUAGE CHARACTERISTICS ASSOCIATED WITH DAT

### Pragmatics

Bayles (1985) defines pragmatic knowledge as, "an individual's knowledge of language use and includes the ability to recognize the intentions, purposes and beliefs of speakers in producing a particular utterance." Commonly pragmatic function is analyzed by assessment of speech acts, which include production of the utterance, promising, reporting, asking, threatening, persuading, intimidating, and deceiving. Speech acts are used for the social purpose of relaying intention in accordance with a particular context. (Lund & Duchan, 1983; and Fey, 1986). Additionally, pragmatic knowledge includes awareness of the rules of conversation or turn taking, topic initiation, topic maintenance, and utterance relevance. Since individuals with DAT theoretically have a deficit in the encoding of new information, they should have the greatest deficits in the language area which requires the most information processing or in pragmatics. The only report in the literature to date about the effects of DAT on pragmatic function is from Bayles (1985); who suggested that those speech acts which have an effect on the hearer (i.e. persuading, deceiving) disappear first and that speech acts of performance (i.e. reporting, threatening) are less diverse. On tasks of description, patients with mild dementia provide significantly fewer relevant bits of information than do age-matched, normal controls (Bayles, 1985). Thus, a pragmatic deficit appears to exist even in the mildest stage of DAT.



Theoretically speaking, one would expect individuals with DAT to retain the behaviors which require the least amount of access to semantic memory and encoding of new information. Turn taking, for instance, is a well-learned behavior, which calls for realizing that a speaker has ended his utterance and associating that end with an expected response by the listener. However, higher level processing is required for the response, if it is to be more than a simple production of a sound. If the response is to be one of persuasion, the respondent must encode the message and the context into short term memory, must recognize the meaning of the utterance, then interpret the utterance and formulate an abstract message of persuasion. This speech act requires the individual to use the highest levels of cortical functioning. Although no studies currently exist which have objectively studied communicative intentions or rules, the hierarchy depicted in Table 5 was predicted by consideration of the complexity of the mental activity involved in each pragmatic act.

### Semantics

The semantic component of language encompasses the areas of meaning and reference. Semantic deficits will impair the ability of the communicator to use linguistic symbols to represent objects, concepts, attributes, actions or feelings (Nation & Aram, 1984). As would be predicted for the hierarchy of linguistic complexities, semantic skills would be the next most impaired system. Many authors have termed semantic knowledge as "the" major impairment of DAT, although pragmatic functions were not considered (Bayles & Boone, 1982; Bayles, 1982; Appell et al., 1982; Schwartz, & Saffran, 1979). These

Table 5. Pragmatic Act Deterioration in DAT (predicted)

<u>Pragmatic Act</u>	<u>Normal Elderly</u>	<u>Mild DAT</u>	<u>Mod. DAT</u>	<u>Severe DAT</u>
Utterance	***	***	***	**
Turn taking	***	***	**	*
Reporting	***	***	**	*
Threatening	***	***	**	*
Promising	***	**	**	*
Asking	***	**	**	*
Topic Initiation	***	**	**	*
Utterance relevance	***	**	**	*
Topic maintenance	***	*	*	-
Intimidating	***	*	*	-
Persuading	***	*	*	-
Deceiving	***	*	*	-

- (-) = no ability  
 (\*) = moderate-severe deficit  
 (\*\*) = mild-moderate deficit  
 (\*\*\*) = normal ability

authors assert that although syntax and phonology may deteriorate in the last stage of DAT, semantic knowledge is the only system which is significantly impaired in the earlier stages.

Semantic abilities are impaired in DAT subsequent to an inability to access semantic memory rather than from total deterioration of the semantic system. Grober, Buschke, Kawas & Fuld (1985) investigated the question as to the degree of erosion in the content of semantic information associated with a concept, revealing that the content was indeed preserved. DAT subjects were able to identify attributes representative of a word's meaning, but were unable to weigh the relative importance of the attributes to delineate the word meaning (Grober et al., 1985). Thus, Grober and colleagues, (1985) findings suggested that while their basic semantic knowledge is intact, the DAT patients are unable to access salient features, resulting in a semantic deficit.

Semantic knowledge has been investigated in DAT both in the expressive and receptive realms, with tests of naming, vocabulary defining, verbal fluency, sentence correction, reading comprehension, with the Peabody Picture Vocabulary Test (PPVT), with picture description tasks and with spontaneous speech tasks. In spontaneous language semantic deficits are manifest in the mild patient as inappropriate content and word finding difficulties with anomie discourse (Bayles, 1985). The moderately demented patient's spontaneous language is characterized by empty speech. The empty speech of DAT was classified by Nicholas, Obler, Albert & Helm-Estabrooks (1985),

revealing that those with mild and moderate DAT produce dietic terms, semantic paraphasias, conjunctions, repetitions, and pronouns without antecedants significantly more frequently than did normal age- and education-matched controls. In severe cases of DAT spontaneous language is usually meaningless. A semantic knowledge deficit is apparent in the spontaneous language of DAT patients even in the mild stages of dementia and is generally characterized by more verbose utterances that convey less information, which increases with increasing severity (Hier et al., 1985).

Individuals with DAT progressively lose their ability to name objects. Nicholas et al. (1985) asserted that 75% of patients in the earliest stages of DAT have naming deficits. However, Bayles and Tomoeda (1983) claimed that naming deficits are not significant until later stages; but, Bayles & Tomoeda's naming task may not have been complex enough to detect the mild deficit.

Apparently, naming abilities deteriorate in DAT subsequent to an erosion of the referential boundaries. Analysis of naming errors has revealed that up to 92% of misnamings are related to the stimulus, and that the substitutions are either the category name or within the semantic field (Martin and Fedio, 1983). In a case study, a DAT subject was found to overextend the word "dog" to different types of cats and later to squirrels and rabbits, although other types of animals were routinely excluded (fish, horses, cows and elephants) (Schwartz, et al., 1979). Overextension has been hypothesized to mean that a person only associates one or two attributes to characterize the word meaning. In

children, learning more features of the word helps to narrow down the meaning until the word equates with the adult definition (Martin and Fedio, 1983). Martin and Fedio (1983) suggested DAT causes an unraveling of this process, yet leaving the semantic structure in general preserved. In terms of the encoding deficit hypothesis, the DAT individual progressively loses the ability to disassociate salient semantic features subsequent to the reduced ability to access semantic memory.

Following the same principle as confrontation naming, but involving a slightly higher level skill, is the ability to name items within a category (verbal fluency). Here, DAT subjects would be expected to perform poorer, since naming within a category requires two accesses to semantic memory. One access is to retrieve the meaning of the category and the second access is to recall the label, comparing those linguistic representations to the qualifications of the category. Indeed, various research studies have shown that subjects with DAT perform significantly poorer than normal elderly controls on generative naming tasks (Martin and Fedio, 1983; Bayles and Tomoeda, 1983).

Bayles and Boone (1982) compared several language tasks to certain psychological tests known for their sensitivity in detecting DAT. Of the language tasks evaluated, a test of semantic knowledge, (i.e. semantic correction task) proved the most sensitive for the differentiation of DAT subjects from controls and was more sensitive than the psychological measures. One other semantically oriented task which evidenced greater differential ability than the psychological measures was a disambiguation task. On this task subjects were required to resolve

the meaning of the sentence through analysis of the sentence structure and word meaning. Thus, sentence disambiguation requires use of syntactic knowledge as well as semantic.

Vocabulary may also be considered a semantic skill which is deteriorated in DAT, although receptive abilities appear to be affected by the deficit more than expressive abilities. Scores of mild DAT subjects were found to be significantly lower than normal controls on the PPVT (Bayles, 1985). However, both Bayles (1985) and Martin & Fedio (1983) did not find expressive vocabulary scores of mild DAT subjects to be significantly different from normal controls. Still, expressive vocabulary skills were found to deteriorate in the later stages of the disease (Bayles, 1985)

### Syntax

Syntactic processing generally is a more automatic task, requiring only the retrieval of well-learned rules (Bayles, 1985; Emery and Emery, 1983). As Hier and colleagues (1985) point out syntax production is less impaired in the DAT patient, than production of semantics due to difficulties accessing the lexicon. These researchers, investigating spontaneous productions on picture description tasks, found that syntax was relatively unimpaired during the early phase of DAT but syntactic impairment progressed with increasing severity, resulting in simplified syntax and emergence of violated syntactic rules (Hier et al., 1985). Among the deviated syntactic rules cited by Hier are: 1) errors in preposition use, 2) errors in inflection, 3) use of sentence fragments, 4) word omissions, and 5) use of inappropriate functors. This research team

was among the first to objectively analyze syntactic function. Prior to their investigation subjective observations and analysis of lower level syntactic forms had lead to the conclusion that syntactic ability in DAT was only minimally impaired, if at all, until the most severe phases (Schwartz et al., 1979; Appell et al., 1982; Bayles, 1982; Bayles & Boone, 1982; Kirshner et al., 1984; and Stevens, 1985).

Another point to make in regard to the syntactical research conducted in DAT, is that most of the observations are of expressive syntax. However, Emery & Emery (1983) found significant deficits in higher level syntactic ability, when the receptive domain was assessed. Bayles (1985) predicted, that as syntactic structure becomes more complex, they may become more dependent upon semantic knowledge. Thus, greater deficits would be expected in DAT. However, research by Emery & Emery (1983) did not entirely support this prediction. Rather they found comprehension of higher syntactical complexity structures which were devoid of semantic cueing, to also be significantly impaired in DAT. As these authors explain "the Alzheimer elderly were not capable of processing syntactically complex forms (Post-Stage II) and showed constant evidence of regression toward use of the most simple form (Stage I) of syntactic patterning." (Emery & Emery, 1983). These findings also support the encoding-deficit hypothesis since higher level syntactical forms utilize logical relations, which require integration of ideational representations, making effortful encoding necessary.

### Morphology

Morphological markers or morphemes are the smallest units of meaning, in which the symbol is associated with a meaningful idea. A finite number of morphemes exists. Emery & Emery (1983) found significantly less impairment on morphological tasks than on syntactic tasks. This finding adds additional support of the encoding-deficit hypothesis, since morphology would be considered a more automatic function which is well learned, thus requiring minimal access to semantic memory.

### Phonology

Phonology is the lowest level on the linguistic hierarchy and may be thought of as an automatic processing task. In adults phonological production requires the retrieval of a finite set of sounds, characteristic of a language, which are combined by a finite set of rules. Linguistically, phonology is one of the first acquired function and thus, becomes extremely well practiced by adulthood to the point individuals are not consciously aware of the rules used for sound combinations (Bayles, 1985). The automatic processing and production of phonological rules as an adult, may not require integration of linguistic representations. Possibly, phonological processing in adults utilizes lower cortical activity. According to the encoding-deficit hypothesis then, phonology should be preserved in DAT, since access to semantic memory would not be required. Essentially, this hypothesis has been found to be accurate.



Phonology is sometimes relatively unimpaired even in the most severe stages of DAT (Bayles, 1986; Cummings et al., 1985; and Emery & Emery, 1983). By the most severe stage, some phonological substitutions and paraphasias are evident in the speech of DAT patients (Bayles, 1986), which is usually echolalic. Emery & Emery (1983) found repetition of sounds/words to be intact in a group of 13 DAT patients studied; however, severity level was not defined. Regardless, repetition was judged a phonological task since sounds are simply repeated without an association with meaning. Another measure of phonological knowledge is correction of phonologically imprecise sentences, which Bayles & Boone (1982) found to be intact until the last stages of DAT. Thus, phonological function in DAT is usually maintained until the final stages. One might speculate that automatic processes deteriorate in the later stage due to profuse brain atrophy which has long since destroyed encoding abilities, but then proceeds to destroy lower level functioning as well.

#### OUTLINED PROTOCOL FOR DAT

Clinically, the role of the diagnostician is to separate the disordered population from the normal population, and to differentially diagnose the disorder. Thus, the first challenge to the clinician working with DAT is to identify those qualities which deteriorate the soonest, in order to distinguish the mildest stages of DAT from the normal aging. The second challenge is to differentiate DAT from other dementing diseases. Psychometric measures with a cognitive emphasis have been developed for detection of mild DAT, which quite reliably separate DAT from the

normal aging (Rosen, 1983; and Storandt, Botwinick, Danzinger, Berg & Hughes, 1984). In both of these studies language testing was among the most discriminating of assessment tasks. Bayles & Boone (1986) also determined that four language measures held more discriminatory power than perceptual tasks which had previously been regarded as the most sensitive measures of DAT in the early stages. As reviewed in the previous section, a exist which describe the language characteristics of DAT in the mild stage. However, to date an evaluation protocol specific to language behaviors of the mild DAT patient has not been presented. The aim of this paper was to outline such a protocol. The language evaluation protocol for DAT, presented in Table 6, follows the communication model and the encoding deficit hypothesis described previously.

The emphasis of the evaluation protocol is to characterize language of the mild DAT. However, language does not function separately from the other mental representations or from memory. Thus, the protocol suggests that a screening of abstraction, visual perception and memory is also necessary for an accurate diagnosis. For instance, if a patient presented with the language deficits of decreased verbal fluency, with decreased inflectional syntactic comprehension and with empty speech, but had normal perception, abstraction and memory, the patient could not be classified as DAT. But, if other mental activities had not been tested, the patient could have been misdiagnosed since his language deficits were consistent with those of mild dementia.

The assessment is not complete without the consideration of the other communication components. The motor planning and motor

Table 6. Dementia of the Alzheimer's Type (DAT) Communication Evaluation Protocol

I. SYNTHETIC MENTAL ACTIVITY

A. Orientation

1. Person
2. Place
3. Time

B. Language

	<u>Comprehension</u>	<u>Expression</u>
1. Pragmatic Knowledge	Conversation	Conversation Object Description
2. Semantic Knowledge	Semantic Sentence Correction Sentence Disambiguity PPVT-R Token Test Reading Comprehension	Semantic Sentence Correction Sentence Disambiguity Conversation Object Description Cookie Theft Verbal Fluency
3. Syntactic Knowledge	Token Test Test for Syntactic Complexity or Complex Linguistic Structure Test Writing	Conversation Object Description Cookie Theft

**Table 6. Dementia of the Alzheimer's Type (DAT) Communication Evaluation Protocol--Part II**

C. Abstract Reasoning	Pictorial/Verbal Analogies Calculation
D. Visual Perception	Block Designs Clock Setting
E. Memory	Story Retell
II. ATTENTION	
A. Awareness level	
III. SENSATION	
A. Auditory	
B. Visual	
C. Tactile	
IV. MOTOR PLANNING	
A. Oral-motor coordination	
V. MOTOR PRODUCTION	
A. Speech	
1. Articulatory movement	
2. Rate	
3. Rhythm	
4. Voice	

production assessments will further confirm a diagnosis of DAT, since those in the mild stage of DAT should have no motor or phonological deficit. Observation of attention and sensation will alert the examiner to any confounding disorders or behaviors.

Following is a brief description and rationale for each of the components of the synthetic mental activities section of the protocol.

#### Orientation Assessment

For the mild DAT patient, disorientation should only be noted in the time domain. Orientation questions are included in this protocol to provide the clinician with a quick, initial impression of the mental status deficit. Refer to Appendix A for orientation questions.

#### Language Assessment

Object Description. This task has evidenced usefulness in the elicitation of spontaneous language, which is directed, yet open-ended enough to allow for variation. Pragmatic, syntactic and semantic knowledge may be assessed according to the analysis forms compiled from data cited in the review section (refer to Appendix B & C). Bayles (1985) has obtained data using four specific items (button, nail, marble and penny) which suggests a significant difference between the DAT group and normal elderly population for number of relevant information units produced.

Conversation. A five-minute sample of conversation should be obtained for the assessment of pragmatic acts, which may be recorded on the pragmatic analysis form. Comparison of pragmatic acts observed may then be compared to the predicted hierarchy of deterioration of pragmatic acts (Table 5) to look for a pattern similar to the mild DAT characteristics. Suggested conversation topics include: 1) family; 2) previous occupation; or 3) hobbies.

Semantic Correction. This task requires the patient to correct a semantically illogical sentence (Refer to Appendix E), requiring processing of errored sentence, comparison against semantic memory for the meaning of each word, and finally choosing a semantically accurate replacement. Thus, the examiner must utilize both receptive and expressive vocabulary. Semantic sentence correction was found to be the most sensitive task for discriminating DAT as compared to other linguistic and non-linguistic mental abilities (Bayles & Boone, 1982).

Sentence Disambiguation. Sentence disambiguation is suggested because of its high discriminatory ability for DAT (Bayles & Boone, 1982), finding that deep structure disambiguations evidence the greatest difference between normals and DATs. Subjects are presented with several ambiguous and non-ambiguous sentences and are asked to paraphrase them, and are also informed that some sentences have more than one meaning. This task surveys both expressive and receptive semantic skills. (Refer to Appendix E.)

Peabody Picture Vocabulary Tested-Revised-(PPVT-R). Receptive vocabulary has been shown to be deficient in DAT upon administration of the PPVT-R (Bayles, 1985). The results of this test may prove useful in providing information about the patient's functional language level (i.e., if the patient is not comprehending certain word types). Refer to Bayles (1985) for normative scores of DAT subjects as compared to normal elderly.

Token Test. The Token test is suggested for the protocol as a measure of both syntactic and semantic comprehension, since the test has evidenced high discriminatory ability for DAT. In administration of the complete Token test Emery & Emery (1983) found a level of significance greater than the .0001 level between DAT elderly and normal elderly subjects. In particular the DAT subjects evidenced the most difficulty on the last and most complex section. In regard for time allowances, the shortened version is recommended (see Appendix F) with the prediction that since the screening form was valid with the initial test group, it will also parallel the results obtained with the long form for DAT subjects (De Renzi & Faglioni, 1978), although the examiner should validate this prediction with their own normative sample.

Reading Comprehension. A short reading comprehension exercise (see Appendix G) was included in the battery, since DAT subjects have been

noted to have preserved ability to read aloud (preserved orthography or phonology) but have early degeneration of reading comprehension skills (requiring repeated access to semantic memory). Cummings, Houlihan & Hill (1986) suggested that reading skills systematically decline as the dementia progresses. Also refer to Sevush (1984) for further discussion of reading skills in DAT.

Verbal Fluency. As previously mentioned word, retrieval skills are significantly impaired in DAT. A generative naming task versus confrontation naming, was chosen due to higher degree of sensitivity found with verbal fluency measures (Huff, Corkin & Growden, 1986). On verbal fluency tasks, the subject is provided with a category and required to list as many components as possible in 60 seconds. Since several normative studies have been conducted with the "animal" category (Martin & Fedio, 1983; Baylkes & Tomoeda, 1983, and Huff et al., 1986) this category is recommended.

Test for Syntactic Complexity (TSC). Briefly described in Emery & Emery (1983), the TSC is a measure of higher syntactic complexity comprehension, probing inverse and inflectional structures. However, the reliability/validity of this measure is questioned and use of the test should only occur after thorough review or it should be used as a nonstandardized observation tool. As an alternative the Complex Linguistic Structure (Appendix H) subtest from Goodglass & Kaplan (1983) is suggested as an observation tool.



### Abstract Reasoning Assessment.

Pictorial/Verbal Analogies. This task is intended to assess abstract thinking skills, in that the respondent must make a relation based upon information which is not provided by the stimuli. Both auditory and visual modalities are assessed to determine if one modality is more readily accessible. (See Appendix I for verbal analogies and refer to Hiskey-Nebraska Test of Learning Aptitudes for pictorial analogies.)

Calculations. Mathematical calculations also require abstract, logical thought. Simple addition and subtraction problems may be a more complex mental activity compared to multiplication/division, since the latter math operations require memorization of a finite set of solutions which are well-rehearsed by most adults with an average education. Thus, both addition/subtraction and multiplication/division problems should be assessed (see Appendix I), but hypothetically the examiner may find addition and subtraction more impaired.

### Perceptual Assessment.

Block Designs. This task has repeatedly demonstrated a high discriminatory ability in separating mild DAT from the normal elderly. (Sasanuma, Itho, Toshiko, Watamori, Fukuzawa, Sakuma, Kukusako & Monoi, 1985; Bayles, 1982; Bayles & Boone, 1982). The Block Design is a subtest from the Wechsler Adult Intelligence Scale (WAIS) and measures

visual perceptual hand-eye coordination. Refer to Sasanuma et al. (1985) for normative values.

Clock Setting. On a clock setting task subjects are required to draw the missing clock hands onto a blank clock face (see Appendix J). Selection of this task for the protocol was based on the ease of administration of a task which involves high perceptual integration across all modalities. Sasanuma et al. (1985) found the clock setting task to have the highest discriminatory ability of all the visuospatial functions tested.

#### Memory Assessment.

Story Retell. This logical memory task has exhibited the best ability of short-term memory tasks to differentiate DAT patients from the 'normal' elderly population (Storandt et al., 1984; Sasanuma et al., 1985; and Bayles & Boone, 1982). Upon verbal presentation of a short paragraph containing 18 information units, the subject is required to recall as many details as possible (see Appendix K). The normal elderly would be expected to recall approximately 60% of the information units, whereas mild DAT subjects will typically recall approximately 30% (or 6) of the units (Sasanuma et al., 1985).

#### Management Plan

In general, this protocol is presently intended for use only as an observation tool. The inclusion of items is based upon existing data which assesses the essential components of communication with the purpose of

describing the patient's abilities/disabilities. Administration and interpretation of results must be made cautiously, remembering that diagnosis of DAT is one of exclusion. The overriding purpose of assessment, though, is to delineate the best means of intervention. The position taken in this paper states that intervention is best achieved by patient management, in other words, intervention of the patient's environment. The speech-language pathologist may best intervene by providing management suggestions for the caregivers. The management suggestions provided in tables 7 and 8 may offer some guidelines for counseling.

Counseling the family about the progression of the disease is also important in the management of the DAT patient. The clinical course may be more accurately predicted for the family if variables such as early age of onset, presence of extrapyramidal and myoclonus signs, and presence of early severe language impairment are considered in combination with the symptomatology outlined in Table 4 (page 20). Additionally, families of DAT victims must be counseled about the possibility of a genetic factor contributing to the disorder.

**Table 7. Difficult Communication Situation for Dementia of Alzheimer Type**

**Difficult Situations**

1. Group conversations
2. Telephone conversations
3. Explaining information to strangers
4. Receiving information without contextual cues
5. Situations requiring recent memory
6. Situations requiring social leadership
7. Situations requiring time limits
8. New living environments

**Difficult Language Forms**

1. Humor
2. Sarcasm
3. Non-literal utterances
4. Indirect utterances
5. Open-ended questions
6. Abstract topic
7. Lengthy & complex utterances

(Adapted from Bayles, 1986a.)

**Table 8. Management Plans for Dementia of Alzheimers' Type**

**Communications Suggestions**

1. Use concrete utterances
2. Use short, simple structure sentences
3. Avoid sarcasm
4. Do not reason or argue with DAT patient
5. Speak slowly and clearly
6. Maximize contextual cues with gestures, facial expression and body language
7. Communicate one-on-one
8. Provided step-by-step instructions
9. Repeat utterance but do not overload
10. Minimize background noise
11. Allow processing time

**General Suggestions**

1. Establish simple daily routine
2. Announce routine changes
3. Expect increased disorientation in new situations but minimize by displaying familiar objects
4. Minimize distractions
5. Expect denial of problem and blame to be put on others
6. Expect sleep disturbances
7. Expect mental status to worsen
8. Manage patient's diet and medicine
9. Keep household items in designated place

(Adapted from Bayles, 1986a)

## CONCLUSION

Dementia of the Alzheimer's Type (DAT) is a degenerative disease affecting the cortical region of the brain, which results in a progressive deterioration of synthetic mental activity. Synthetic mental activity as defined by the communication model (Figure 1) is the integration of mental representations with memory, of which language is a modality inseparable from thought. Etiology of this deterioration is presently unknown, although learning is impossible without this neurotransmitter system. The cholinergic hypothesis parallels behavioral observations. Research suggests that the synthetic mental ability of semantic memory structure is not destroyed, but rather the person's ability to access this information is impaired. With an inability to access semantic memory, the process of receiving new information, comparing this information to semantic memory and storing it in semantic or episodic memory is impossible. This behaviorally observed phenomenon is referred to as the encoding-deficit hypothesis, which attempts to explain why DAT patients progressively lose complex to simple mental operations.

Since language is a major component of synthetic mental activity deterioration observed in DAT, the Speech-Language Pathologist working with the geriatric and adult population is obligated to be familiar with the disease process and its effects on communication, in order to appraise this population. The intent of this paper was to provide a basic foundation for the evaluation and management of communication in DAT and to suggest a protocol by which appraisal may be achieved. The

protocol presented, by no means should be considered a formal measure. Rather, the protocol is a theoretically based list of suggested tasks which most efficiently probe the communication components involved in DAT . However, as a plan for future reasearch, the protocol could be objectified.

## APPENDIX A

Orientation

1. Person: Name \_\_\_\_\_

Age \_\_\_\_\_

2. Place: City \_\_\_\_\_

State \_\_\_\_\_

Address \_\_\_\_\_

Hospital \_\_\_\_\_

3. Time: Year \_\_\_\_\_

Date \_\_\_\_\_

Day \_\_\_\_\_

Morn/Eve \_\_\_\_\_

Season \_\_\_\_\_



## APPENDIX B

Pragmatic Analysis

<u>Speech</u>	<u>Number Observed</u>	<u>Number Opportunity</u>
---------------	------------------------	---------------------------

<u>Acts</u>		
-------------	--	--

Deceiving		
-----------	--	--

Persuading		
------------	--	--

Intimidating		
--------------	--	--

Asking		
--------	--	--

Promising		
-----------	--	--

Threatening		
-------------	--	--

Reporting		
-----------	--	--

Utterance		
-----------	--	--

Number of relevant information units:

<u>Appropriate</u>	<u>Inappropriate</u>
--------------------	----------------------

Turntaking		
------------	--	--

Topic Initiation		
------------------	--	--

Topic Maintenance		
-------------------	--	--

Interruption		
--------------	--	--

## APPENDIX C

Semantic Analysis

	<u>Number Observed</u>		<u>Object Description</u>
	<u>Conversation</u>	<u>Cookie Theft</u>	
Repetitions			
Deictic Terms			
Semantic			
Paraphrases			
Conjunctions			
Pronouns without			
Antecedents			
Inappropriate			
Context			
Word finding			

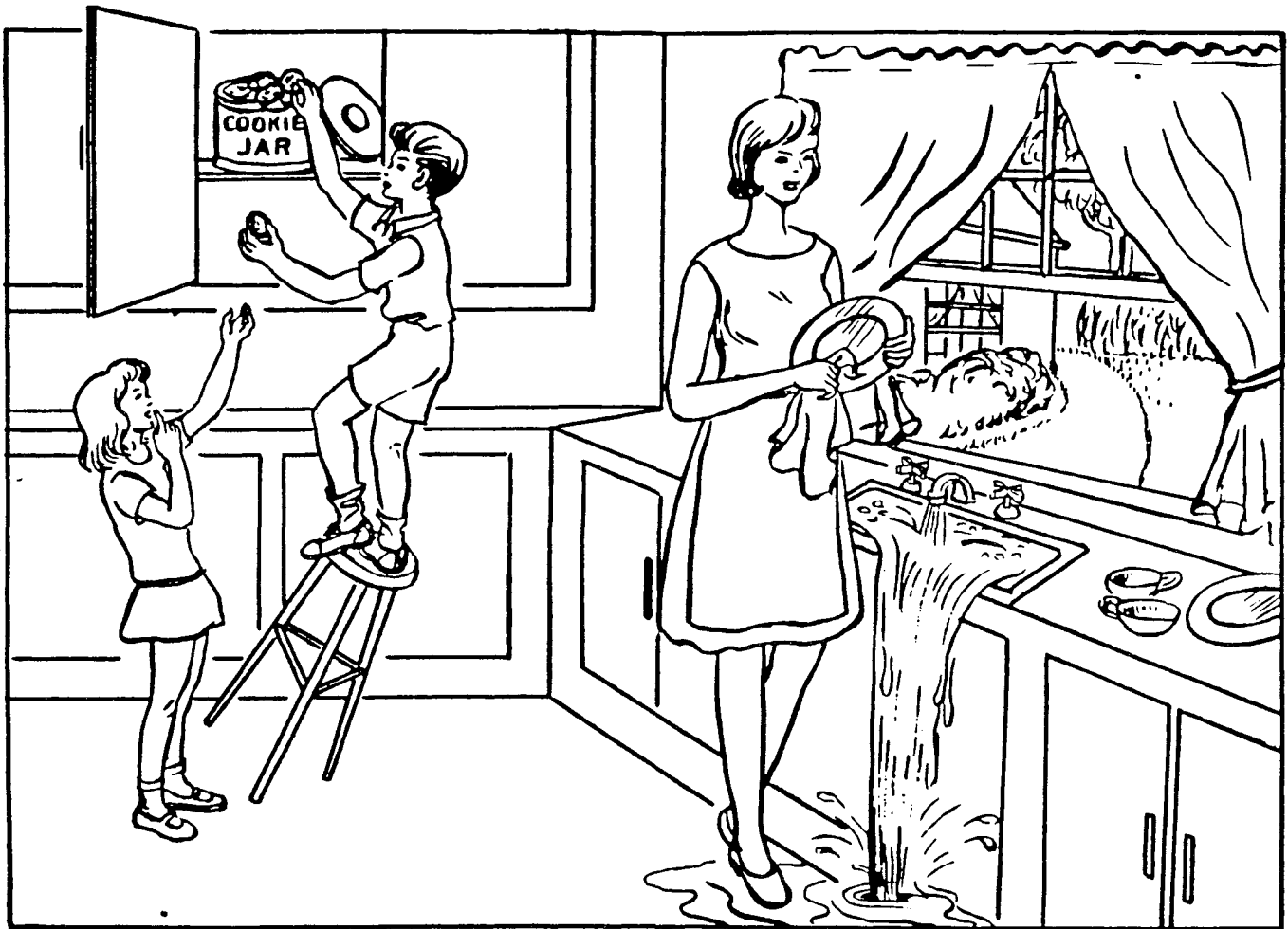
(Refer to Bayles, 1985; and Nicholas et al., 1984.)

Syntactic Analysis

	<u>Number Observed</u>		<u>Object Description</u>
	<u>Conversation</u>	<u>Cookie Theft</u>	
Prepositional			
errors			
Inflectional			
errors			
Fragments			
Word omissions			
Inappropriate			
functors			

(Refer to Hier et al., 1985.)

APPENDIX D



## APPENDIX E

## Semantic Sentence Correction

1. I'm not as tall as I am.

---

2. Where's in the package?

---

3. My sister is an only child.

---

4. He lost John's temper.

---

## Sentence Disambiguation - Deep Structure

1. Visiting relatives can be a nuisance. \*

---

---

2. She was responsible for the child.

---

---

## APPENDIX E (cont.)

3. The shooting of the police was awful. \*

---

---

4. I have money in the bank.

---

---

5. The recently assembled club broke up.

---

---

6. I have more friends than Mary. \*

---

---

7. The duck is ready to eat. \*

---

---

(Adapted from Bayles & Boone, 1982)

\* Ambiguous sentence



## APPENDIX F (cont.)

## Shortened Version of the Token Test (con't)

	CORRECT		FAIL
	1st try 1 pt.	2nd try .5 pt.	
<b>Part 4. (Use only the large tokens)</b>			
16. Touch the red circle & the green square			
17. Touch the black square & the blue square			
18. Touch the white square & the green circle			
19. Touch the white circle and the red circle			
<b>Part 5. (Use all 20 tokens)</b>			
20. Touch the large white circle & small green square			
21. Touch the small blue circle and large black square			
22. Touch the large green square and the large red square			
23. Touch the large white square and the small green circle			
<b>Part 6. (Use only the large tokens)</b>			
24. Put the red circle on the green square			
25. Touch the blue circle with the red square			
26. Touch the blue circle and the red square			
27. Touch the blue circle or the red square			
28. Put the green square away from the black square			
29. If there is a yellow circle, touch the red square			
30. Put the green square next to the red circle			
31. Touch the squares slowly and the circles quickly			
32. Put the red circle between the black square and the green square			
33. Touch all the circles, except the green one			
34. Touch the red circle - no - the white square			
35. Instead of the white square, touch the black circle			
36. In addition to touching the black circle, touch the blue circle			

Rating of Severity:

<u>Raw Score</u>	<u>Impairment</u>
36-29	Nil
28-25	Mild
24-17	Moderate
16-9	Severe
6-0	Very Severe

Raw Score: \_\_\_\_\_

Correction: \_\_\_\_\_

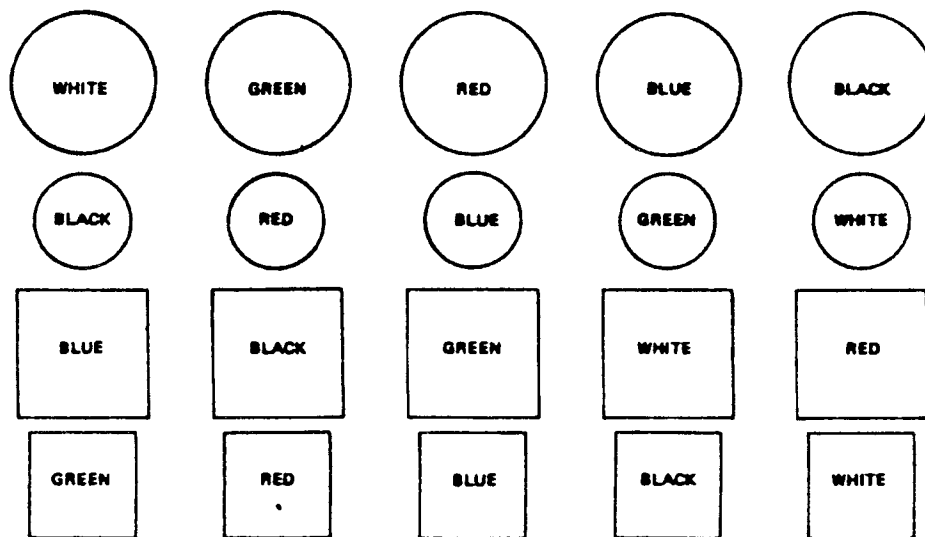
Adj. Score \_\_\_\_\_

Add 1 pt. for 3-6 yrs. schooling  
 Subtract 1 pt. for 10-12 yr. "  
 Subtract 2 pts. for 13-16 yrs. "  
 Subtract 3 pt. for 17 yrs. "

## APPENDIX F (cont.)

## TOKEN LAYOUT

Use all tokens for Pretest and Subtest II, IV, VI, VIII, and X. Use large tokens only for Subtest I, III, V, VII, and IX.





## APPENDIX G

**Snoring**

Snoring sounds are made by vibration of the soft palate at the back of the mouth. More men snore than women, because more men sleep on their backs, a position that is more likely to produce snoring. Though there is nothing physically wrong with loud snorers, many have black and blue ribs.

Snoring sounds are made by the

teeth

soft palate

gums

Most snoring is done by

women

men

neither

One way to stop snoring is to

play soft music

be very quiet

wake the person up

The one most likely to snore would be a

man sleeping on his back

woman sleeping on her side

man sleeping on his bed

## APPENDIX H

Complex Linguistic Structure TestBefore - AfterCorrect    Incorrect

- 1) Do you eat lunch after supper?
- 2) Do you eat supper after lunch?
- 3) Do you put on your shoes after your socks?
- 4) Is evening before noontime?
- 5) Do you get dressed before taking a bath?

Passive Subject - Object Discrimination

- 1) The lion was killed by the tiger, which animal is dead?
- 2) The lion was killed by the tiger, which animal killed the other one?
- 3) the boy was slapped by the girl, which one slapped the other?
- 4) The boy was slapped by the girl, which one felt the slap?
- 5) The car was damage by the motorcyle, which vehicle needs the repair?

Subject of Verb Complement

- 1) John asked his father to mail the letter, and he did. Who mailed the letter?
- 2) Susan promised her mother to bake some brownies and she did. Who baked the brownies?

Adapted from:  
The Assessment of Aphasia  
& Related Disorders  
 Goodglass & Kaplan (1983)

## APPENDIX I

Verbal Analogies

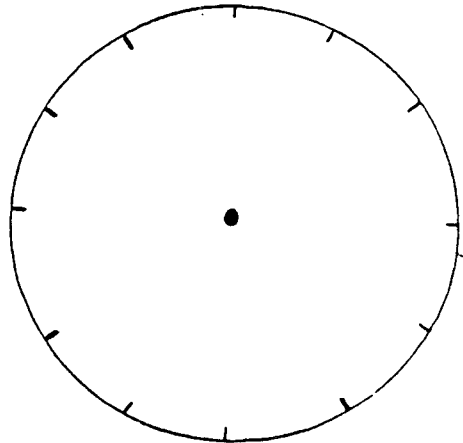
1. Black is to white as hot is to \_\_\_\_\_
2. Hand is to glove as foot is to \_\_\_\_\_
3. Jelly is to jar as eggs are to \_\_\_\_\_
4. Eye is to see as ear is to \_\_\_\_\_
5. Shoe is to foot as hat is to \_\_\_\_\_
6. Beverage is to drink as cake is to \_\_\_\_\_
7. Right is to wrong as good is to \_\_\_\_\_
8. Sleep is to bed as sit is to \_\_\_\_\_
9. Husband is to wife as man is to \_\_\_\_\_
10. Dinner is to eat as book is to \_\_\_\_\_

Calculations

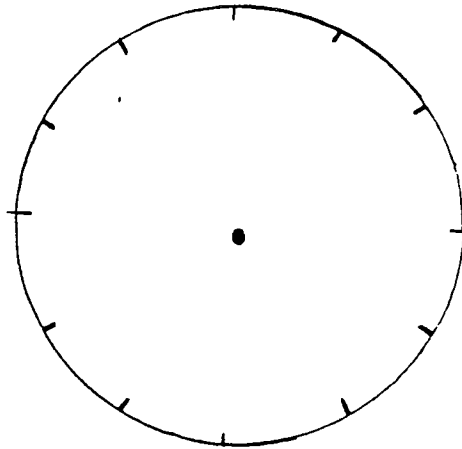
- |                                                           |                                                      |                                                           |                                                      |
|-----------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------|
| 1. $\begin{array}{r} 17 \\ -9 \\ \hline \end{array}$      | 2. $\begin{array}{r} 14 \\ +7 \\ \hline \end{array}$ | 3. $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$ | 4. $\begin{array}{r} \_ \\ 6/36 \end{array}$         |
| 5. $\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$ | 6. $\begin{array}{r} 11 \\ -9 \\ \hline \end{array}$ | 7. $\begin{array}{r} \_ \\ 9/54 \end{array}$              | 8. $\begin{array}{r} 7 \\ +36 \\ \hline \end{array}$ |

APPENDIX J

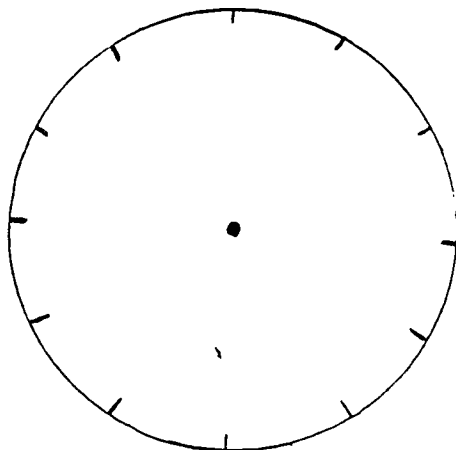
CLOCK SETTING



1. 7:00



2. 1:25



3. 9:40

## APPENDIX K

STORY RETELL**Coke Adds Life**

A man/had only a quarter./ He went/to the store/to buy something/to drink./ The lady/who owned the store/said/“We have very little here/for a quarter.”/ About the only things/he could buy/were soft drinks/or cartons of milk./ He bought/a small Coke/and left./

## APPENDIX L

ATTENTIONAwareness Level

Alert \_\_\_\_\_

Awake \_\_\_\_\_

Lethargic \_\_\_\_\_

Stuporous \_\_\_\_\_

Other Behaviors

Perseverative \_\_\_\_\_

Anxious \_\_\_\_\_

Agitated \_\_\_\_\_

Impulsive \_\_\_\_\_

SENSATIONAuditory

Otosopic inspection: \_\_\_\_\_

Hearing loss: \_\_\_\_\_

Visual

Visual fields: \_\_\_\_\_

Optokinetic nystagmas: \_\_\_\_\_

Tactile

Double simultaneous stimulation: \_\_\_\_\_

## APPENDIX L (cont)

MOTOR PLANNINGOral-Motor Coordination

Imitative oral movements: \_\_\_\_\_

DDKs: \_\_\_\_\_

MOTOR PRODUCTIONSpeech Analysis

<u>Articulation</u>	<u>Rhythm</u>	<u>Rate</u>	<u>Voice</u>
___ adequate	___ regular	___ adequate	___ adequate
___ imprecise within word	___ irregular	___ slow	___ hypernasal
		___ fast	___ harsh
___ imprecise between words			___ hoarse
___ substitutions			___ breathy
___ omissions			___ abnormal pitch
			___ decreased loudness
			___ aphonic

### Bibliography

- Appell J., Kertesz A. and Fisman, A Study of language functioning in Alzheimer patients, Brain and Language, 17(1):73-91, 1982.
- Bayles, K.A., Language function in senile dementia, Brain and Language, 16:265-280, 1982.
- Bayles, K.A., Communication in dementia, In: The Aging Brain: Communication in the Elderly, H.K. Ulatowska (Ed), San Diego: College Hill Press, 1985.
- Bayles, K.A., Language and dementia, In: Handbook of Speech and Language Disorders, J.M. Costello and A.L. Holland (Eds), San Diego: College Hill Press, 1986.
- Bayles, K.A., Alzheimer's disease: effects on communication, the Hospital Satelite Network, 1986a.
- Bayles, K.A., and Boone, D.R., The potential of language tasks for identifying senile dementia, JSHD, 47:210-217, 1982.
- Bayles, K.A. and Tomoeda, C.K., Confrontation naming impairment in dementia, Brain and Language, 19:98-114, 1983.
- Benson, P.F., Kuhl, D.E., Hawkins, R.A., Phelps, M.E., Cummings, J.L. and Tsai, S.Y., Positron computed tomography in the diagnosis of dementia, Ann. Neurol., 10:76, 1981.
- Berg, L., Danziger, W.L., Storandt, M., Coben, L.A., Gado, M., Hughes, C.P., Knesevich, J.W., Botwinick, J., Predictive features in mild senile dementia of the Alzheimers type, Neurology (Cleveland), 34:563-9, 1984.
- Bird, Thomas, Differential diagnosis of dementia, Presentation for Veteran's Administration Medical Center Health Professionals, Seattle, WA, 1987.
- Bird, T.D., Stranahan, S., Sumi, M., Raskind, M., Alzheimer's disease and choline acetyltransferase activity in brain tissue from clinical and pathological subgroups, Ann. Neurol., 14:284-93, 1983.



- Brun, A., An overview of light and electron microscopic changes, In: Alzheimer's Disease, B. Reisberg (Ed), N.Y.: The Free Press, 1983.
- Buse, E.W., Electroencephalography, In: Alzheimer's Disease: The Standard Reference, B. Reisberg (Ed), N.Y.: The Free Press, 1983.
- Chui, H.C., Teng, E.L., Henderson, V.W., and May, A.C., Clinical subtypes of dementia of the Alzheimer type, Neurology, 35:1544-1550, 1985.
- Cummings, J.L., Dementia: definition, classification, and differential diagnosis, Psychiatric Annals, 14:2:85-88, 1984.
- Cummings, J.L., Dementia: neuropathological correlates of intellectual deterioration in the elderly, In: The Aging Brain: Communication in the Elderly, H.K. Ulatowski (Ed), San Diego: College Hill Press, 1985.
- Cummings, J.L. and Benson, D.F., Dementia: A Clinical Approach, Boston: Butterworth Publishers, 1983.
- Cummings, J.L., Benson, F., Hill, M.A., Read, S., Aphasia in dementia of the Alzheimer type, Neurology, 35(3):394-7, 1985.
- Cummings, J.L., Houlman, J.P., Hill, M.A., The pattern of reading deterioration in dementia of the Alzheimer's type: observations and implications, Brain and Language, 29:315-323, 1986.
- DeRenzi, E., and Faglioni, P., Normative data and screening power of a shortened version of the token test, Cortex, 14:41-49, 1978.
- Diagnostic and statistical manual of mental disorders, American Psychiatric Association, 3rd Ed., 1980.
- Dunn, L.M. and Dunn, L.M., Peabody Picture Vocabulary Test - Revised, Circle Pines, MN: American Guidance, Inc., 1981.
- Eisdorfer, C., Cohen, D., and Preston, C., Behavioral and Psychological therapies for the older patient with cognitive impairment, In: Clinical Aspects of Alzheimer's Disease and Senile Dementia (Aging, V. 15), N.E. Miller and G.D. Cohen (Eds), N.Y.: Raven Press, 1981.

- Emery, O.B., and Emery, P.E., Language in senile dementia of Alzheimer type, Psychiatr. J. Univ. Ottawa, 8(4):169-78, 1983.
- Fey, M.E., Language Intervention with Young Children, San Diego: College Hill Press, 1986.
- Foster, N.L., Chase, T.N., Fedio, P., Patronas, N.J., Brooks, K.A., and diChiro, G., Alzheimer's disease: focal cortical changes shown by positron emission tomography, Neurology (Cleveland), 33:961-5, 1983.
- Fuld, P.A., Behavioral signs of cholinergic deficiency in Alzheimer dementia, In: Alzheimer's Disease: A Report of Progress, S. Corkin et al (Eds), N.Y.: Raven Press, 1982.
- Goodglass, H., and Kaplan E., The Assessment of Aphasia and Related Disorders, 2nd Edition, Philadelphia: Lea and Febiger, 1983.
- Grimes, A.M., Grady, C.L., Foster, N.L., Sunderland, T., and Patronas, N.J., Central auditory function in Alzheimer's disease, Neurology, 35:352-358, 1985.
- Grober, E., Buschk, H., Kawas, C., and Field, P., Impaired ranking of semantic attributes in dementia, Brain and Language, 26(2):276-86, 1985.
- Harkins, S.W., Effects of presenile dementia of the Alzheimer's type on brainstem transmission time, Int. J. Neurosci., 15:165-70, 1981.
- Heston, L.L., Mastri, A.R., Anderson, V.E., and White, J., Dementia of the Alzheimer type: clinical genetics, natural history and associated conditions, Arch. Gen. Psychiatry, 38:1085-90, 1981.
- Heyman, A., Logue, P., Wilkinson, W., Holloway, D., and Hurwitz, B., Lecithin therapy of Alzheimer's disease: a preliminary report. In: Alzheimer's Disease: A Report of Progress (Aging V. 19), S. Corkin et al. (Eds), N.Y.: Raven Press, 1982.
- Hier, D., Hagenlocker, K. and Schindier, A., Language disintegration in dementia on a picture description task, Brain and Language, 25:117-133, 1985.

- Hiskey, M.S., Hiskey-Nebraska Test of Learning Aptitudes, Lincoln, NB: College View Printers, 1955.
- Huff, F.J., Corkin, S., and Growdon, J.H., Semantic impairment and anomia in Alzheimer's disease, Brain and Language, 28(2):235-49, 1986.
- Hughes, C.P., Berg, L., Danziger, W.L., Coben, L.A., and Martin, R.L., A new clinical scale for the staging of dementia, Br J Psych, 140:566-72, 1982.
- Kaye, W.H., Weingartner, H., Gold, P., Ebert, M.H., Gillin, J.C., Sitaram, N. and Smallberg, S., Cognitive effects of cholinergic and vasopressin-like agents in patients with primary degenerative dementia, In: Alzheimer's Disease a Report of Progress. (Ageing, V. 19), S. Corkin et al. (Eds), NY: Raven Press, 1982.
- Kirschner, H.S., Webb, W.G., Kelly, M.P., and Wells, C.E., Language disturbance: an initial symptom of cortical degenerations and dementia, Arch. Neurol., 41:491-6, 1984.
- LaPointe, L.L., and Horner, J., Reading Comprehension Battery for Aphasia, Tigard, OR: C C Publications, 1979.
- Leon and George, Computed Tomography Studies of Alzheimer's Disease, In: Alzheimer's Disease, B. Reisberg (Ed), NY: The Free Press, 1983.
- Levin, H.S., and Peters, B.H., Chronic oral physostigmine and lecithin administration in memory disorders of aging, In: Alzheimer's Disease: A Report of Progress, S. Corkin et al. (Eds), NY: Raven Press, 1982.
- Lund, N.J. and Duchan, J.F., Assessing Children's Language in Naturalistic Contexts, New Jersey: Prentice-Hall, Inc., 1983.
- Martin, A., and Fedio, P., Word production and comprehension in Alzheimer's disease: the breakdown of semantic knowledge, Brain and Language, 19(1):124-41, 1983.
- Martin, P.R., Loewenstein, R.J., Kaye, W.H., Ebert, M.H., Weingartner, H. and Gillin, J.C., Sleep EEG in Korsakoff's psychosis and Alzheimer's disease, Neurology, 36:411-14, 1986.

- Mayeux, R., Stern, Y. and Spanton, S., Heterogeneity in dementia of the Alzheimer type: evidence of subgroups, Neurology, 35:453-461, 1985.
- Mohs, R.C., Rosen, W.G., and Davis, K.L., Defining treatment efficacy in patients with Alzheimer's disease, In: Alzheimer's Disease: A Report of Progress (Aging, V. 19), S. Corkin et al. (Eds), N.Y.: Raven Press, 1982.
- Mortimer, J., Alzheimer's disease and senile dementia: prevalence and incidence, In: Alzheimer's Disease, B. Reisberg (Ed), N.Y.: The Free Press, 1983.
- Nation, J.E., and Aram, D.M., Diagnosis of Speech and Language Disorders: 2nd Edition, San Diego: College Hill Press, 1984.
- National Center of Health Statistics, Survey conducted 1973-74, reported 1978.
- Nebes, R.D., Martin, D.C., and Horn, L.C., Sparing of semantic memory in Alzheimer's disease, J Abnormal Psychol, 93(3):321-30, 1985.
- Nicholas, M., Obler, L.K., Albert, M.L., and Helm-Estabrooks, N., Empty Speech in Alzheimer's Disease and Fluent Aphasia, JSHR, 28:405-410, 1985.
- Reisberg, B., An overview of current concepts of Alzheimer's disease, senile dementia, and age-associated cognitive decline, In: Alzheimer's Disease, B. Reisberg (Ed), N.Y.: Raven Press, 1983.
- Reisberg, B., Ferris, S.H., DeLeon, M.J. and Crook T., The global deterioration scale for assessment of primary degenerative dementia, Am J Psychiatry, 132:1136-9, 1982.
- Rosen, W.G., Neuropsychological investigation of memory, visuoconstructional, visuo-perceptual, and language abilities in senile dementia of Alzheimer's type, Adv Neurol, 38:65-73, 1983.
- Rosenberg, Greenwald & Davis., Pharmacologic treatment of Alzheimer's Disease: An overview, In: Alzheimer's Disease, B. Reisberg (Ed), N.Y.: The Free Press, 1983.

Rossor, M.N., Iverson, L.L., Reynolds, G.P., Mountjoy, C.Q., and Roth, M., Neurochemical characteristics of early and late onset types of AD, British Med Journal, 288:961-964, 1984.

Sasanuma, S., Motomobu, I., Watanori, T.S., Fukuzawa, K., Sakuma, N., Fukusako, Y., & Monor, H., Linguistic and Nonlinguistic abilities of the Japanese elderly and patients with dementia, In: The Aging Brain: Communication in the Elderly, H.K. Ulatowska (Ed), San Diego: College Hill Press, 1985.

Schwartz, M.F. and Safran, E.M., Dissociations of language function in dementia: a case study, Brain and Language, 7:277-306, 1979.

Seltzer, B. & Sherwin, I., A comparison of clinical features in early- and late-onset primary degenerative dementia, Arch Neurol, 40:143-6, 1983.

Semple, S.A., Smith, C.M. & Swash, M., The Alzheimer's Disease syndrome, In: Alzheimer's Disease: A Report of Progress (Aging, V.19), S. Corkin et al. (Eds.) N.Y.: Raven Press, 1982.

Sevush, S., Oral versus semantic reading in Alzheimer's Disease, Neurology 34 (Suppl 1), 102 (abstract), 1984.

Shindler, A.G., Caplan, L.R., & Hier, D.B., Intrusions and perseverations, Brain and Language, 23(1): 148-58, 1984.

Spence, M.A., Heyman, A., Marazitta, M.L. Sparkes, R.S. & Weinberg, T., Genetic linkage studies in Alzheimer's disease, Neurology, 36:5811-584, 1986.

Stevens, S., The language of dementia in the elderly: a pilot study, British J of Disorders of Communication, 20:180-190, 1985.

Storandt, M., Botwinick, J., Danzinger, W.L., Berg, L., & Hughs, C.P., Psychometric differentiation of mild senile dementia of the Alzheimer type, Arch Neurol 41:497-99, 1984.

Sulkav, R., Matti, N., Paetan, A., Wikstrom, J. & Palo, J., Accuracy of clinical diagnosis in primary degenerative dementia: correlation with neuropathological findings, J Neurosurg Psychiatry, 46:9-13, 1983.

Summers, W.K., Majovski, L.V., Marsh, G.M., Tachiki, K., & Kling, A., Oral tetrahydroaminoacridine in long-term treatment of senile dementia, Alzheimer type, The New England J of Med, 315:20: 1241-1245, 1986.

Tagliavini, F., & Pilleri, G., Neuronal counts in basal nucleus of Meynert in Alzheimer's Disease and in simple senile dementia, Lancet, 1: 469-70, 1983.

Tomlinson, B.E., Plaques, tangles and Alzheimer's Disease, Psychol Med, 12:449-59, 1982.

US Dept. of Health & Human Services (USDH & HS) Alzheimer's Disease: Report of the Secretary's Task Force on Alzheimer's Disease, DHHS Publication No(ADM) 84-123, 1984.

Wang, H.S., Dementia of old age, In: Aging & Dementia, W. Smith & M. Kinsbourne (Eds), NY: Spectrum Publ., 1977.

Wang, H.S., Neuropsychiatric procedures for the assessment of Alzheimer's Disease, senile dementia and related disorders, In: Clinical Aspects of Alzheimer's Disease & Senile Dementia (Ageing, Vol 15), N.E. Miller & G.D. Cohen (Eds), N.Y.: Raven Press, 1981.

Wechsler, D., Wechsler Adult Intelligence Scale, NY: The Psychological Corporation, 1955.

Weingartner, H., Kaye, W., Smallberg, S.A., Ebert, M.H., Gillin, C., & Sitaram, N., Memory failures in progressive idiopathic dementia, 90:3: 187-96, 1981.

Weintraub, S., Baratz, R., & Mesulam, M.M., Daily living activities in the assessment of dementia, In: Alzheimer's Disease: A Report of Progress (Ageing, V19), S. Corkin et al (Eds), New York: Raven Press, 1982.

Whitehouse, P.J., Hedreen, J.L., White, C.L., Clark, A.W., & Price, D.L.,  
Neuronal loss in basal forebrain cholinergic system is marked in  
Alzheimer's Disease than in Senile Dementia of the Alzheimer's Type,  
Abstract, Ann Neurol, 14: 149, 1983.