4-1992

Cognitive Disability Theory as a Basis for Activity Analysis for Elderly Persons with Dementia

Deborah S. Kaeser
Western Michigan University

COGNITIVE DISABILITY THEORY AS A BASIS FOR ACTIVITY ANALYSIS FOR ELDERLY PERSONS WITH DEMENTIA

by

Deborah S. Kaeser

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Science
Department of Occupational Therapy

Western Michigan University
Kalamazoo, Michigan
April 1992

COGNITIVE DISABILITY THEORY AS A BASIS FOR ACTIVITY ANALYSIS FOR ELDERLY PERSONS WITH DEMENTIA

Deborah S. Kaeser, M.S.

Western Michigan University, 1992

Allen's (1985) Cognitive Disability approach provides a guideline for modifying the cognitive demands of an activity to match the abilities of an individual. Thirty older adults with a mean age of 78.1 years and a diagnosis indicating an irreversible dementia were selected for the study. A counterbalanced design was used to compare the performance of 15 individuals with a Level Three cognitive ability and 15 individuals with a Level Four cognitive ability on two tiling craft activities: one with Level Three cognitive demands and one with Level Four cognitive demands. Analysis of variance indicated a significant interaction between cognitive level and activity level ($F [1,29] = 24.09$, $p < .001$). Individuals with a Level Three cognitive ability performed significantly better on the activity with Level Three cognitive demands. For subjects with a Level Four cognitive ability, there was no significant difference in performance on the two levels of activity.

ACKNOWLEDGEMENTS

I would like to thank David L. Nelson, Ph.D., OTR, FAOTA for his expertise and guidance throughout this project. I extend my gratitude to Ellen Page-Robin, Ph.D., and Doris A. Smith, M.Ed., OTR, FAOTA who served as my second and third readers. I appreciate the financial support granted to this project by The Graduate College of Western Michigan University, Kalamazoo. Special thanks go to Dorothy Markusse, Director of the Behavioral Care Unit at Hillside Manor Nursing Home in Kalamazoo, Michigan, and to Leslie Campbell, Activity Director of the Park Place Living Center in Kalamazoo, Michigan, for their enthusiasm in this study and their assistance in identifying appropriate subjects. I am grateful and appreciative to all the residents who participated in the study; they have taught me so much. Finally, I extend my thanks to Aaron M. Eakman for his support and encouragement every step of the way.

Deborah S. Kaeser

Order Number 1347839

Cognitive disability theory as a basis for activity analysis for elderly persons with dementia

Kaeser, Deborah S., M.S.

Western Michigan University, 1992

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

TABLE OF CONTENTS

Table of Contents--Continued

LIST OF TABLES

INTRODUCTION

Occupational therapy is a health care profession that focuses on facilitating maximal independence in self-care, work, and leisure activities for individuals with mental, emotional, and physical impairments. Occupational therapy is based upon the use of occupation (purposeful activity), that is, the goal-directed use of time, energy, interest and attention to promote independence, maintain wellness, and prevent the debilitating effects of inactivity (American Occupational Therapy Association [AOTA], 1981). Cynkin (1979) proposed that occupational therapy is founded on the belief that activities have a positive effect on the physical and mental health of an individual and can assist in the restoration of function. Similarly, in the field of gerontology, Havinghurst, Neugarten, and Tobin (1968) asserted that maintaining activity is important to adaptation and life satisfaction in the later years.

The capacity to maintain active participation in preferred activities may be compromised in elderly persons who experience physical and cognitive disabilities. Levy, a gerontic occupational therapist, raises the question: "How can therapeutic regimens, whose goal is to assist older adults to restore their lives to fullest use and satisfaction, be adapted to meet the needs of the multiply impaired aged?" (1989, p. 53). This study investigates a proposed occupational therapy intervention for cognitively impaired elders which incorporates the tenets of the Cognitive Disability frame of reference

(Allen, 1982, 1985) and the principles of Activity Analysis (Mosey, 1985). It is proposed that modifying the cognitive demands of an activity to place them within the individual's range of cognitive ability will result in successful performance of the activity. This approach is particularly valuable for persons with dementia as it provides a means of adapting activities to enable the individual to independently pursue self-care, work, and leisure routines.

Dementia as a Cause of Cognitive Disability

Dementia is one of the most common causes of disability among the elderly, and one of humanity's most devastating health problems. In the United States alone, over four million persons are affected by this syndrome; it is the fourth leading cause of death in adults (Alzheimer's Disease and Related Disorders Association [ADRDA], 1990). At present, certain diagnoses of dementia, including Alzheimer's disease, can only occur postmortem by microscopic tissue examination. Alzheimer's Disease is the most common form of the dementing disorders. It is a progressive, degenerative brain disease that results in impaired memory, thinking, and behavior. Symptoms of Alzheimer's Disease include gradual memory loss, decline in the ability to perform routine tasks, impairment in judgment, personality change, disorientation, difficulty in learning, and loss of language skills (ADRDA, 1990). The gradual progression of the disease slowly strips individuals of their capacity for self-care and independent living, and leads ultimately to physical deterioration and death. It is a devastating disease in terms of the loss of cognitive capabilities,

functional capabilities, and autonomy. It also makes disabling demands on caregivers and involves impoverishing costs of care. There is no treatment to cure, reverse, or stop the progression of the true dementias or their primary impairments. For now, the treatment approach is one of helping the individual maintain as much comfort, dignity, and ability as possible throughout the course of the disease by modifiying activities and the environment to match the individual's remaining abilities (Levy, 1987a).

Occupational Therapy's Role With Persons With Dementia

The environmental approach reflects a philosophy of care that is only beginning to gain legitimacy in the health care system, yet the philosophy is fundamental to the profession of occupational therapy (Levy, 1988). Occupational therapy was founded on the principles of moral treatment (Meyer, 1922), affirming that regardless of the extent or the chronicity of a disability, all people possess strengths and potentials that can be used to enhance their ability to function in the environment. Occupational therapy's earliest pioneers, Meyer (1922), Slagle (1922), and Haas (1944) recognized that function is largely a feature of the environment. The primary goal of occupational therapy is to facilitate persons' ability to function at the highest possible level of independence despite their impairments, in order to help them gain competence in their environment.

Occupational therapy clearly has a critical contribution to make to care through all stages of dementia (MacDonald, 1986). Persons with dementia present symptoms of decreased skill in the cogni-

cognitive, sensory, motor, social, and psychological areas of functioning. These areas of dysfunction affect performance in self-care, work, and leisure, and are clearly within occupational therapy's domain of concern (Mosey, 1981). In 1986, the American Occupational Therapy Association developed a Position Paper which identified and illustrated occupational therapy services used in managing irreversible dementing illnesses (AOTA, 1986). The role of occupational therapy with persons with dementia involves a continuous simplification of activities and the environment so that activities remain within the individual's decreasing capabilities. Successful performance is enhanced when the demands of an activity remain within the individual's level of ability.

The occupational therapist is specially trained and uniquely qualified to modify activities and the environment to match the capabilities of the individual. The occupational therapist applies the principle of activity analysis to obtain information on the explicit component demands of any given activity. Activity analysis refers to the examination of each step in an activity to determine its neuromuscular, sensorimotor, and cognitive demands (Fidler & Fidler, 1954). In addition to understanding the demands of the activity, the occupational therapist must also understand the capabilities and limitations of the individual; this is accomplished through a variety of observations, assessments, and interviews. Using these two sources of information, the occupational therapist makes the crucial match between the activity and the individual's abilities. Mosey defines this process as activity synthesis, that is, "combining component

parts of the human and non-human environment so as to design an activity suitable for intervention" (Mosey, 1985, p. 242).

Definition of the Cognitive Disability Frame of Reference

As defined by Allen (1985), the Cognitive Disability theoretical frame of reference is used to prescribe intervention strategies for persons who, as a result of cognitive dysfunction, are not able to carry out their normal life activities. This approach was designed to provide a sound theoretical basis to enable occupational therapists to further understand the relationship between mental disease and functional ability (Allen, 1982, 1985). The frame of reference derives its theoretical underpinnings from neuropsychology, cognitive psychology, and biological psychiatry.

This frame of reference contains the following assumptions:

> 1. Cognition underlies all behavior.
> 2. Brain pathology compromises cognitive processes in a manner that can be observed in normal life activities.
> 3. In diseases of the brain in which recovery can be expected, the reorganization of cognitive abilities follows a predictable and hierarchical sequence. In diseases marked by progressive deterioration, as in dementia, the loss of cognitive abilities follows a predictable, reversed sequence.
> 4. Regardless of the level of cognitive ability, cognitive processes are maximized and behavioral responses become more effectively organized when environmental stimuli are presented to the impaired person in a manner that matches his or her level of cognitive functioning (Levy, 1986, p. 17).

The Allen Cognitive Levels Screening Tool (The ACL)

Allen (1985) developed the Allen Cognitive Levels Screening Tool (ACL) to be used as an assessment tool to identify an individual's cognitive level. Six cognitive levels may be identified through the

ACL; this study focuses on Level Three and Level Four. The ACL is a standardized measure which requires the individual to imitate three increasingly complex leather lacing sequences. Scoring criteria specifically for Level Three and Level Four are as follows: Level Three is able to imitate the running stitch for two stitches but unable to imitate the whip stitch; Level Four is able to imitate the whip stitch for two stitches but unable to imitate the single cordovan stitch. The ACL is designated to be a screening tool and as such it has advantages and disadvantages. It is quick and easy to administer and the reliability of scoring is high. Its biggest disadvantage as a screening tool is that it is not 100% accurate. The Allen approach to functional assessment has been studied in various diagnostic groups including persons with schizophrenia, depression, dementia, as well as in a non-disabled population. Studies involving persons with dementia demonstrate a significant correlation to Mini-Mental Status Examination scores (Heying, 1985).

Allen Cognitive Levels

One of the most important contributions of the Cognitive Disability frame of reference is the behavioral hierarchy of cognitive levels. Allen (1985, pp. 31-62) has proposed a hierarchy of six cognitive levels that identify those dimensions of thought that differentiate and explain functional limitations in day-to-day activities. These cognitive levels describe the varying effects of brain pathology on normal life activities, provide a means for analyzing the relative difficulty of any activity in terms of the requisite thought

patterns, and delineate factors within the environment that can be modified to help the individual carry out preferred activities as independently as possible. Hence, at each level, varying patterns of thought are identified that are available to the individual to organize behavior. Allen has analyzed each of the cognitive levels with regard to the following attributes: (a) attention to sensory cues, (b) motor actions, (c) conscious awareness, and (d) time. At Level One, individuals are profoundly impaired and initiate little but reflexive spontaneous activity. At Level Two, individuals often exhibit unusual postures, gestures, or repetitive motions. They are able to imitate a demonstrated direction if it involves the use of a highly familiar motor activity. At Level Three, individuals apply their actions to physical objects found in the environment. Their attention is focused on a repetitive motor action, and they do not seem to be aware that their actions can be connected to a goal. At Level Four, individuals experience significant cognitive impairment, although they appear to be less confused while engaged in concrete activities. They are able to initiate activity with a specific outcome in mind. At Level Five, individuals are able to function independently in concrete task-oriented activities but are unable to manipulate symbols or use abstractions. They do not pre-plan or anticipate the consequences of their actions. At Level Six, individuals function normally in daily activities.

The focus of this study will be on individuals identified at Level Three or Level Four. At Level Three, individuals are still able to initiate familiar motor activity to explore the effects of

their actions on external objects and thereby remain somewhat connected to their environment. They are easily engaged in tactile, repetitive action activities which have predictable effects on the environment. Attention can be sustained for approximately 30 minutes. New learning is not possible based on the reliance on familiar motor patterns. They are easily distracted and disoriented to time, place, and person. At this level, suggested interventions involve providing as many opportunities as possible for the use of one-step, familiar, repetitive, action-oriented activities to reinforce the relationship between one's actions and predictable effects on the environment. Directives should be demonstrated one step at a time, with repetition as needed (Levy, 1987b).

Individuals at Level Four can initiate familiar actions to produce a desired result. Their actions appear to be intentional. They can follow through on a two to three step action sequence that produces predictable visible results. Attention can be sustained for approximately one hour. Adapting to change is difficult. They are unable to make plans beyond the immediate situation nor remember directions for use at a later time. At this level, suggested interventions involve maximizing opportunities for the individual to engage in two- to three-step familiar action-oriented activities which have predictable, visible results. Use of visual memory aids such as calendars, lists, and labels may assist with remembering self-care activities or appointments (Levy, 1987b).

Application of the Cognitive Disability Frame of Reference

Allen's (1985) Cognitive Disability approach may be used to provide guidelines for activity analysis for persons with cognitive disabilities, specifically for persons with dementia. Using knowledge of activity analysis and knowledge of human cognitive levels, the occupational therapist can provide specific activities which match the individual's level of cognitive functioning. The Cognitive Disability approach entails knowledgeably modifying the cognitive elements of the activity and the environment in order to place them within an individual's range of comprehension. When activities and the environment are modified so that an individual can comprehend what is involved, it is hypothesized that performance will be successful (Allen, 1985). Cognitive maximization occurs in the context of activities and environments that are designed to match the carefully assessed cognitive abilities and impairments of an individual. Appropriately synthesized, such activities and environments can contribute significantly to enhanced functional independence and quality of life (Levy, 1987a). This concept is also supported in the gerontological literature. Lawton and Nahemow (1973) noted that maximization of functional independence can best be realized when the environment of individuals with dementia is structured such that the external demand on the individual matches the level of demand to which the individual has adapted.

In addition to outlining the abilities and limitations an individual may have at each cognitive level, Allen (1985) also proposes a

guideline that can be used to determine the demands of a given activity. This guideline is a crucial component in the selection and adaptation of activities which match an individual's cognitive level. Allen (1985) explains that the same attention to sensory cues, motor actions, and conscious awareness that make up an individual's cognitive level should be used to identify an appropriate activity. This specification ensures that an activity is within an individual's range of ability. Allen (1985) defines the match between the individual's ability and the demands of the activity as task (activity) equivalence. The following criteria should be examined when specifying task equivalence: (a) task demands, which are the requirements and structure of the activity, including material objects needed, the samples and choices provided, the steps of the activity, the tools used, potential errors, the length of activity time, the preparation and storage of supplies, and the setting of the activity; (b) task directions, which are the directions given by another person, including demonstrations, verbalizations, and the number of steps explained at one time; and (c) individual differences, which involve past experience in doing an activity and stated preferences.

An explanation to how this relates specifically to Level Three and Level Four is in order. The activity analysis at Level Three is influenced by the person's ability to act on the external environment without connecting his or her actions to a goal. The activity demands must involve familiar, repetitive, manual actions. Options demanding choices are meaningless and should be avoided. The steps of the process should require attention to the tangible properties of

objects, and should involve one action. The activity should demand no more than one-half hour of attention. Supplies are chosen by the therapist, and presented as needed. The exact number of items needed should be available and within arms reach. In terms of activity direction, one direction is given at a time, augmented by demonstration, with repetition as needed (Allen, 1985).

The activity analysis at Level Four is influenced by the individual's ability to use visible cues to achieve a goal. Activity demands must contain clearly visible cues. The sample must be such that an exact match can be produced from the available supplies. The choices offered should include the opportunity to produce an exact match of a sample. The supplies required are two-dimensional objects with striking colors and clearly discernible forms. All of the necessary supplies may be laid out ahead of time. The activity should demand no more than one hour of attention. Directions may be given verbally, one step at a time (Allen, 1985).

This process of activity analysis offers the therapist a structure for changing the activity demands so that an individual can achieve greater mastery of the activity. The Cognitive Disability frame of reference holds promise for contributing significantly to the state of understanding of intervention strategies for persons with dementia. Using knowledge of activity analysis and knowledge of cognitive levels, the occupational therapist can provide specific activities with demands which match the individual's level of decreasing cognitive function and can provide caregivers with valuable information on how to support the individual to maximize independence

and ability.

Need of Study

Although there has been much research done to assess and define the cognitive levels (Allen & Allen, 1987; Averbuch & Katz, 1988; Heying, 1985; Katz, 1985; Mayer, 1988), there is no published empirical research which applies the concept of activity analysis and adaptation to the cognitive levels. Levy (1987a) commented: "Occupational therapists must seriously begin the work of testing the postulates that have always been basic to practice. We should be the prime movers in this rapidly developing area of psychosocial intervention" (p. 101).

Hypothesis

This study compared the performance of thirty older adults with dementia (fifteen adults with a Level Three cognitive ability and fifteen adults with a Level Four cognitive ability) on two precisely designed tiling activities (one activity with Level Three cognitive demands and one activity with Level Four cognitive demands). The following question was examined: Does matching the cognitive demands of an activity to an individual's cognitive level affect the individual's performance of the activity? It was hypothesized that there would be an interaction between the subjects' cognitive levels and their performances on the two activities. Specifically, it was hypothesized that subjects with a Level Three cognitive ability would perform significantly higher on the activity with Level Three

cognitive demands than on the activity with Level Four cognitive demands.

METHODS

Subjects

The study was conducted in a small Midwestern city at a nursing home and an assisted living center with specific units serving adults with dementia. Subjects meeting the following criteria were chosen for the initial sample: (a) a diagnosis of an irreversible dementia, (b) adequate upper extremity functioning to carry out a tiling craft activity, (c) adequate fine motor coordination to carry out a tiling craft activity, and (d) adequate visual acuity to carry out a tiling craft activity. The initial subject sample was chosen by the designated contact person at each facility (a social worker and an activities therapist) based on chart review and familiarity with the residents. Forty-two subjects meeting the initial sample criteria were then screened by the primary investigator using the Allen Cognitive Levels Screening Tool (ACL) (Allen, 1985). The ACL, a leather lacing test, was used as an assessment tool to determine the subject's level of cognitive ability. The ACL was administered on an individual basis in the activity room of each facility, with only the primary investigator and the subject present. Allen's 1990 recommended protocol was used (Allen, 1990). Thirty individuals whose resultant score on the ACL indicated either a Level Three or Level Four cognitive ability were included in the final sample of the study. There were 10 males and 20 females with an age range of 58 to 90 years, and a mean age of 78.1 years (SD = 7.6). Of the 15 subjects with a Level

Three cognitive ability, 5 were male and 10 were female, with an age range of 66-90 years and with a mean age of 78.8 years. Of the 15 subjects with a Level Four cognitive ability, 5 were male and 10 were female, with an age range of 58-88 years and with a mean age of 77.5 years. Subject diagnoses, as indicated from the medical records, included: multi-infarct dementia, suspected Alzheimer's disease, Pick's disease, senile dementia of the Alzheimer's type, and primary degenerative dementia, along with additional multiple medical problems.

Apparatus

This study compared the performance of two groups of individuals with dementia on two activities: (1) a tiling craft activity with Level Three cognitive demands, and (2) a tiling craft activity with Level Four cognitive demands. The tile trivet craft activity was chosen because of its adaptability to the various cognitive levels (Earhart & Allen, 1988). Materials included a 6" x 6" masonite fiber board, 64 3/4" smooth ceramic tiles and non-toxic white glue. Each subject participated in two counterbalanced trials: the Level Three activity which involved a single-color design on the trivet, and the Level Four activity which involved a two-color checkerboard design on the trivet. Each activity was designed to match what Allen (1985) defined as the attributes of each cognitive level. For example, at Level Three, individuals are interested in the manual action of placing the tiles on the trivet. No attention is paid to color or pattern; therefore, the individual can experience success given one

color and no pattern. At Level Four, individuals do attend to the color of the tiles and usually prefer a checkerboard pattern (Allen, 1985, pp. 50-51).

Scoring was determined by counting the number of tiles placed correctly in 30 minutes or less to match the sample. The initial scoring was done by the primary investigator at the time of the trial. The score was obtained by counting the number of correctly placed tiles. The possible range of a score was 0-64 -- "0" indicating no correctly placed tiles, and "64" indicating all tiles placed correctly to match the sample. A correctly placed tile was defined as a tile which was: (a) placed colored side up, (b) secured to the board with glue, (c) placed parallel to the sides of the board in an alloted space, and (d) of a color to match the sample. A photograph of each trivet was taken upon completion and marked with the subject I.D. number and activity level of the trial. These photos were later scored by an individual blind to the purposes and conditions of the study.

Procedure

Individuals began the tile trivet trials 1-2 weeks after the initial screening. A counterbalanced design was implemented in this study. All subjects participated in both of the conditions; however, they experienced them in two different randomly assigned orders. Eight of the individuals with a Level Three cognitive ability completed the Level Three activity first and the Level Four activity second, while seven of the individuals with a Level Three cognitive

ability completed the Level Four activity first and the Level Three activity second. Similarly, eight of the individuals with a Level Four cognitive ability completed the Level Four activity first and the Level Three activity second, while the other seven subjects with a Level Three cognitive ability completed the Level Three activity first and the Level Four activity second. Seven days passed between the presentation of each condition.

Each subject engaged in each condition individually in the activity room of the facility. The subject sat in a chair at a rectangular table which was facing a blank wall; the primary investigator sat to the right of the subject. The table was covered with a plain cloth; the only material initially visible was a sample of that trial's tile trivet placed in front of the subject at 24" from the edge of the table. The primary investigator began each session with these instructions:

> This is a tile trivet. It is used for decoration, or to place hot dishes on top of, or to place plants on top of, or to give as a gift. Today I will show you how to make your own trivet. Would you like to try it?

Once the subject agreed, the primary investigator commenced with the protocol for the appropriate trial.

For the Level Three activity, the primary investigator placed the following materials at 16" in front of the subject: a 6" x 6" clear bin containing 64 black tiles and a blank masonite fiber board. The following directions and demonstrations were given by the primary investigator. Demonstrations are noted in brackets [ ].

> I will show you how to make this trivet. [Pick up sample and allow subject to touch it]. It has one color, black.

> The black tiles are in this bin. [Point to bin]. You will place these tiles on to this board. [Pick up masonite fiber board and allow the subject to handle]. They will stick once you put them on. Watch and listen while I show you how. [Apply glue to the board in eight horizontal rows and eight vertical rows. Then demonstrate each of the following steps while giving the following directions]. Pick up a tile and put it on the board, starting at the corner. Make sure the black side is up. Pick up another tile and put it on the board next to the first one. Make sure the tiles are in a straight line, each tile touching the one next to it. Fill up the whole board with black tiles. You should use all of the tiles in this bin. You can work for thirty minutes. When you are finished, I will take a picture of your trivet and you will be allowed to keep your work. Do you understand the instructions?

If the subject did not understand the instructions, they were repeated in their entirety. When the subject indicated comprehension, the primary investigator applied the glue to the subject's board, set the timer for 30 minutes, and the trial began.

For the Level Four activity, the primary investigator placed the following materials at 16" in front of the subject: one clear 6" x 6" bin containing 32 white tiles, one clear 6" x 6" bin containing 32 black tiles, and one bottle of white glue. A blank masonite fiber board was placed 4" in front of the subject. The following directives were given:

> I will show you how to make this design. [Point to sample]. Notice it has two colors of tiles, black and white, placed alternately. The tiles are in these bins. Here is black. [Point to bin]. Here is white. [Point to bin]. You will use this glue to stick these tiles on to your trivet. [Point to glue and to masonite board]. Watch and listen while I show you how. [Each of the following steps are demonstrated while the following directions are given]. First, squeeze the glue on to the trivet. Place the tiles onto the glue. The tiles should match the sample. Start in one corner and work across the board. Each tile should be placed with the colored side up, in a straight line, each tile touching the one next to it. When you finish the row, go on to the next row until the whole board is covered to look like the sample.

> You should use all of the tiles in the bins. You can work for thirty minutes. When you are finished, I will take a picture of your trivet, and you will be allowed to keep your work. Do you understand the instructions?

If the subject did not understand the instructions, they were repeated in their entirety. When the subject indicated comprehension, the timer was set for 30 minutes and the trial began.

During each trial, the primary investigator was present to answer questions, provide clarification, and provide supportive comments (i.e., "You're doing fine"). If the subject stopped manual action for more than 20 seconds, the primary investigator stated, "Keep going to fill up the board like the sample." If the subject stopped manual action for more than one minute, the primary investigator asked, "Are you finished?" If the subject answered in the negative, the primary investigator stated, "Keep going to fill up the board like the sample." If the subject answered in the positive, the primary investigator photographed the trivet, scored the trivet, and returned the product to the subject. If the subject did not finish at the end of 30 minutes, the primary investigator stopped the trial, photographed the trivet, scored the trivet, and then assisted the subject in completing the product.

The 4" x 6" photographs were scored by a research assistant who was blind to the purposes of the study and the conditions of each trial. The research assistant was instructed on the scoring protocol and was asked to record a score for each of the 60 photographs. Interrater reliability was calculated by dividing the smaller of the primary investigator's and the research assistant's scores by the

larger of the two rater's scores for each trial, by multiplying the result by 100, and by taking the mean across the sixty trials. The overall percentage of agreement was 99.7%. It was 99.7% for the Level Three activity as well as for the Level Four activity.

RESULTS

The mean scores for both groups on each condition of the independent variable are found in Table 1. There was no evidence of skewed or abnormally distributed data. The Box M test did not reveal a violation of SPSS Manova assumptions (Norusis, 1990). A three-way ANOVA with one repeated measure (cognitive level x order x activity level) was conducted (see Table 2). As hypothesized, a significant interaction between the cognitive level (ACL) and the activity level (ACT) was found F (1, 29) = 24.09, $p < .001$. F tests for simple effects across orders were then conducted (see Table 3). Subjects at Cognitive Level Three performed significantly better on the Level Three activity than on the Level Four activity (F [1,14] = 125, $p < .001$). However, there was no significant difference for individuals at Cognitive Level Four between their performance on the Level Three activity and the Level Four activity (F [1,14] = .01, p = .91).

These statistical findings confirm what can be seen by considering the mean scores in Table 1. Of the four means, the performance of the Cognitive Level Three subjects on the Level Four activity stands out from the other three means. The mean of 13.1 indicates a much poorer performance by the Cognitive Level Three subjects on the Level Four activity. The statistically significant main effects for Cognitive Level (ACL) and Activity Level (ACT) in the within subjects comparison (Table 2) have no practical significance because of the nature of the statistical interaction. Order effects were not

significant.

Table 1

Summary of Subjects' Scores by Allen Cognitive Level (ACL) and by Activity Level (ACT) Across Orders

		ACT 3	ACT 4
	Mean	46.6	13.1
ACL 3	SD	13.8	9.1
(n=15)	Range	23-64	2-29
	Mean	47.9	48.7
ACL 4	SD	18.4	16.2
(n=15)	Range	9-64	13-64

Table 2

Analysis of Variance

	SS	df	MS	F	p
I. Between Subjects					
ACL	5385.87	1	5385.87	22.15	<.001
ORD	924.00	1	924.00	3.80	.062
ACL x ORD	4.14	1	4.14	.02	.847

Table 2 -- Continued

	SS	df	MS	F	p
II. Within Subjects					
ACT	4162.98	1	4162.98	23.14	<.001
ACL x ACT	4333.89	1	4333.89	24.09	<.001
ORD x ACT	32.02	1	32.02	.18	.677
ACL x ORD x ACT	295.24	1	295.24	1.64	.211

Legend. ACL = Allen Cognitive Level (3 v. 4)
ACT = Activity Level (3 v. 4)
ORD = Order of Administration of ACT (1 v. 2)

Table 3

F Tests for Simple Effects Across Orders

	SS	df	MS	F	p
I. ACL 3					
ACT	8434	1	8434.0	125	<.001
Within Cells (Error)	948	14	67.7		
II. ACL 4					
ACT	4	1	4.0	.01	.91
Within Cells (Error)	4056	14	289.8		

Legend. ACL = Allen Cognitive Level (3 v. 4)
ACT = Activity Level (3 v. 4)

DISCUSSION

The results of this study clearly lend support to using Allen's (1985) Cognitive Disability frame of reference to adapt activities for persons with dementia. The results for persons with a Level Three cognitive ability clearly support the hypothesis. Their performance on the Level Three activity ($\underline{M}$ = 46.6) was significantly greater than their performance on the Level Four activity ($\underline{M}$ = 13.1). There was no significant difference for persons with a Level Four cognitive ability. Their performance on the Level Four activity ($\underline{M}$ = 48.7) was not significantly greater than their performance on the Level Three activity ($\underline{M}$ = 46.7). Indeed, this result for persons with a Level Four cognitive ability may indicate that such persons may perform equally well on Level Three and Level Four activities. Several factors may be explored to offer explanations of these results.

The hypothesis in this study was derived based on Allen's premise that "successful performance occurs when the task demands and directions match the individual's cognitive level" (Allen, 1985, p. 80). Allen (1985) stated that when the demands of an activity are <u>above</u> an individual's cognitive level, the individual may be inattentive to higher demands or may be reluctant to participate in the activity. This pattern was clearly demonstrated by individuals with a Level Three cognitive ability. In this group, <u>each</u> of the 15 subjects had a higher individual score on the Level Three activity (mean = 46.6) than on the Level Four activity (mean = 13.1).

Performance on the Level Three activity was successful; individuals were able to carry out the single repetitive motion involved in creating a trivet from the one color available. Performance on the Level Four activity was severely impaired; individuals were unable to follow multistep directions nor to shift their attention to incorporate the two colors. It appeared this was due to the subjects' inattention to objects in the environment and inability to process multiple motor directives and actions. Individuals with a Level Three cognitive ability demonstrated such patterns as completing only the first step of the activity (spreading glue on the trivet) without completing subsequent steps, or only choosing one color of tiles from one bin when working on the Level Four activity. These behaviors may indicate why subjects with a Level Three cognitive ability were able to successfully complete the activity designed with Level Three cognitive demands but were unable to complete the activity designed with Level Four cognitive demands.

Allen (1985) stated that when the activity's cognitive demands are at a level that is lower than the individual's cognitive level, there may be decreased arousal and effort. Allen also stated that an individual may compensate for lack of arousal by creating his or her own more stimulating method or pattern, rather than following the sample (C. Allen, personal communication, June 1, 1991). The performance of individuals with a Level Four cognitive ability varied greatly. For this group, some individuals performed better on the activity matched to their level, some individuals performed better on the activity with lesser cognitive demands (which was suited to

individuals with a Level Three cognitive ability), and some performed equally well on both activities. Observations of subject performance may offer some valuable information. First, three of those individuals with a Level Four cognitive ability who did well on the Level Four activity but poorly on the Level Three activity seemed to have followed Allen's premise; they often tried to create a more complex design than the sample when completing the Level Three activity (thus resulting in a lower score because the product did not match the sample).

Secondly, four individuals with a Level Four cognitive ability performed better on the Level Three activity than on the Level Four activity. This clearly opposes the initial predictions. One possible explanation may have to do with the process of determining each individual's cognitive level. The 1990 Allen Cognitive Levels scoring protocol (Allen, 1990) was utilized which results in the individual's score broken down into decimal increments (i.e., 4.0, 4.1, 4.2, etc.). For purposes of the study, the cognitive level was recorded as the main level (i.e., 3 or 4), without the decimal places, thus ignoring differences within a level. This was done primarily because the trials were based on the 1985 activity analysis guidelines which are only applicable to the main level. As related to the results of the study, it may be possible that individuals whose cognitive ability was at the low end of Level Four (i.e., 4.0 - 4.2) may not have performed as successfully on the Level Four activity as individuals whose cognitive level was at the high end of Level Four (i.e., 4.7 - 4.9). This may account for why some of the individuals

with a Level Four ability were unable to complete the Level Four activity, but were able to complete the Level Three activity. These results indicate the need for a more refined guideline for activity analysis that would match the more refined Allen Cognitive Levels scale.

Lastly, seven individuals with a Level Four cognitive ability did well on both the Level Four and the Level Three activity. In addition, the mean overall group scores indicate this same trend. This result indicates that individuals can perform within their specific range as well as within lower ranges. An explanation of this may be found in one of Allen's premises; that is, that the cognitive levels are organized in a hierarchy, each higher level building upon and containing the assets of the lower levels. Allen (1985) reported that "a higher cognitive level increases the number of tasks that can be successfully done, thereby expanding the usable task environment" (p. 98). Allen (1985) also commented that an individual may not always perform only at his or her own level, but may seek out and successfully perform in situations with lesser cognitive demands. In this study, for those individuals with a Level Four cognitive ability whose scores were high on both the Level Four activity and the Level Three activity, it is assumed that they were able to complete both tasks without negative consequence. An area for future study might be to investigate what is optimal for health and well-being: to be continuously stimulated at the "just right" level or to be stimulated at various levels. Individuals who function at Level Six (no cognitive disability) undergo many different levels of stimulation in

their routine activities (Allen & Allen, 1987).

Limitations

There are several limitations which may have had some effect on the results of the study. One limitation is the process by which the activity was adapted to the level of cognitive disability. The 1985 task analysis (Allen, 1985, p. 82) was used as a guide to adapt the tiling activity to a Level Four and a Level Three cognitive ability. Although this guideline is the only available tool at this time, it is not structured to assist in precisely modifying an activity. In addition, using the 1985 task analysis did not allow for modification to the precise assets and limitations that can be identified using the 1990 version of the Allen Cognitive Levels scale (Allen, 1990). A major limitation of any group study is that the independent variable cannot be easily adapted to meet individual differences.

Another limitation is in the choice of activity for the study. A craft activity was chosen based on Allen's finding that crafts are a preferred choice of people who do not have physical dysfunctions (Allen, 1985). However, it is possible that tiling was not a preferred activity for some people in this study. Allen (1985) noted that "recognizing and honoring stated preferences is regarded as an essential component of task equivalence" (p. 83). In this study, the individual's preference was not considered. Performance scores may have been different if the activity were considered meaningful by each individual.

One other limitation is that the primary investigator conducted

the initial screening as well as facilitated the tiling trials. The primary investigator may have added some bias which affected the outcome of the study. This may have had an impact when the primary investigator offered support and encouragement throughout the trials in a non-standardized way.

Suggestions for Improvement of Study

Based on these limitations, some improvements could be made to the present study. First, a more precise adaptation of the demands of the activity to the precise cognitive level may lead to more accurate results. Second, replications may serve to improve validity. Thirdly, having separate individuals who are blind to the conditions and purpose of the study conduct the initial screening and guide the tiling sessions may also improve validity.

Suggestions for Future Research

The need exists for further empirical research to explore and prove the efficacy of activity analysis using Cognitive Disability as a frame of reference. In light of Allen's current work to expand the identification of cognitive levels to 52 precise points (Mastrangelo, 1991), it is crucial to develop guidelines for activity analysis and adaptation based on each of these precise levels. While it is important to identify an individual's cognitive assets and limitations, it is even more important to utilize this information to develop interventions which will maximize independence and remove excess disability. Future research may include investigating the same principle

with persons with dementia who exhibit lower cognitive levels.

It would be useful to investigate adaptations of a variety of activities, specifically activities of daily living such as bathing, dressing, grooming, and eating. This would prove particularly valuable to elderly persons and their caregivers. Also, it is indicated to investigate how individual preference of activity would influence performance on appropriately adapted activities. In addition, it might prove interesting to study what the optimal level of stimulation is for persons with various disabilities, be it constant stimulation within an individual's cognitive level or a mix of greater and lesser demands. Finally, to build a solid knowledge base in this area, it is imperative to apply this process to different cognitively disabled and non-disabled populations in a variety of settings.

The results of this study offer support to the use of the Cognitive Disability frame of reference as a basis for activity analysis and adaptation for persons with dementia. It is a novel attempt to empirically demonstrate that analyzing and adapting an activity to match an individual's cognitive level can have a positive effect on performance. This method provides a means for therapists and caregivers to build on an individual's remaining abilities and contribute to a sense of competence and quality of life throughout the course of a disease which ultimately strips one of all self-control.

CONCLUSION

This is one of few studies in occupational therapy to empirically examine the use of Allen's (1985) Cognitive Disability approach to analyze and adapt activities for persons with dementia. This study demonstrates that activities whose cognitive demands are within an individual's cognitive level can be performed successfully. This study supports one of the core principles of occupational therapy (activity analysis) and applies it to a newly emerging frame of reference (Cognitive Disability). It is hoped that this study will generate future related research efforts.

Appendix A

Human Subjects Institutional Review Board
Research Protocol Approval

Human Subjects Institutional Review Board

Kalamazoo, Michigan 49008-3899

WESTERN MICHIGAN UNIVERSITY

Date: March 20, 1991

To: Deborah S. Keeser

From: Mary Anne Bunda, Chair Mary Anne Bunda

Re: HSIRB Project Number 91-03-04

This letter will serve as confirmation that your research protocol, "Cognitive Disability Theory as a Basis for Activity Analysis in Persons with Dementia," has been approved after full review by the HSIRB. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the approval application.

You must seek reapproval for any change in this design. You must also seek reapproval if the project extends beyond the termination date.

The Board wishes you success in the pursuit of your research goals.

xc: David L. Nelson, Occupational Therapy

Approval Termination: March 20, 1992

Appendix B

Subject Consent/Assent Form

Occupational Therapy Department

Kalamazoo, Michigan 49008-5051
616 387-3850

WESTERN MICHIGAN UNIVERSITY

Dear Sir or Madam:

I am a graduate student in occupational therapy at Western Michigan University. I am conducting a study at three facilities serving older adults in Kalamazoo, Michigan in order to better understand how activities can be best suited to match the abilities of older persons.

First, you will be assessed using the Allen Cognitive Levels Screening Tool, which should take approximately one-half hour. If your score falls into one of the two distinct levels I am using for the study, you will continue in the study. If your score does not fall into one of the two levels I am using for the study, you will not be required to participate in the study any further. If you are chosen to continue in the study, approximately one week after the screening test, you will be involved in a simple craft activity, which should take approximately 30-45 minutes. One to two weeks after that, you will be involved in a similar craft activity, which should take approximately 30-45 minutes. For each activity, an occupational therapy student will explain the activity and will provide necessary assistance.

Your name will not be recorded for any reason, so no one will be able to identify you in any way. There are no special risks involved in participation in this study, and I believe you will enjoy the activity. There is no obligation to participate, and you may stop your participation in the study at any time without consequence.

Feel free to ask any questions you may have. You may leave a message for me or my research advisor, Dr. David Nelson at 387-3850.

Thank you.

Sincerely,

Deborah S Kaeser

Deborah S. Kaeser, OTS

I fully understand all the above information. All my questions have been answered, and I consent/assent to participate.

Signature _____ Date _____

Appendix C

Legal Guardian Consent Form

Occupational Therapy Department

Kalamazoo, Michigan 49008-5051
616 387-3850

WESTERN MICHIGAN UNIVERSITY

Dear Sir or Madam:

I am a graduate student in occupational therapy at Western Michigan University. I am conducting a study at three facilities serving older adults in Kalamazoo, Michigan in order to better understand how activities can be best suited to match the abilities of older persons.

First, your legal dependent will be assessed using the Allen Cognitive Levels Screening Tool, which should take approximately one-half hour. If your legal dependent's score falls into one of the two distinct levels I am using for the study, s/he will continue in the study. If your legal dependent's score does not fall into one of the two levels I am using for the study, s/he will not be required to participate in the study any further. If your legal dependent is chosen to continue in the study, approximately one week after the screening test, s/he will be involved in a simple craft activity, which should take approximately 30–45 minutes. One to two weeks after that, s/he will be involved in a similar craft activity, which should take approximately 30–45 minutes. For each activity, an occupational therapy student will explain the activity and will provide necessary assistance.

Your legal dependent's name will not be recorded for any reason, so no one will be able to identify her/him in any way. There are no special risks involved in participation in this study, and I believe participants will enjoy the activity. There is no obligation for your legal dependent to participate, and s/he may stop participating in the study at any time without consequence.

Individuals for whom legal guardians have been appointed may participate in the study only if this consent form is signed by the guardian prior to the study. If consent is given, the procedure will also be explained to the participants at the time of the study, and they may decide whether or not they wish to participate.

Feel free to ask any questions you may have. You may leave a message for me or my research advisor, Dr. David Nelson at 387-3850.

Thank you.

Sincerely,

Deborah S Kaeser

Deborah S. Kaeser, OTS

I have read and understood all the above information. All my questions have been answered, and I give my consent for _____ to participate.

_____ _____

Signature Date

BIBLIOGRAPHY

Allen, C. (1982). Independence through activity: The practice of occupational therapy (psychiatry). American Journal of Occupational Therapy, 36, 731-739.

Allen, C. (1985). Occupational therapy for psychiatric diseases: Measurement and management of cognitive disabilities. Boston: Little, Brown.

Allen, C. (1990). Allen cognitive levels kit and test manual. Colchester: S & S / Worldwide.

Allen, C. (June 1, 1991). Personal communication.

Allen, C., & Allen, R. (1987). Cognitive disabilities: Measuring the social consequences of mental disorders. Journal of Clinical Psychiatry, 48(5), 185-190.

Alzheimer's Disease and Related Disorders Association, Inc. (1990). Alzheimer's disease fact sheet. Chicago: ADRDA Press.

American Occupational Therapy Association. (1981). Occupational therapy definition for purposes of licensure. American Journal of Occupational Therapy, 35, 798.

American Occupational Therapy Association. (1986). Occupational therapy services for Alzheimer's disease and related disorders (Position paper). American Journal of Occupational Therapy, 40(12), 822-824.

Averbuch, S., & Katz, N. (1988). Assessment of perceptual cognitive performance: Comparison of psychiatric and brain injured adult patients. Occupational Therapy in Mental Health, 8(1), 57-71.

Cynkin, S. (1979). Occupational therapy: Toward health through activities. Boston: Little, Brown.

Earhart, C., & Allen, C. (1988). Cognitive disabilities: Expanded activity analysis. Los Angeles: Author.

Fidler, G., & Fidler, J. (1954). Introduction to psychiatric occupational therapy. New York: Macmillan.

Haas, L. (1944). Practical occupational therapy. Milwaukee: Bruce.

Havinghurst, R., Neugarten, B., & Tobin, S. (1968). Disengagement and patterns of aging. In B. Neugarten (Ed.), Middle age and aging (pp. 161-177). Chicago: University of Chicago Press.

Heying, L. (1985). Research with subjects having senile dementia. In C. Allen (Ed.), Occupational therapy for psychiatric diseases: Measurement and management of cognitive disabilities (pp. 339-365). Boston: Little, Brown.

Katz, N. (1985). Research on major depression. In C. Allen (Ed.), Occupational therapy for psychiatric diseases: Measurement and management of cognitive disabilities (pp. 299-313). Boston: Little, Brown.

Lawton, M., & Nahemow, L. (1973). Ecology and the aging process. In C. Eisdorfer & M. Lawton (Eds.), Psychology of adult development and aging (pp. 168-189). Washington: American Psychological Association.

Levy, L. (1986). A practical guide to the care of the Alzheimer's disease victim: The cognitive disability perspective. Topics in Geriatric Rehabilitation, 1(2), 16-22.

Levy, L. (1987a). Psychosocial intervention and dementia, Part I: State of the art, future directions. Occupational Therapy in Mental Health, 7(1), 69-107.

Levy, L. (1987b). Psychosocial intervention and dementia, Part II: The cognitive disability perspective. Occupational Therapy in Mental Health, 7(4), 13-36.

Levy, L. (1988). Cognitive treatment. In L. Davis & M. Kirkland (Eds.), ROTE: The Role of Occupational Therapy with the Elderly (pp. 289-323). Rockville, MD: The American Occupational Therapy Association.

Levy, L. (1989). Activity adaptation in rehabilitation of the physically and cognitively disabled aged. Topics in Geriatric Rehabilitation, 4(4), 53-66.

MacDonald, K. (1986). Occupational therapy approaches to treatment of dementia patients. Physical and Occupational Therapy in Geriatrics, 4(2), 61-72.

Mastrangelo, R. (1991). Allen scale update: Fine-tuned levels make abilities predictable. Advance for Occupational Therapists, 7(42), 8.

Mayer, M. (1988). Analysis of information processing and cognitive disability theory. American Journal of Occupational Therapy, 42, 176-183.

Meyer, A. (1922). The philosophy of occupational therapy. Archives of Occupational Therapy, 1, 1-10.

Mosey, A. (1981). Occupational therapy: Configuration of a profession. New York: Raven Press.

Mosey, A. (1985). Psychosocial components of occupational therapy. New York: Raven Press.

Norusis, M. (1990). SPSS introductory statistics student guide. Chicago: SPSS.

Slagle, E. (1922). Training aides for mental patients. Archives of Occupational Therapy, 1, 11-17.