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DISERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Andrew Hanniable Lewis, B.S., M.S.

* * * * *

The Ohio State University

1981

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Department of Physical Education
To my wife, Josephine and children, Andrew Jr. and Adrain, whom I love very much. A special tribute to my Grandmother, Mrs. Georgia M. Williams (in memoriam).
ACKNOWLEDGEMENTS

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CHAPTER I
INTRODUCTION AND STATEMENT OF THE PROBLEM

INTRODUCTION

The influence of the environment upon the behavior of mankind is an issue that has interested man for many years. However, the effects of an aquatic environment on stereotypic and self-injurious behaviors of handicapped individuals is one problem that has received limited attention.

Stereotypic (antisocial self-stimulatory) behavior is highly repetitive motor behavior that seems to have no apparent purpose. Observations of institutionalized mentally retarded residents show that the majority of the residents display at least one type of stereotypic behavior (Berkson and Davenport, 1962; Kaufman and Levitt, 1965). Because residents with stereotypic behavior interact less with their environment, it is important for institutional and non-institutional settings alike, serving retarded persons to provide an environment that lessens the likelihood of the occurrence of inappropriate self-stimulatory behavior (Berkson, 1964; Berkson and Mason, 1965; Koegel and Covert, 1972; Lovaas, Litrownik, & Mann, 1971).

The behaviors used to fix the boundaries of antisocial self-stimulatory actions vary greatly. The intent of this investigation is to study inappropriate stereotypic behaviors in three
different environmental settings. The following are some typical inappropriate self-stimulatory behaviors, excessive body rocking, rapid movements of the hand/fingers/arms, rapid head movements, and self-injurious behaviors. The first three types of behavior do not pose serious physical harm to the person and therefore lend themselves to programming that can be developed over extended periods of time. However, because of the seriousness of physical injury posed through self-injurious behavior (SIB) a major focus in the review of literature will be aimed at the management techniques that have been used to reduce this self-destructive type of inappropriate self-stimulatory behavior.

A significant number of individuals, who are diagnosed as psychotic or severely retarded, manifest at one time or another in their lives, stereotypic behaviors (Lovaas and Simmons, 1969). This behavior consists of head-banging (against walls and furniture), arm-waving, arm-banging (against sharp corners), biting themselves on wrists, arm, and shoulders, and many other types of antisocial behavior. In some individuals, the self-injurious behavior can be severe enough to pose a major problem for the person's safety. This concern for safety has led to investigations on how self-injurious behavior can be reduced without using aversive techniques to suppress the behavior.

Researchers interested in environmental psychology have studied a myriad of places, from small-scale to large-scale, and from man-made environments to natural environments of wilderness and recreational areas. There has been a significant number of studies dealing with normal individuals to show that environmental changes can cause changes
in behavior (Freedman, 1970; Heron, 1970). Even though the use of water as a therapeutic agent dates back many years, there are a limited number of studies which consider the aquatic environment as an acting force by which behavioral change can occur.

Self-injurious behavior (SIB) is a serious and pervasive problem among severely and profoundly retarded persons. Surveys have indicated that approximately 10 - 17% of the institutionalized retarded exhibit some form of SIB (Baumeister and Rollings, 1976). Self-injurious behavior by children has been reported since before the turn of the century and there have been many attempts to explain why a person exhibits this type of behavior. Early explanations were derived mostly from psychoanalytic theory.

Fenichel (1945) suggested a relationship between self-injurious behavior and the archaic biological reflex of autonomy, a reflex producing abandonment of an injured organ for a substitute organ to be regenerated. Ferenczi (1956) interpreted these behaviors as manifestations of a death wish. Spitz (1953) attributed self-injurious behavior to the guilt of children in whom superego functioning had developed (about 18 months of age). Spitz theorized that development of self-injurious behavior that took place before the psychosexual stage was a product of anaclitic depression. Actually, there is little empirical justification as to why persons are self-injurious for essentially all that is known is the consequence of the behavior not the intent (Maisto, Baumeister and Maisto, 1978).

More recently, a behavioral analysis of stereotypic and self-injurious behavior has emerged that has focused on procedures for
modifying the behavior. Ferster (1961) suggested that social reinforcement may sometimes be responsible for maintaining stereotypic behaviors and that elimination of the social consequences for this type behavior might reduce its frequency. Corte, Wolf, and Locke (1971) states that attempts to develop systematic treatment to reduce stereotypic and/or self-injurious behavior have been both numerous and varied, ranging from relatively innocuous procedures such as differential reinforcement of other behavior (DRO) to more drastic techniques such as electric shock.

The work presently being done with behavioral research shows that a person's behavior and his environment are inexorably continuous in time, that they are relentlessly ongoing from sunrise to sunrise with no gaps whatsoever (Baker, 1978). A number of researchers have suggested that enriched environmental experiences may be a way to reduce the stereotypic and self-injurious behaviors exhibited by many individuals (Horner, 1980). Horner further states that the effects of an environmental enrichment program on the behavior of handicapped individuals can have positive results as revealed in his study.

The research to date has not yet found an effective environmental intervention to reduce stereotypic and self-injurious behaviors significantly, except through aversive means. Thus, this investigation attempts to observe whether an aquatic environment will reduce the frequency of stereotypic and self-injurious behaviors. A study of this nature may offer an alternative environment with less aversive means by which stereotypic and self-injurious behaviors can be reduced.
The Problem

Statement of the Problem

The intent of this study is to examine the effects of an aquatic, classroom, and gymnasium environment upon stereotypic and self-injurious behaviors of institutionalized severely and profoundly mentally retarded individuals. There have been numerous investigations which have studied ways of reducing stereotypic and self-injurious behaviors, most of which have dealt with behavior modification techniques (differential reinforcement of other behaviors) or aversive techniques such as electrical shock. Research has indicated that stereotypic and self-injurious behaviors can be reduced through aversive means. However, this investigation will deal more specifically with the non-intrusive, less aversive means by which the frequency of stereotypic and self-injurious behavior might be altered.

The seriousness of this problem has lead to considerable research in this area. However, the research is limited when reviewed from the observational point of the effects of an aquatic environment. Thus, this investigation will seek to answer the following questions:

1. What effect does three different environments have on the frequency of stereotypic and/or self-injurious behaviors of a group of severely and profoundly mentally retarded individuals over a period of eight weeks?

2. What effect does exposure to three environmental settings (classroom, gymnasium, pool) have upon individuals that display stereotypic and/or self-injurious behavior?
3. What effect does exposure to three environmental settings (classroom, gymnasium, pool) have upon groups of experience subjects (individuals with prior water experience) as compared to non-experience subjects (individuals with no prior water experience)?

Further analysis of the data from this study will result in valuable secondary outcomes of investigation: The identification of an environmental setting that may be more conducive for programming of select skills.

Justification of the Study

The proposed study is designed to investigate the effects of an aquatic, classroom and gymnasium environment on the frequency of stereotypic and self-injurious behaviors of institutionalized handicapped individuals. An effective non-aversive treatment to alleviate stereotypic and self-injurious behavior has not been developed to date. However, because of the major problems posed for both the self-injurious individual and the personnel who care for them, a variety of approaches aimed at reducing stereotypic behaviors have been undertaken (Smolev, 1971; Risley, 1968).

The use of behavior management on stereotypic behaviors (body rocking, hand-waiving, inappropriate hand gestures, etc.) has received minimum attention when compared to self-injurious behavior. The reason for this difference is due primarily to the seriousness of the types of behavior involved. However, the prevalence of stereotypic behavior is thought to include about two thirds of institutionalized individuals (Berkson and Davenport, 1962; Kaufman and Levitt, 1965).
The use of behavioral modification techniques such as over-correction have been promoted with success of the mentally retarded (Azrin, et. al., 1975). However, Lovaas, et. al. (1965) found that some stereotypic behavior could be suppressed by building incompatible behaviors but indicated that failure of this type behavior to be maintained could lead to increases in other stereotypic behaviors if not properly administered. There is a general consistence that behavioral modification techniques may work for short periods of time but do not maintain suppression of stereotypic behavior (Smolev, 1971; Bandura, 1969; Tate and Baroff, 1966).

The use of aversive stimuli (electric shock) as a treatment has shown success by means of immediate suppression of self-injurious behavior when given contingent upon that behavior (Lovaas, Schaeffer, and Simmons, 1965; Risley, 1968; Tate and Baroff, 1966). Thus, punishment by the use of aversive stimuli or extinction through withdrawal of effective reinforcers (ignoring) involves purposefully exposing the individual and raises ethical questions.

The use of electrical shock has worked and its effects have been shown to be highly specific and discriminatory (Lovaas and Simmons, 1969). However, Azrin (1960) reported recovery of the suppressed behavior during continued punishment after repeated application of the punishing shock in which the subjects appeared to adapt to the shock and the punished response recovered. Similar responses were also reported by (Birnbrauer, 1968). Corte, Wolf, and Locke (1971) further concluded that extinction was not an advisable procedure due to the physical damage undergone by subjects during its long process.
This study is important and justifiable because it seeks to offer a viable less aversive approach that could possibly have immediate success upon reducing the frequency of stereotypic and self-injurious behavior emitted by handicapped individuals. Additional results of this study may have implications for instructional programming, which would directly impact on the educational benefits that institutionalized individuals now experience.

Limitations

The proposed study's results may be affected by the following limitations:

1. The individuals selected were eight (8) severely and profoundly mentally retarded persons from an institutionalized setting.
2. The ages of the persons selected ranged between 18 and 25 years.
3. Selection into the study was restricted to ambulatory individuals that did not show a fear of entering the water.
4. The investigation was restricted to individuals that had observable and measurable stereotypic and self-injurious behaviors in all environments.
5. The results can not be generalized to all severely and profoundly mentally retarded individuals because of the small number of subjects.
6. A limited amount of space within the gymnasium area.

Assumptions

The assumptions in this investigation are:
1. The individuals selected have not had life threatening experience in the aquatic or gymnasium environments.

2. The data collected can be generalized to a small group of severely and profoundly mentally retarded individuals that fall into the criteria outlined in the limitations.

3. The water temperature was warm enough to be physically comfortable, and not cause additional stereotypic behaviors if they were to occur in the aquatic environment.

4. Being placed in the aquatic environment was a pleasing and positively reinforcing experience.

5. It is assumed that the novelty of the new environment does not effect the subjects after the second experience.

Definitions of Terms

**Stereotypic Behavior** - Baumeister & Forehand (1974), refers to it as "repetitious, topographically invariant motor behaviors or action sequences in which reinforcement is not specified or is noncontingent and the performance of which is regarded as pathological."

**Self-Injurious Behavior (SIB)** - is defined as repetitive acts by individuals directed toward themselves which result in physical harm or tissue damage (Tate and Barroff, 1966).

**Examples of SIB** - Among the more common forms are head banging, face-slapping, fist-to-head movements, biting, beating, scratching the body, and hair-pulling (VanVelzen, 1975).

**Mental Retardation** - Significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior,
and manifested during the developmental period (Grossman, 1977).

Severely Mentally Retarded - Grossman (1977) identifies the severely retarded as those individuals sometimes known as "dependent retarded." He further classifies the severely mentally retarded as having an intelligence quotient range that is four standard deviations below the norm. On the Stanford-Binet and Cattell, this range is 35 - 50 and on the Wechsler scales it is 39 - 25.

Profoundly Mentally Retarded - Grossman (1977) identifies the profoundly retarded as those individuals who are likely to fall at or among those sometimes called "life support" levels. He further classifies them as having an intelligence quotient range that is five standard deviations below the norm. On the Stanford-Binet and Cattell, this range is 19 and below and on the Wechsler scales it is 24 and below.

Handicapped Individual - Refers to the barriers that a disability imposes between the person and his optimal functional status (Arnheim, Auxter, and Crowe, 1977, p. 38).

Aquatic Environment - Refers to a man-made constructed body of water (Pool) that is completely enclosed with adequate air and water temperature controls.

Gymnasium - A building or room for physical education activities.

Experience Group - Subjects with prior exposure to the aquatic environment.

Non-Experience Group - Subjects with no prior exposure to the aquatic environment or an aquatic program.
CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter an attempt was made to review and synthesize pertinent literature regarding stereotypic and self-injurious behaviors.

The literature on intervention with stereotypic behavior is based almost exclusively on the premise that it is learned social response subject to the laws of operant conditioning. Thus, the vast majority of treatments reported are based on the contingency management approach.

Little attention, however, has been given to the effects of non-contingent modifications on stereotypic behavior on how general environmental changes might lawfully interact with contingency management. Yet, a stimulus control analysis of this type of behavior suggests that general environmental modifications and antecedent events must be taken into account in the treatment of stereotypic behavior. Examples: transitional periods of the day, from one activity to another, different teachers or ward staff, and situational demands during various program and non-program activities have all been shown to influence the rate and topography of stereotypic behavior (Carr, Newsom, and Binkoff, 1976; Schroeder & Humphrey, 1977).

The chapter has been divided into five sections for the convenience of the reader. The first section examines literature pertaining to management approaches used with individuals that exhibit stereotypic behaviors. Section Two reviews literature on the stereotypic
behaviors of individuals that are severely and profoundly mentally retarded. And section three reviews literature pertaining to the stereotypic behaviors of individuals that are mildly or moderately mentally retarded. The fourth section will cover literature involving environmental programming for stereotypic behaviors. In the fifth section, a summary of the review of literature is presented.

Management Approaches for Stereotypic Behavior

A variety of management approaches have been used in attempting to find alternatives or positive ways of dealing with self-stimulatory individuals. The most commonly noted topographies are body rocking, rapid movements of the head, hands, arms, etc. Self-injurious behaviors include head banging, self-biting, arm-banging and self-beating. The prevalence of such inappropriate behaviors has been studied mostly among residential populations, yet the estimates vary for different clinical populations. Green (1967) and Shodell and Reiter (1968) found that up to 40% of schizophrenic children in residential centers engaged in stereotypic behavior. An extensive review by Baumeister and Rollings (1976) reported prevalence of 10 - 17% among the institutionalized retarded.
Behavioral techniques used to decelerate the inappropriate social responses of retardates have usually involved the stipulation of some sort of negative contingency following the target response in combination with attempts to strengthen relevant appropriate behaviors by positive reinforcement. It is well to point out at the outset that many of the negative contingencies used by therapists have involved the very kinds of stimuli (e.g. extinction, differential reinforcement of other behavior, timeout, overcorrection, and painful electric shock: punishment) used to elicit aggressive responses in the laboratory. Sajwaj, et. al., (1972) have pointed out that some side effects may develop as a result of various forms of negative contingencies management program. The factual cause of the side effects are not known presently. However, it is hoped that future studies will be designed to take a serious look at the side effects of various intervention strategies.

**Extinction** - The extinction procedure requires the removal of contingent stimulus events which maintain the stereotypic behavior (Gardner, 1971). This requirement is often difficult to attain as the reinforcement associated with stereotypic behavior is often not readily apparent (Frankel and Simmons, 1976) and in fact, may include self-reinforcing components. The attempts at identifying the possible controlling factors of stereotypic behavior have been studied by (Lovaas and Simmons, 1969, and Corte, Wolfe, & Locke, 1971).

Based upon the paucity of literature available on the severely and profoundly mentally retarded, four preliminary statements concerning the potential effectiveness of extinction appear warranted:
1. Extinction is a slow, gradual process which may be too dangerous for use with subjects exhibiting severe self-injurious behavior.

2. Inadvertent reinforcement applied during the early stages of an extinction procedure may unwittingly worsen the inappropriate stereotypic behavior.

3. The suppression effects of an extinction procedure have been reported to be situation specific (Smolev, 1971), thus requiring extensive and difficult-to-manage generalization strategies.

4. Extinction used alone requires total social consequence removal contingent upon stereotypic. This criterion may be impractical to implement on wards in institutional settings where the majority of stereotypic behavior appears to occur.

 **Differential Reinforcement of Other Behavior (DRO)** - This procedure refers to a schedule of reinforcement in which the subject is reinforced for abstaining from the emission of stereotypic behavior for a specified period of time (White, 1971).

Other studies (Flovell, 1973; Repp et. al., 1974; and Weisberg, Passman & Russell, 1973) also confirmed the efficacy of the DRO procedure. However, the effectiveness of DRO appears to be situation specific (Repp, et. al., 1974). The most important consideration in employing DRO is to insure the subjects sensitivity to the contingencies in effect. This requirement can be enhanced by using modeling (Weisberg, et. al., 1973) and discrimination procedures (Repp, et. al., 1974) within a DRO framework, and by applying reinforcement contingent upon specific alternative behaviors (Flovell, 1973) rather than in the absence of stereotypic (Mulhen and Baumeister, 1969).
Time-Out - The procedure of time-out is defined as the contingent removal of the opportunity to earn positive reinforcement (Craighead, Kazdin, and Mahoney, 1976). Typically this procedure requires the physical removal of the subject from the setting in which the stereotypic behavior is occurring, to a room or area which has minimal stimulation. This procedure may be distinguished from extinction in that with the time-out procedure, no assumption is made about specific controlling variables of stereotypic behavior. Instead, the rationale states that the contingent removal of all potentially reinforcing events will serve to reduce the strength of the inappropriate behavior. Considering the potential danger of lengthy time-out for creating stereotypic behavior (Smolev, 1971), suggest short duration and well-supervised time-out periods are advisable.

Overcorrection - This is a reductive procedure that was developed by Foxx and Azrin (1972). It may prove particularly useful in situations in which extinction, positive reductive procedures, response cost and time-out have little chance of succeeding. Overcorrection is a specific type of mild punishment designed to minimize the negative reactions caused by intense punishment. It has two basic components which are; to overcorrect the environmental effects of an inappropriate act, and to require the disrupter to intensively practice overly correct forms of relevant behavior (Foxx & Azrin, 1973).

Generally, the overcorrection procedure offers an effective treatment for stereotypic behavior and an acceptable alternative to shock punishment. Although the procedure appears to demand excessive staff time, the effort may be defensible in that a supportive treatment
environment is concomitantly shaped. Determining which specific factors within the overcorrection "treatment package" produce behavior change may be difficult to ascertain (Forehand & Baumeister, 1976).

**Punishment (Aversive Therapy)** - This procedure involves the presentation of an aversive stimulus immediately following the emission of inappropriate stereotypic behavior (White, 1971). The aversive stimulus employed in the majority of studies has been electrical shock. The shock is usually applied to a subject's extremity with a prod (Corte et. al., 1971) or a remote control apparatus (Prochasha et. al., 1974). The remote control device appears preferable to the prod in that it insures immediate presentation of the shock following the inappropriate behavior, it makes experimenter-specific discrimination learning more difficult for the person, and most importantly, it facilitates generalization training in new settings.

In the majority of studies reviewed, systematic efforts using a variety of procedures (E.G., extinction, DRO, restraints) had been attempted to control the inappropriate stereotypic behavior prior to using shock. Thus contingent shock was usually chosen as a "last resort" measure.

**Managing Stereotypic Behaviors of Severely and Profoundly Mentally Retarded Individuals**

The most frequently cited definition of stereotypy is that given by Baumeister and Forehand (1974) who define stereotypy as "repetitious, topographically invariant motor behaviors or action sequences in which
reinforcement is not specified or is noncontingent and the performance of which is regarded as pathological." Body rocking appears to be the most prevalent stereotypy (Baumeister and Forehand, 1972), with other forms including hand-waving, mouthing objects, hand-clapping, lip-flapping, screaming, and bizarre hand gestures such as poll-rolling and complex finger movements.

The prevalence of stereotypy is pervasive with approximately two thirds of institutionalized retarded individuals exhibiting some form of stereotyped behavior (Berkson and Davenport, 1962; Kaufman, Levitt, 1965). Additionally, an inverse relationship between stereotypy and IQ has been reported (Mulhern and Baumeister, 1969). Consequently, this behavior would have the highest relative incidence in the lower ranges of functioning (i.e., severe and profound mental retardation).

Denny (1980) studied wheelchair-mobility training (contingent upon inappropriate stereotypic behavior) combined with social praise contingent upon toy-play behavior). His results indicate that baseline self-directed activity means an outward directed activity means were altered significantly by the combined treatment approach.

Rincover (1978) did a study designed to investigate the role of sensory reinforcement on the motivation of self-stimulation. The effectiveness of sensory extinction was assessed by a reversal design for each of three autistic children, and the results showed the following. First, self-stimulation reliably extinguished when a certain sensory consequence was removed, then increased when that consequence was permitted. Second, different sensory extinction procedures were required for different self-stimulatory behavior,
since the sensory reinforcers supporting them were idiosyncratic across children. Finally, regarding clinical gains, the data suggest that sensory extinction may be a relatively convenient and rapid alternative for the treatment of self-stimulation. The application of reinforcement may be applied contingently to compatible or incompatible or simply to the nonoccurrence of any targeted stereotypic behaviors. Young and Wincze (1974) defined compatible behavior as any behavior which can be performed at the same time as the stereotypic behavior. Incompatible behavior was defined as any behavior which is physically impossible to carry out concurrently with stereotypic behavior.

Employing this definitional basis, Young and Wincze (1974) found that reinforcing compatible and incompatible behaviors of a 21 year old profoundly retarded female was ineffective for reducing her stereotypic behavior. They suggested that future research investigate alternative behaviors with complete stimulation input (Greene, 1967). Peterson and Peterson (1968) reduced the stereotypic behavior of an 8 year-old retarded boy to a near zero level using a combination of approaches.

Hamilton, Stephens, and Allen (1967) eliminated the high-rate back and head banging of a severely retarded female by restraining her for 30 minutes in a padded chair which was bolted to the floor. Follow-up at nine months indicated a continued elimination of the stereotypic behavior. In the same article, Hamilton, et. al. (1967) described a severely retarded female who would frequently use her head to break windows. This behavior was eliminated by restraining her to a bed for a two-hour period following each episode.
Tate (1972) used a combination of positive reinforcement and time-out procedures during meal time to reduce the severe stereotypic behavior of an 18½ year-old female. These procedures were replaced by a faradic intervention following two sessions of no improvement in stereotypic behavior. Pendergrass (1972) found a two-minute time-out effective for reducing the head banging behavior of an 8 year-old severely retarded boy. Self-biting behavior, although not treated, also systematically reduced in direct correspondence with the reduction of banging behavior.

In an attempt to determine the optimum time-out period for behavior suppression, White, Nielsen, and Johnson (1972) compared the effectiveness of 1, 15 and 30 minute time-out periods with twenty moderately and severely retarded children ($\bar{x}$ age = 11-6). The results indicated that (a) 15 minute time-out was as effective as 30 minute time-out for reducing behavior, (b) 1 minute time-out was inferior to longer time-out periods, and (c) 1 minute time-out are most effective if the subject had not been previously exposed to longer time-out periods. Azrin et. al., (1975) reduced 96% of the stereotypic behaviors of 10 severely retarded subjects in one week through a number of overcorrection procedures. In addition, new appropriate behaviors by the subjects and positive reactions to the procedures by the clinical personnel were reported.

Lovaas and Simmons (1969), in one of the first studies of treatment for stereotypic behavior in the mentally retarded, reported the immediate suppression of stereotypic behavior in three severely retarded children by the use of contingent shock punishment.
For all children, the suppression effects were both experimenter and situation-specific. Fewer shock presentations were required to establish generalization than were needed during the initial treatment phases. All side effects were "judged to be therapeutically desirable" (p. 153). In one child, a loud "No" acquired suppression properties which effectively facilitated generalization in another setting without the use of shock.

Shock punishment was used to reduce the stereotypic behavior of four profoundly retarded adolescents (Corte, et. al., 1971) and a 9 year-old profoundly retarded girl (Prochasta et. al., 1974). In the former study, shock applied across therapists and settings was necessary to obtain generalization of the suppressive effects. In the later study, contingent shock eliminated a head-slapping response which emerged following the disappearance of the targeted stereotypic behavior. Reduced crying spells and increased socialization were reported to occur in the retarded girl following stereotypic behavior suppression.

Young and Wincze (1974) noted that the application of shock to a 21 year-old female for head-banging behavior reduced this stereotypic behavior but did not generalize to a fist-head stereotypic behavior. One possible explanation may be that the second untreated stereotypic behavior did not belong to the same response class as the first, and thus remained unaffected by the aversive consequence applied. The generalized suppressive effects reported by Lovaas and Simmons (1969) might also support a response class explanation of controlling variables.
In a clinically-oriented case report, Tate (1972) reported reduction in the stereotypic behavior of an 18 year-old female who had been restrained in bed 7½ years prior to treatment. The stereotypic behaviors were so severe and extensive that shock had to be applied to her extremities as each was systematically unrestrained over the treatment period. Generalization of suppression effects was observed across extremities. Partial recovery of the stereotypic behavior was reported eleven months following treatment. As a DRO was used with the punishment procedure, the specific effectiveness of punishment could not be determined.

Griffin, Locke and Landers (1975) described an extensive program, involving hair tug and shock punishment along with reinforcement procedures, used to eliminate the stereotypic behavior of a blind, profoundly retarded male. In contrast to the other studies reviewed, Griffin et. al., (1975) made shock contingent on recurrent antecedents of stereotypic behavior cycles. A three year follow-up indicated total stereotypic behavior suppression in all settings in which the person resided.

A few investigators have studied self injurious behavior in relation to other variables such as sex, severity, special handicaps, IQ and environmental factors (Berkson and Davenport, 1962; MacKay et. al., 1975). An interesting finding reported by Berkson and Davenport (1962) was that blind retarded patients exhibited a higher incidence than sighted residents.

A factor analysis of the behavior of severely retarded boys, reported by McKinney (1962), yielded eight orthogonal factors, one of which,
"self-stimulation," included self-injurious behavior. Schroeder (1978) conducted a multidimensional investigation dealing specifically with self-injurious in the retarded. Schroeder found contingent shock in one study, and a verbal command to "Stop Rocking!" in a second study, effective for reducing the stereotypic behavior of retarded adults. The effects were situation-specific.

Azrin, Kaplan, and Foxx (1973) used social and tangible reinforcement of outward-directed behavior to reduce by two-thirds the stereotypic behavior of nine severely retarded residents. When an overcorrection (autism-reversal) program was combined with the previous reinforcement strategy, the "autism" were reduced to a near zero level by the third day of treatment. The extensive overcorrection procedure was quickly faded to a verbal warning along with continued reinforcement of alternative behavior.

In another study, Foxx and Azrin (1973) found an oral-hygiene overcorrection procedure then non-contingent and contingent reinforcement physical punishment (slap), and a distasteful solution applied to the child's hands, for reducing the mouthing behavior of two severely retarded children. In a second study, the stereotypic behavior of four severely retarded children was reduced to near-zero levels with 20 days of overcorrection treatment. An extension of the procedure to all settings in which the children functioned was required to established generalization. However, fewer training sessions were required in the new settings.

Rollings et. al., (1977) used the overcorrection procedure described by Foxx and Azrin (1973) to treat the head-weaving response of a 21
year-old profoundly retarded male. The response was not affected by the self-injurious behavior in the retarded. Schroeder found that self-injurious behavior was related to general intellectual functioning and the ability to communicate expressively.

Dorsey et. al., (1980) evaluated the effects of a fine mist of water applied to the face contingent upon self-injurious behavior exhibited by profoundly retarded persons. In experiment one, results of individual reversal designs showed substantial reductions in a variety of self-injurious behaviors (mouthing, hand biting, skin tearing, and head-banging) for seven participants. In experiment two, two participants who frequently bite their hands were each observed in two different settings. Following initial baseline in each setting, a series of manipulations were undertaken to compare the effects of mild verbal punishment ("No") with those of a combined treatment ("No" plus mist procedure). Results in one setting indicated the "No" suppressed self-injurious behavior after it was first paired with the water mist. Data also suggested that, once acquired, the punishing properties of "No" could be extended to a second setting in which the mist was never applied, and that these effects could be generalized across therapists. Results of these experiments indicate that the water mist procedure may be an effective alternative to traditional punishment techniques.

Hamilton and Standahl (1969) reduced the high rate stereotypic screaming behavior of a 24 year-old profoundly retarded female by the use of shock punishment. The treatment was applied on a 24 hour basis to insure
generalization and maintenance. Baumeister and Forehand (1972) found contingent shock in one study, and a verbal command to "Stop Rocking" in a second study, effective for reducing the stereotypic behavior of retarded adults. The effects were situation-specific.

Azrin, Kaplan, and Foxx (1973) used social and tangible reinforcement of outward-directed behavior to reduce by two-thirds the stereotypic behavior of nine severely retarded residents. When an overcorrection (autism-reversal) program was combined with the previous reinforcement strategy, the "autisms" were reduced to a near zero level by the third day of treatment. The extensive overcorrection procedure was quickly faded to a verbal warning along with continued reinforcement of alternative behavior.

Rollings et. al., (1977) used the overcorrection procedure described by Foxx and Azrin (1973) to treat the head-weaving response of a 21-year old profoundly retarded male. The responses were not affected by the treatment procedures which had to be terminated because new behaviors emerged which were judged to be dangerous to the subject. The same procedure was effective in eliminating the rocking behavior of a 35 year-old profoundly retarded male. The most likely explanation for the failure of the first case was: a) treatment was conducted for only 20 minute sessions over a 14 day period; and b) as Azrin et. al, (1973) cautioned, these procedures may prove difficult to employ with resistive unmanageable adults.

Mulhern and Baumeister (1969) reinforced "sitting still" in two severely retarded adults to reduce their stereotypic behavior. An added aversive discriminative stimulus was required to reliably reduce
their stereotypic behavior, thus, increasing the person's awareness of the experiment's contingencies resulted in reduced stereotypic behavior. Baumeister and Forehand (1971) reinforced lever-pulling which virtually eliminated the rocking behavior of six severely retarded males, and an extinction conditioned returned the subject's stereotypic behavior to above-baseline levels.

Stereotypic Behaviors and the Midly and Moderately Retarded

Baumeister and Rollings (1976) noted, there is an inverse relationship between cognitive levels and stereotypic behavior. Consequently, few studies are available which describe procedures for dealing with stereotypic behaviors of mildly and moderately retarded individuals. Three of the studies researched are reviewed below. The first two studies extends the previously described work done with severely and profoundly retarded in the area of consequence, manipulation. The third study suggests that stimulus control may function as a preventive method in deterring stereotypic behavior.

Barkley and Zupick (1976) used physical restraint and DRO to treat the stereotype body contortions of a 9 year-old, moderately retarded girl (IQ=42). This unique behavior was considered moderately self-injurious to the child. The physical restraint procedure involved shouting "no" at the girl several times while holding the girl's hands at her side until the behavior stopped. The DRO procedure consisted of social and tangible reinforcement contingent upon the absence of stereotypy for one minute. The period was gradually increased to 30 minutes over the course of the study. The stereotypic behavior reduced
to zero following ten days of intensive treatment, the latter of eight of which were carried out by the child's teacher. Although some generalization within the treatment setting (school) occurred, the mother reported no improvement in stereotypic behaviors at home.

Durability of Barkley's treatment could not be assessed as the child was institutionalized shortly after treatment ended. This intervention package is important, however, in that it demonstrates significant change in the targeted response and was easily implemented by a teacher with no previous experience in formal behavior modification.

Harris and Romanczyk (1976) reported the use of an overcorrection procedure with the stereotypic behavior of an eight year-old moderately retarded boy with maternal rubella syndrome. Treatment initially was implemented on a continuous basis in a clinical setting and then subsequently extended into the child's home. The stereotypic behavior was reduced to near zero levels within two weeks of treatment. Only two days were required for stereotypic behavior suppression in the home following successful treatment in the research setting. The suppressive effects of the treatment remained durable with only occasional reoccurrences of the stereotypic behavior over 180 days of data collection. An interesting observation reported by the therapists was that the stereotypic behavior often occurred in response to situations which were either demanding to the boy or which removed positive events. This suggests that the child was using the behavior to extend some control over his environment. This functional feature of stereotypic behavior typically is not observed in the stereotypic behaviors of the severely and profoundly retarded. It thus seems reasonable that

...
preventive approaches which emphasize stimulus control may offer another viable alternative to punishment procedures.

Carr, Newson, and Binkoff (1976) researched the behaviors of a self-destructive 8 year-old boy diagnosed as schizophrenic with associated mental retardation (IQ=66). The therapist initially determined that situations in which the boy was presented with several commands by the experimenter led to high rates of stereotypic behavior, whereas, free time and simple conversational sessions resulted in near zero ratio of stereotypic behavior. It appears that the stereotypic behavior functioned to terminate events which were aversive and thus were strengthened through negative reinforcement. This conclusion may also explain why previous attempts at controlling the stereotypic behavior through consequence manipulation failed. Extinction of behavior maintained by negative reinforcement requires a reduction in the aversiveness of the stimulus conditions (not the consequent conditions) which the behavior has functioned to terminate (Gardner, 1977).

Environmental Programming for Stereotypic Behavior

Stereotypy, like self-injurious behavior, offers an enigma to researchers and clinicians in mental retardation in that clear understanding of its emergence and maintenance is not available. Early studies were conducted to support a number of theoretical formulations derived to account for stereotypy. The hypothesis investigation has implicated arousal level and availability of alternative activities (Berkson, 1967), frustration (Baumeister and Forehand, 1971), tension reduction (Kaufman and Levitte, 1965), and self-reinforcement (Lovaas,
Litrownik, and Mann, 1971) as partially responsible for the occurrence and maintenance of stereotypic behavior.

Azrin, Kaplin and Foxx (1973) refer to stereotyped behaviors as autisms, suggesting a common link with one of the defining characteristics of autistic children (Rimland, 1964). However, regardless of theoretical inclination, several empirical findings have emerged from these early studies which proved valuable for subsequent intervention efforts.

The most important data were accumulated by studies directed at determining the role of the environment in influencing stereotypic behavior. The most comprehensive series of studies on stereotypic behavior in mental retardation were conducted by Berkson and his associates (1962, 1964). Their finding was that stereotypic rates could be influenced by varying environmental conditions. This conclusion pinpointed the environment as at least partial responsible for the frequency of stereotypic behavior.

Kaufman and Levitte (1965) observed head rolling and body rocking in 83 institutionalized retarded individuals and found that higher rates occurred prior to meals and rest periods and lower rates were noted after meals. Guess and Rutherford (1967) reduced the stereotypic behavior of 13 blind retarded persons by providing toys and noise-making objects. This finding supported the negative correlation between stereotypic behavior and object manipulation reported by Berkson and Mason (1964).

Hollis (1971) shaped body rocking in retarded subjects using different reinforcement schedules. This study added support for the
operant control of stereotypic behavior. Experimental control of stereotypy was also established by Pohl (1976) using a pacemaker light and by Hollis (1976) who reinforced participation in an activity which was not incompatible with stereotypic behavior.

Adams, Tallon and Stangl (1980) investigated the effects of passive environmental conditions (silence, radio and television) and manipulable objects (no toys, toys, toys plus staff interaction) on stereotypic behavior. They used four institutionalized, mentally retarded residents with high rates of stereotypic behavior and observed them in a multipurpose room of their cottage. Results showed statistically significant lower levels of stereotypic behavior under the silence and music conditions as compared to the television conditions. There were no significant differences between the three manipulable-object conditions.

Higenbottam and Chow (1975) investigated sound-induced drive, prior motion restraint, and reduced sensory stimulation effects on body rocking rate in a group of 16 retarded subjects. Significant rate increases were associated with the presentation of high intensity sound and short periods of reduced sensory stimulation. Increases were not associated with prior motion restraint. The results suggest that reduced sensory stimulation operates as a drive variable, summing with other operationally defined sources of drive, e.g., high intensity sound.

Horner (1980) studies the effects of procedures designed to enrich the physical and social environment of an institutional ward on the adaptive and maladaptive child, adult self, and object-directed
behaviors of five profoundly retarded ambulatory females. Behaviors were observed in two treatment conditions, enrichment with toys and objects and another enriched environment coupled with differential reinforcement of adaptive behavior, was compared to behavior occurring in corresponding baseline or "austere" conditions and during a period of noncontingent reinforcement. The results revealed: (1) little change in adaptive and maladaptive child and adult-directed behavior across conditions, (2) an overall higher incidence of adaptive object-directed behavior and reduced self-directed maladaptive behavior in each treatment condition for that observed in corresponding control conditions, and (3) the use of an enriched environment and differential reinforcement of adaptive behavior resulted in maladaptive self-directed behavior being reduced and adaptive object-directed behavior being increased beyond that observed in the enriched environment alone.

Music, frequently loud and continuous, is a common feature in the wards of many mental deficiency hospitals, particularly low grade wards where the patients remain on the wards all day. A study by Tierney, McGuire and Walton (1978) was designed to investigate the effects of music on body-rocking manifested by severely mentally deficient patients in ward environments. There results indicate there were significant difference between male and female patients. While music did not appear to affect rates, but increased the amounts of body-rocking in both groups, the distribution of this increase was different. These results suggested that the effect of music was to increase the duration of body rocking sequences.
Once the operant components of stereotypic behavior are established, researchers will be in a position to begin applying intervention strategies to influence the stereotypic behavior of retarded individuals. Justification for initiating intervention strategies primarily concerned with reducing or eliminating stereotypic behaviors include: A) stereotypy results in negative adaptive consequences (Rollings, Baumeister, and Baumeister, 1977) and b) stereotypy reduces the child's receptivity to organized forms of stimulation (Kaufman and Levitte, 1965) which are necessary for guiding appropriate behavior (Repp, Deitz, and Speir, 1974).

Summary

Stereotypic behavior is an extensively occurring phenomenon in the retarded population which interferes with adaptive development. Operant control of stereotypic behavior has been established in both laboratory and natural settings. DRO and shock punishment procedures have proven effective in reducing the frequency of stereotypy, although the benefits are situation-specific.

The use of shock punishment raises several pragmatic and ethical dilemmas. Therefore, at the present time, overcorrection appears to contain all of the necessary ingredients of an effective and comprehensive treatment program both to reduce stereotypic behavior and to increase alternative adaptive behaviors.

The prevalence of inappropriate stereotypic behaviors among residential populations has been estimated to be as high as 10 - 17%. In one report, an inverse relationship between stereotypic behavior and
IQ was shown. Consequently, this behavior would have the highest relative incidence in the lower ranges of functioning (i.e., severe and profound mental retardations).

The prevalence of inappropriate stereotypy is pervasive with approximately two thirds of institutionalized retarded individuals exhibiting some form of stereotypic behavior. However, because there is an inverse relationship between cognitive levels and inappropriate stereotypic behavior. Consequently, few studies were available which described procedures for dealing with the stereotypic behaviors of mildly and moderately retarded individuals. The studies review however, support the fact that most all types of management approaches worked to suppress or reduce the rate of stereotypic behavior among individuals classified as mildly or moderately mentally retarded.

Etiological theories advanced to account for the development of stereotypic behavior among retarded persons do not yet clearly indicate which management procedure within the environment will be most effective in individual cases. Negative consequences are frequently used to decelerate stereotypic behavior responses among institutionalized and noninstitutionalized retarded children and adults. The results of most of these reports suggest that the effects of each of these procedures will depend, in part, upon the nature, quality and rate of reinforcement for alternative behavior available in the setting in which therapy occurs. However, durable elimination of stereotypic behavior appears to depend upon maintenance of both positive and negative contingencies in the resident's natural environment.
The information reviewed further, indicated that variables such as sex, severity, special handicaps, IQ and environmental factors may be of considerable importance when working with individuals that display stereotypic behavior.
CHAPTER III

METHODS AND PROCEDURES

INTRODUCTION

This chapter describes the methods and procedures utilized in investigating the effects of three environmental settings upon stereotypic behavior of severely and profoundly mentally retarded individuals. In organizing the methods and procedures, the chapter has been divided into seven sections: (1) Description of Environmental Settings, (2) Selection of Subjects, (3) Experimental Design, (4) Selection of Reliable Evaluators, (5) The Assessment Instruments and Procedures, (6) Recording Technique, and (7) Data Analysis Procedures.

The Environments

During this experiment, the subjects selected were involved in activities within three environmental settings. The three environments under investigation were the classroom, gymnasium, and the pool (aquatic environment).

Classroom - The subjects involved were from different educational programming, the three programs were: basic living skills, personal skills and functional living skills. The educational instructions were designed to teach and develop appropriate skills of that program,
based on the individual needs of each subject. The average classroom was approximately, 25 X 30 feet in size, which accommodated an average class of 4-5 students one teacher and an aid. However, with some subjects, the classroom instructions were one-on-one.

The combining of all subjects into one classroom group was impossible because of educational time schedules. Thus, each subject's classroom programming was carried out by the classroom teacher in the subject's regular classroom setting. The common element among all subjects and teachers was the activity during the four minute taping sessions. In each classroom session, the teachers were instructing the subjects in one or two activities which were a planned part of the subjects' individual education program.

**Gymnasium** - The subjects' while in this area took part in various gross motor activities. In this area all eight subjects were combined to form one class. The instructions were for the most part one-on-one, however, there were days when a higher ratio was used. The area used was half the gymnasium floor space, approximately 50 X 45 feet. The area of the gymnasium in use was separated from the other half by a gymnasium divider (curtain). The actual amount of floor space in use for the investigation was approximately 33 X 35 feet, the area used for the investigation was also used to store large equipment. In this experiment the actual amount of usable floor space, the closeness of 16 persons and other equipment restraints, a limitation may have resulted which would have acted to increase the occurrence of stereotypic behavior.

The equipment used in the investigation included: 8 X 4 foot mats, mini-tramp, basketballs, playground balls, soccer balls, nerf balls,
jumper, air mattress, etc. An instruction plan of the gymnasium activities can be reviewed (see Appendix H).

Pool (Aquatic Environment) - The subjects while in the pool were combined to form one class of eight students. The aquatic environment was painted with light attractive colors, had adequate lighting, water and air controls, and proper ventilation. The pool was 40 X 50 feet in size, had a slope grade of 1 - 12 degrees, and a depth slope of 1/2 - 5 feet. The temperature was kept at approximately 88 degrees and the pool was equipped with a ramp entrance.

The instructional ratio in the aquatic environment was also one-on-one. However, because some students would not enter the deeper water, there was adequate space in both the shallow and deep areas to carry out the instructional plan. The instructional plan used for pool activities can be reviewed (see Appendix G).

Selection of Subjects

The design of this investigation called for observations of institutionalized severely or profoundly mentally retarded subjects in three environmental settings, therefore, of primary consideration for subject selection into the investigation was each subject's educational programming. A second important factor was the scheduling of the aquatic and gymnasium facilities at the Orient Development Center (O.D.C.), Orient, Ohio. Thus, initial contact was made with Mrs. Ann Fowble, Director of Education (see Appendix A), Mrs. Sue Combs, Director of the Activity Therapy building and Mrs. Judy Hard Hug, Director of Aquatics. Upon
presentation of a proposal and explanation of the study, Mrs. Fowble (see Appendix A) and Mrs. Hug (see Appendix B) both responded through letters, which were then forwarded with my letter to Dr. A. Z. SoForenko, Superintendent of Orient Development Center (see Appendix C). On April 13, 1981, I received confirmation that the study could be undertaken at the Orient Developmental Center (see Appendix C).

Upon notification that the study was cleared, Mrs. Fowble made available the names of twenty-eight potential candidates that exhibited the behaviors under investigation (stereotypic and/or self-injurious) and meeting the criterion outlined in the limitations, within the twenty-eight names only fourteen were said to have behaviors with frequencies that were amenable for the investigation. The parents and/or guardian of the fourteen were then sent a letter explaining the study (see Appendix D) and a research consent and videotape authorization form (see Appendix D) to be completed for their approval of the subject's participation in the investigation. Upon return of participation approval letters, additional letters requesting information were sent to cottage coordinators (see Appendix E).

With fourteen available subjects, randomization was used in the selection of the final eight subjects that were involved in the investigation. The remaining six subjects were not used because of space and staffing restraints. However, the six names were placed on an alternates list to be used if any of the subjects selected were to be removed from the study.

The subjects selected were divided into two equal groups. One called the Experience Group (subjects with prior experience in the
aquatic environment) the other was identical as the Non-Experienced Group (subjects with no previous experience in the aquatic environment. No previous experience meaning the subject had not been in the pool within a year and/or was not enrolled in the organized aquatic program at O.D.C.). The ages of the subjects selected ranged from 18 - 25 years, and (Table 1, p.85) described the subjects in more detail.

Experimental Design

The intent of this study was to observe the occurrence or non-occurrence of stereotypic behaviors of eight subjects across three types of environments. The study gave no importance to a reversal phase. Therefore, a multielement baseline design was selected.

The multielement design selected for this study does not consist of experimental phases where one behavior modification procedure is applied during several consecutive sessions until stability is achieved within that condition. Rather, experimental and baseline conditions are presented in alternation on either a consistent and an unpredictable schedule within sessions and/or from one session to the next. The experimental conditions of a multielement baseline procedure are alternated independent of changes in the behavior. Thus, if different patterns of responding develop, and each pattern is observed to be unique to a particular experimental condition, then experimental control has been demonstrated (Ulman and Sulzer-Azaroff, 1975).

Sulzer-Azaroff and Mayer (1977) have listed several advantages for this design over the traditional reversal and multiple baseline designs.
The first advantage is that of non-reversibility, such that when data overlap, the efficacy of the experimental procedure is not ruled out as can be the case in reversal type experiments.

A second advantage is that an experiment may be terminated at the discretion of the investigator following his judgment that experimental control has been reliably demonstrated. This is not so in either the reversal or multiple baseline where several sessions must be measured before proceeding to the next phase (reversal) or that two behaviors be monitored concurrently (multiple baseline). In case of abrupt or unexpected termination the multielement baseline design may preclude the necessity for repeating the experiment from the beginning.

Third, an unstable baseline can be very disturbing in conducting operant research. This is quite common when new behaviors or environmental condition change, the resulting conditioning being an ascending baseline or irregular variable due to task complexity.

Fourth, the multielement baseline design seems best suited for conducting complex behavior analysis, especially when one wishes to isolate the effects of interrelated controlling variables:

"Especially with complex behavior analyses the more often the independent variables are manipulated, the more believable is the demonstration of experimental control. Thus, when conducting a complex behavior analysis, it is better to vary the order of their presentation than not to do so." (Ulman and Sulzer-Azaroff, 1975, p. 384).

Another advantage of this design is that the stimulus generalization may be assessed using the multielement baseline design. By observing daily performance comparisons under the various experimental conditions it is possible to demonstrate generalization of particular effects across situations.
Sixth, and lastly, condition-change interactions may be minimized. Condition-change interactions refer to differential responding that is seen in one situation that is the result of an individual's contact with another condition. There are two classes of condition-change interaction, namely, sequence effects and contract effects. Sequence effects may be found in a reversal or multiple baseline design, whereas contrast effects are interactions within and/or between the sessions of a multielement baseline design.

The multielement baseline design reduces the sequence effects by involving each condition briefly (a maximum of three consecutive sessions), versus a prolonged period of time. Contrast effects may be controlled by counter-balancing the presentation of conditions in such a way that each condition is followed equally often by every other condition. A second way of reducing contrast effects is by programming the sessions. Third, the most direct approach of controlling for these would be to determine the extent to which these effects are present. Assessment of these effects may be done by conducting control experiments in which each component appears separately. If reliable effects are found with the multielement baseline design, that is, if condition-change interactions are small, then this type of design would be quite advantageous for use in educational research (Ulman and Sulzer-Azaroff, 1975).

The arrangement of this design is such that environmental stimuli is available to promote subject discrimination between the conditions under which they are operating.
The data collected in this investigation was further subjected to an analysis of variance (ANOVA). This design makes it possible to determine if quantitative differences exist in the stereotypic and self-injurious behavior of the experience group as compared to the non-experience group. This design also allows comparing the groups across and within the environmental settings under study.

Selection of Reliable Evaluators

Four evaluators participated in this investigation. All were associated with the Adapted Physical Education Training Project at the Ohio State University. Three evaluators were doctoral students with a major program emphasis in adapted physical education. The fourth evaluator was the project director of the Adapted Physical Education Training Project at the Ohio State University, Columbus, Ohio. Each individual had expressed an interest in the investigation and were willing to devote numerous hours to the observation and recording process.

The evaluators who participated in the investigation had some degree of familiarity with the types of stereotypic and self-injurious behaviors under investigation. However, to familiarize the evaluators with behaviors that were subject specific, a handout sheet, identifying the types of behaviors exhibited by the subject was made available to the evaluators (see Appendix F).
Analysis of Evaluator Reliability — To determine the agreement among evaluators in observing stereotypic behaviors, the performances of two children were videotaped in the environments under study, and a percentage of evaluator agreement (score reliability) for each child in all environments was calculated. The accepted procedure was to divide the number of instances of agreement by the evaluators for each child by the total number of evaluator agreements plus disagreements. The quotient is multiplied by one hundred and the resulting figure is the percentage of agreement among the evaluators (Hall, 1971).

The nearer the evaluators are to perfect agreement, the nearer they will be to one hundred percent. Ninety percent or above is considered desirable, but eighty percent agreement or better is acceptable for many types of observational recordings.

No absolute standards have been established but the percentage of agreement gives some measure of the consistancy of the evaluator's observations.

Due to the types of observational information being collected and the procedure used, two types of evaluator agreements were established. The two types were agreement across subjects and agreement within intervals. Results from percentage agreement computations for the two subjects yielded a score of .9696 for the agreement across subjects, and an interval agreement of .9833, indicating a near hundred percent agreement in both area. The entire agreement yielded a mean score reliability of .9764 for both types of evaluator agreement. An evaluator reliability follow up was done using the same videotapes 43 hours later, and the inter-evaluator score reliability of .9899 was recorded for both across subjects and within intervals.
The Assessment Instruments and Procedures

The data was collected through the use of videotaping and the instruments used in all environmental settings was a portable Sony Videocorder. AVC - 3400 DC 12V No. 28726. The system is designed to operate on battery or an electrical power adapter, the AD-3400 power adapter was used in all recordings. The type videotape used was Scotch 361-4-1200-R1488 (30 minute length). A Magnovox Cassett Tape Recorder TE-3252 BK 21 was used to give audio cues for data collection in the gymnasium and aquatic environments.

Taping Procedures - The investigation involved two types of taping procedures that covered a seven-week period. The classroom procedure and a second type for the gymnasium and aquatic settings. The subjects selected came from eight different educational programs, which prevented the combining of one class, for videotaping.

Thus, all subjects participating in the investigation were taped in their regular educational classroom. The taping process followed a planned schedule and took place between the hours of 8:15 - 10:45 a.m. in the classrooms involved in the study. The subjects were taped individually in the classroom using a continuous taping process for eight sessions of three minutes and 45 seconds each, which yielded twelve ten-second intervals per session, for a total of 96 ten-second intervals per subject across the seven-week period. In an effort to avoid inconsistencies, each classroom teacher was asked and agreed to have for each taping session a planned activity that was part of the subject's daily educational programming.
The subjects were combined into one group for the gymnasium and aquatic environments. All taping in these two environments occurred between 1:00 - 2:00 p.m. each session. In both environments, an audio cue was given to the camera person through the use of a cassette recorder, with the following instructions:

Testing 1, 2, 3, 4, set volume and listen for instruction. This tape will give audio cues for the taping process. The subjects should be taped according to the order as outlined for today's taping schedule.

This technique will require your calling the subject's last name. If for some reason a subject is absent the camera should be focused high on the wall during the period that subject would be taped and the subject's name should still be called.

The information will be in 10-second intervals of taping and 10-second intervals preparing to tape next subjects. The audio cues are: (1) Find subject, call last name, (2) Stop talking, focus away from activity area, (3) Find next subject, wait for audio cue, call last name. Please listen carefully and follow the directions closely.

Due to the number of persons involved acting as teachers in both environments, and in an effort to control for inconsistencies throughout the investigation, a time schedule lesson plan was developed with general instructions for teacher behavior and instructions of the activities to be covered during each session (see Appendixes G and H). The subjects were taped individually using 10-second intervals for a continuous period of 25 - 30 minutes for nine sessions. This yielded 11 ten-second intervals per session for a total of 99 ten-second intervals across the seven-week period.
Performance Maintenance

In an effort to determine the maintenance effects of the study, a ten-day followup was instituted. The classroom procedure was carried out in the same manner. The same procedure and lesson plans used on the last regular scheduled day in the gymnasium and pool was also used in the followup.

Recording Techniques

Many kinds of behaviors are not clearly discrete. It is difficult to tell when some behaviors begin and end. Therefore, the method of choice for observing the occurrence or non-occurrence of stereotypic behaviors in three environmental settings was interval recording. There are two major advantages in using interval recording. First, interval recording indicates an estimate of both frequency and duration of behavior. Second, and perhaps most important, interval recording provides an estimate of students' performance across time intervals which does not occur with event and duration recording (Cooper, 1975).

The data recording process was done through observations of videotapes. The classroom videotapes were observed using the following cassette tape audio instructions:

Testing 1, 2, 3, 4, the behaviors you will be observing are classified as stereotypic and/or self-injurious. These behaviors are defined as follows: Stereotypic - refers to repetitious, topographically invariant motor or action behavior sequences in which reinforcement is not specified or is non-contingent and the performance of which is regarded as pathological.
Self-Injurious — refers to repetitive acts by individuals directed toward themselves which result in physical harm or tissue damage. You will be observing subjects in the classroom environment, on which a videotape will correspond to a cassette tape that gives audio cues using ten-second intervals that will indicate when the observational interval begins and ends, in addition the number of the observational interval will also be indicated.

When the occurrence of a behavior is observed a check (✓) should be placed in the appropriate interval block. However, if the behaviors do not occur during the observational interval, a zero (0) should be placed in the block. This recording system should be used if the behaviors are observed directly or are observed being suppressed during the observational interval.

At this time please review the handout sheet outlining subject specific behaviors (see Appendix I). You will observe the continuous taping of an individual subject for three minutes and 45 seconds in the classroom using 10-second observational intervals. Again, the cassette tape will give audio cues as to the beginning, ending and the interval number in each of 12 intervals to be observed. The videotape should be started on the count of three.

There is a ten-second interval of time for reliability evaluators to record the occurrence or non-occurrence of the behavior. This interval beings when the audio cue of "Stop" is given, at this point all evaluators should record their observation using the recording code.

A second cassette tape was developed to give reliability evaluators audio instructions as to the observational process used in the gymnasium and aquatic environments. The instructions were as follows:

Testing 1, 2, 3, 4, observational information for observers in the pool and gymnasium environments. The behaviors you will be observing are classified as stereotypic and/or self-injurious.

They are defined as: Stereotypic — referring to repetitive, topographically invariant motor or action behavior sequences in which reinforcement is not specified or is non-contingent and the performance of which is regarded as pathological. Self-injurious — refers to repetitive acts by individuals directed toward themselves which result in physical harm or tissue damage.

You will be observing subjects in two environments (the pool and gymnasium) at different videotaping periods using the instructions from this cassette tape. This cassette tape will be stopped after the general instructions.
The observational interval will be ten seconds in length, the
cue that indicates the beginning of an observational interval
is the announcing of the subject's last name, which comes
from the videotape playback volume. The cue that signals the
ending of an observational interval is when the camera moves
away from the activity area. If for some reason a student is
absent the last name will still be called, but the camera
will be focussed high on the wall.

Evaluators will be given advanced information as to the order
of the subject's for specific taping sessions and each time a
subject is observed it indicates the next interval.

When the occurrence of a behavior is observed during the obser­
vation of a subject, a check (✓) mark should be placed in the
appropriate interval block. If the behaviors are not observed,
a zero (0) should be recorded, and if a student is absent from
the environment, a diagonal line (/) should be placed in the block.
These recording marks should be entered if the behaviors are
observed directly or are observed being suppressed.

There is a ten-second interval of time for reliability evalua­
tors to record the occurrence or non-occurrence of the behavior,
this interval beings when the camera moves away from the
subject being taped and/or away from the activity area.

The next step in this non-observational interval is when the
camera focusses on the next subject and waits for an audio
cue. Some of the behaviors that may be observed but are not
limited to include: Putting hands to face and/or head, body
and/or head rocking, hand/arm/finger flipping movements in a
slow or rapid motion, self-injurious behaviors such as beating
self or beating self against objects or other body parts, bouncing
up and down in a set, striking out against teacher, others or
objects, watching fingers and/or hands, etc.

Additional information as to specific types of stereotypic
and/or self-injurious behaviors of the subjects involved are
contained on the handout sheet (see Appendix F).

At this time the chief investigator will give you the taping
date, taping session, and the environment, please place this
information in the appropriate area. The cassett-tape is com­
pleted and should be turned off. The videotape should be
started on subject one, interval one, at this time.
Data gathered during the conduct of the investigation were analyzed through two processes. Initially, the data ascertained was converted into percentages and the analysis involved graphic presentation of the subjects' stereotypic and self-injurious behaviors. Graphs were used to illustrate the results of individual subjects' in the classroom, gymnasium and aquatic environments. Graphs were also formulated to give a descriptive profile of group behaviors within environments and to show profiles of groups in all environments. Interpretation of the profiles to determine performance differences was then conducted.

The second process of data analysis involved subjecting the data to an analysis of variances (ANOVA) analysis yielded effect means and F values between experience and non-experience group frequencies, and effect mean and F values of groups across all environmental settings.

Generalizability to the entire population of severely and profoundly mentally retarded individuals cannot be made at this time. Inferences to the population in single subject research can only be made by replicating the study in different settings, with different subjects and by a different researcher.
CHAPTER IV

ANALYSIS OF DATA AND DISCUSSION OF RESULTS

The primary thrust of this study was to investigate the effects of an aquatic, gymnasium and classroom environment upon the occurrences of stereotypic and self-injurious behavior exhibited among institutionalized severely and profoundly mentally retarded individuals. Additionally, differences in group occurrences were also investigated.

Results stemming from this investigation were entirely descriptive in nature. Percentage and mean values have been used to describe the stereotypic behaviors of severely and profoundly mentally retarded individual performances in three environmental settings. The data emanating from the descriptive statistics were not appropriate for determining if statistically significant differences in stereotypic behaviors existed between the groups.

The descriptive data allowed the investigator to distinguish differences in the trends of individual and group stereotypic behavior of all subjects individually and between environments.

During data collection, a continuous recording format was used for each observation. Three observers were assigned to record the behaviors of each subject. Interval recording was the observational technique used to record the occurrence of specific stereotypic and self-injurious behaviors.
Reliability checks were conducted at least every third session and at random whenever a reliability checker was in attendance. Reliability checks when conducted were on individual subjects in all environmental settings. The chief investigator collected the raw data at the end of each session and converted the raw measures to percentages of occurrence interaction and plotted the data graphically. The increases and decreased in stereotypic behavior frequencies were analyzed using a multielement design (the study initially began with eight subjects, however, due to medical reasons beyond the investigator's control, a subject had to be removed from the investigation. Therefore, the results for only seven subjects will appear).

This study attempted to investigate three primary questions:

1. What affect does three different environments have on the frequency of stereotypic and self-injurious behaviors of a group of severely and profoundly retarded individuals over a period of eight weeks?

2. What affect does exposure to three environmental settings (classroom, gymnasium, pool) have upon individuals who display stereotypic and self-injurious behavior?

3. What affect does exposure to three environmental settings (classroom, gymnasium, pool) have upon stereotypic behavior of a group of experience subjects (individuals with prior water experience) as compared to a group of non-experience subjects (individuals with no prior water experience)?

This chapter analyzes, interprets and discusses the descriptive data collected during the conduct of this investigation. The chapter
is divided into two sections (Individual Environmental Results, and Group Environmental Results) which correspond to the three environmental settings under examination. Within the sections, graphic results illustrating the percentages of stereotypic behavior occurrences are examined. Additionally, mean occurrences within and between groups are graphically illustrated and further interpreted for statistical significance through the use of an analysis of variance.

Following the results of individual and group performance in all environmental settings, a summation of the results and response to the question brought forth appears. The final segment of the chapter entails a discussion of the results.

Individual Environment Results

Subject 1

The results for Subject 1 (Figure 1) indicate the occurrence of stereotypic behavior as being most consistent in their relationship across environments. The lowest percent occurrence of the behavior appeared in the pool (Table 4, p.88) followed by the gymnasium behavior (Table 3, p.87) and in the classroom (Table 2, p.86). The performance of stereotypic behavior of Subject 1 was consistent to the point that at no time did the behavior frequency intersect when two environments were presented during the same week.

The stereotypic behavior shown by Subject 1 in the classroom over the course of the study was varied. The behavior patterns indicated a sharp increase in behavior during Week One. However, a lower frequency
is being observed beginning the Third Week, and in fact, is a reduction of the behavior in the Third Week as compared to Week One. The classroom behavior was observed showing increases in both the Fifth and Seventh Week beyond the level shown in the Third Week. The inconsistency of behavior displayed in the classroom does not give rise to any one behavior pattern being established.

The stereotypic behavior results of Subject 1 in the gymnasium (Table 3) showed a similar pattern but different rate to the one displayed in the classroom. The rate of occurrence was lower in the gymnasium than the classroom and the subject appears to have had some reduction in stereotypic behavior, as evident by the closeness of the results on Days 17 through 19.

The results for Subject 1 indicate that initially there was a lower rate of stereotypic behavior in the aquatic environment (Table 4) and that the lower rate of behavior occurrence was maintained throughout the investigation. However, a change of teacher in the pool on Day 20 appeared to positively reduce the occurrence of stereotypic behavior somewhat below the levels that were observed in earlier weeks.

The subject's mean percentage score with respect to the occurrence of stereotypic behavior in each environment can be reviewed in Figure 2 (Table 5, p. 89). With respect to performance maintenance following a ten-day cessation of the three environmental exposures for Subject 1, results indicate the lowest rate occurring in the pool, followed by the gymnasium and classroom environments.
Figure 1: Graphic representation of environmental maintenance for subject 1.
Figure 2 - Graphic representation of mean percent occurrence of stereotypic behavior by environments for subject 1.
Subject 2

The results for Subject 2 (Figure 3) showed an inconsistent relationship of stereotypic behaviors throughout the investigation. Subject 2 displayed no pattern of consistent behavior except that of the aquatic environment (Table 4) was below that of the gymnasium environment (Table 3) at all times during the training sessions. The primary interaction occurred between the classroom (Table 2) and the aquatic environment. The results indicate that Subject 2 was most inconsistent in classroom behavior during the investigation. However, he maintained the same percent occurrence in the classroom on Day 20 and ten days later during performance maintenance.

The results for Subject 2 indicate an inconsistent pattern in the aquatic environment during Week Three. However, in Week Five there was a plateau, with a slight increase appearing on Day 20.

Subject 2 stereotypic behavior patterns during the performance maintenance period was slightly different as compared to Day 20, but the placement in mean occurrence for each environment maintained the same order Figure 4, (Table 5). The lowest occurrence was recorded in the classroom (Table 2), followed by the pool (Table 4), and gymnasium (Table 3).
CA = 25
Sex = male
Diagnosis = SMR

Figure 3 - Graphical representation of environmental maintenance for subject 2
Figure 1 - Graphic representation of mean percent occurrence of stereotypic behavior by environments for Subject 2.
Subject 3

The results for Subject 3 (Figure 5) indicate a mixed pattern of stereotypic behavior in all three environments. The behavior of Subject 3 in the classroom (Table 2) indicates that on Day One stereotypic behavior was occurring at its highest rate (58%) than any other time during the investigation. Subject 3's classroom behavior shows a decrease in occurrence between Week One and Three followed by a slight increase on Day Eight in the Third Week. This latter increase is not maintained, because a decrease appeared in Week Five, Days 13 and 14. The results indicate a plateau in classroom behavior during Weeks Five through Seven. With a slight increase between Days 19 and 20 in Week Seven.

The stereotypic behavior displayed in the gymnasium (Table 3) was very inconsistent. On Day One the behavior was at zero, but took a significant increase between Days One and Two. The inconsistencies in the gymnasium environment are apparent throughout the investigation.

The stereotypic behavior results of Subject 3 showed its most inconsistent pattern in the aquatic environment (Table 4). The behavior in the pool began with a very high occurrence, decreased sharply between Days Two and Three and was very high in Week Three, followed by a sharp decrease. The lower level shown on Day Eight was not maintained because it was followed by an increase on Day Nine. The behavior in the pool again started high on Day 13, as compared to Day 9 like Weeks One and Three, the occurrence was a gradual increase throughout the Fifth Week, with a slight decrease appearing on Day 20 of the Seventh Week. The results for Subject 3 indicates the most unstable and highest
occurrence (73%) of typic behavior took place in the aquatic environment.

The performance maintenance shows a change in position between the classroom and gymnasium environments when compared to Day 19. The performance maintenance results showed the lowest occurrence of behavior in the classroom, followed by the gymnasium, and pool. The mean percent occurrence can be reviewed in Figure 6 (Table 5).
CA = 23
Sex = Female
Diagnosis = SMR

Figure 5 - Graphic representation of environmental maintenance for Subject 3
Figure 6 - GRAPHIC REPRESENTATION OF MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS FOR SUBJECT 3
Subject 4

The results of stereotypic behavior occurrence displayed by Subject 4 (Table 2) show the classroom with the highest percent occurrence of behavior. The behavior proved to be consistent throughout the investigation even though this subject had been classified as having a high rate of stereotypic behavior.

The results of the classroom Figure 7 (Table 2) show a sharp increase in stereotypic behavior occurrences between Week One and Three. However, the increase is not maintained because a gradual decrease is shown between Days Seven and Eight. The behavior pattern of zero occurrence was then maintained for Weeks Four through Seven and into the performance maintenance period of the investigation for all three environments.

The results of behavior exhibited in the gymnasium Figure 7 (Table 3) and the aquatic environment Figure 7 (Table 4) both indicate that the occurrence of behavior during the observational intervals began at zero on Day One and was maintained at a level of zero throughout the investigation.

The results of the performance maintenance show total agreement with the behavior occurrence that was displayed by Subject 4 for all environments in Weeks Four through Seven. With respect to Subject 4's mean behavior occurrence, the results can be reviewed in Figure 8 (Table 5).

The effects of a teacher change for Subject 4 on Days 11, 14, and 18 did not change the frequency occurrence of her stereotypic behavior.
Figure 7 - Graphic representation of environmental maintenance for subject A.

Key:
- #: Teacher change in pool/gym
- #: Environment
- #: Performance maintenance after 10 days
MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS FOR SUBJECT <w '  BEHAVIOR.

FIGURE 4 - GRAPHIC REPRESENTATION OF MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS.

ENVIRONMENTS

POOL

GYMNASIUM

CLASSROOM

MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS.

SUBJECT

SUBJECT
Subject 5

The results for Subject 5 (Figure 9) shows a very inconsistent pattern of stereotypic behavior in all environmental settings throughout the investigation. The classroom results in Figure 9 (Table 2) show that the subject had a sharp decline of stereotypic behavior between Days One and Two. Followed by an increase beginning Week Three Day Seven. The behaviors exhibited during Week Five show the subject going from near maximum occurrence on Day 13 to zero level Day 14. The classroom results for Week Seven show a decline in behaviors with the highest occurrence at (8%) at the lowest at zero.

This same percent of occurrence was supported by the classroom score during the performance maintenance period.

The results of stereotypic behavior for Subject 5 in Figure 9 (Table 3) also indicate an inconsistent pattern. However, the inconsistencies in the gymnasium were not as varied as those displayed in the classroom. The occurrence of stereotypic behavior fluctuated in two of the Three Weeks with the largest increase (73%) in behavior occurring in Week Six.

The results of Subject 5 in the aquatic environment Figure 9 (Table 4) also varied throughout the investigation. The largest increase (82%) in stereotypic behavior occurred between the end of Week Three and beginning of Week Five, while the largest decrease (73%) occurred in Week Five, Days 13 through 15.

With respect to the performance maintenance, results indicate the lowest occurrence of stereotypic behavior taking place in the classroom followed by the pool and the gymnasium.
The mean percent occurrence of stereotypic behavior by environments in Figure 10 (Table 5) supports the results displayed during the performance maintenance with the lowest occurrence in the classroom and the highest occurrence taking place in the gymnasium environment.
Figure 9 - GRAPHIC REPRESENTATION OF ENVIRONMENTAL MAINTENANCE FOR SUBJECT 5
Figure 10 - GRAPHIC REPRESENTATION OF MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS FOR SUBJECT 5
The results for Subject 6 (Figure 11) show that the most inconsistent occurrence of stereotypic behavior took place in the classroom and gymnasium environment. The stereotypic behavior displayed in the classroom (Figure 11, Table 2) had a sharp decline from Day One to Day Two, and an increase between Day Two and Day Seven. The behavior occurrence in Weeks Five and Seven appeared to show a leveling out of the behavior, as no sharp changes occurred during those weeks.

The results for Subject 6 (Figure 11, Table 3) in the gymnasium show a more inconsistent pattern of stereotypic behavior than the occurrence displayed in the classroom. In the gymnasium, the behavior began moderately high (55%), took a slight decline from Day 4 to Day 5, increased again between Day 5 and 6, then took a sharp decline in his behavior pattern to began Week Four which was followed by a gradual increase between Days 10 through 12. However, the occurrence in Week Seven in the gymnasium and the performance maintenance were the only occasions in which there was consistency as both had the same percent occurrence.

The results for Subject 6 in the aquatic environment (Figure 11, Table 4) showed the lowest occurrence (0 - 9%) and most consistent pattern of behavior. The stereotypic behavior for Subject 6 in the pool was at its highest point (27%) during Day Two. However, a decline in behavior was shown from Day Two to Day Three. Thus, behavior in Weeks One, Three, Five, and Seven in the pool showed very little change in pattern. The results show the lowest occurrence of all the environments took place in the classroom and the aquatic environment.
The performance maintenance when compared to Week Seven shows the lowest occurrence (0%) took place in the aquatic and classroom environments. However, with respect to the mean percent occurrence of stereotypic behavior by environments for Subject 6, (Figure 12, Table 5) the positioning of environments clearly shows the lowest overall occurrence was the pool setting followed by the classroom and gymnasium environments.
CA = 24
Sex = Male
Diagnosis = PMR

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**WEEKS**

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**DAYS**

CLASSROOM = △---△
GYMNASIUM = ○---○
POOL (AQUATIC) = □---□

A = Environment
B = Performance Maintenance After 10 Days

Figure 11 - Graphic Representation of Environmental Maintenance for Subject 6
Figure 12 - GRAPHIC REPRESENTATION OF MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR BY ENVIRONMENTS FOR SUBJECT 6
Subject 7

The results for Subject 7 (Figure 13) show the most varied behavior pattern was in the classroom. The classroom behavior, (Figure 13, Table 2), indicates an inconsistent pattern during the first two days followed by a sharp increase during Week Three. However, a sudden decrease from maximum to minimum occurrence of zero is observed between Weeks Three and Five. The stereotypic behavior (Figure 13, Table 2), in Week Five and Seven were the lowest and most consistent for Subject 7 in the classroom.

The gymnasium behavior occurrence (Figure 13, Table 3) shows a variation in behavior occurrence, but not as varied as the pattern displayed in the classroom. The stereotypic behavior in the gymnasium increased and decreased approximately the same amount during the first three days. The results show a gradual decline between Days 10 through 12, while the sharpest increase occurred at Week Seven between Day 17 and 18. A sharp decrease (46%) was noted in the classroom between the score on Day 18 and the beginning of Week Seven, Day 19.

The results for Subject 7, Figure 13 showed its most consistent and lowest occurrence of stereotypic behavior in the aquatic environment (Figure 13, Table 4). The behavior pattern in the pool reached its highest occurrence (27%) on Days Two and Three. The stereotypic behavior declined from Day Two and was at a plateau during Weeks Three and Five and then declined again in Week Seven. The results indicate that the aquatic environment was the most effective of the three in reducing the stereotypic behavior for Subject 7.
The performance maintenance results (Figure 13) was completely the reverse for two environments, classroom and gymnasium, when compared to Week Seven. The percent occurrence during the performance maintenance period was at its lowest (9%) in the pool, followed by the gymnasium and classroom environments.

The mean percent occurrence of stereotypic behavior by environments (Figure 14, Table 5) and the performance maintenance results indicate the lowest occurrence took place in the pool, followed by the gymnasium then classroom environments.
Figure 11: Graphic representation of environmental maintenance for Subject 7
Figure 14 - Graphic representation of mean percent occurrence of stereotypic behavior by environments for Subject 7.
Group Results

The eight subjects were divided into two groups, the experience (subjects with prior exposure to the aquatic environment) and the non-experience (subjects with no prior exposure to the aquatic environment).

In any study that is comprised of more than one group, the order of presenting treatment conditions needs to be given consideration. In this investigation the presentation of environments took place three times per week, alternating environments weekly. The classroom environment was presented on Monday and Wednesday morning during Weeks One, Three, Five and Seven. The aquatic environment was presented during an afternoon hour three times per week on the same weeks as the classroom. The gymnasium environment was presented on Weeks Two, Four, Six, and Seven, and was the only environment presented during that week other than in Week Seven when all environments were presented.

The use of the multielement design allow variety in the presentation of environments. Thus, the subjects were involved no more than five sessions per week, but, may have had those sessions in different environments during different times of the day, but with no more than two sessions per day.

In an effort to aid the reader this section has been divided into three topics. The first topic to be discussed will involve environmental effects on the total group. The second compares the environmental effect of the experience and non-experience groups.
while the third topic reveals information pertaining to environmental effects by sex.

**Environmental Effect on Total Group** — The results of the environmental effects for the total group per week (Figure 15, Table 6) indicate that the total group scores appeared to be inconsistent throughout the study. However, the overall trend of stereotypic behavior tends to be in a declining pattern. The classroom pattern appears to be the most inconsistent of the three, showing considerable increases and decreases throughout the study, with the largest (29%) change occurring in Week Five.

The pattern of stereotypic behavior displayed in the gymnasium was also inconsistent. The behavior in the gymnasium rose gradually in Week Two to its peak level of 47%. However, the patterns in Week Four and Six are much more inconsistent, showing large increases and decreases during both weeks. Although inconsistent throughout the investigation, the behavior pattern displayed in the gymnasium appeared to have a downward trend.

The group's stereotypic behavior pattern in the aquatic environment reached its peak (47%) in the first three sessions after which a sharp decrease was noted in Week Three. The behavior patterns in the aquatic environment were the most consistent of the three environments under investigation.

The overall frequency occurrence of stereotypic behavior for the total group showed many inconsistencies. However, the trend of stereotypic behavior occurrence from Week One to Seven tends to be in a downward direction for all three environments.
PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR FOR THE GROUPS PER WEEK

WEEKS

Figure 15 - GRAPHIC REPRESENTATION OF ENVIRONMENTAL EFFECTS FOR THE TOTAL GROUP PER WEEK
Environmental Effect on Experience and Non-Experience Groups -

The results for the mean score occurrence of stereotypic behavior in each environment by groups (Figure 16, Table 7) indicate that the experience group displayed lower frequency occurrences of stereotypic behavior than the non-experience group in each environment.

The least difference in mean scores (1.17%) between groups was shown in the classroom results. The largest difference in mean scores (6.66%) occurred in the gymnasium environment, followed by the aquatic environment at 4.2%.

The results indicate that in all environments, the group with prior exposure to the aquatic experience, displayed lower rates in their occurrence of stereotypic behavior. The results for mean score occurrence and standard deviations of stereotypic behavior in each environment by groups can be reviewed in Table 7.

The analysis of variance (Table 8) conducted between the experience and non-experience groups indicated similar results as those graphically illustrated in Figure 16. The results of Table 8 show that a statistically significant difference does exist between the groups $F(1, 180) = 3.89$, $P > .05$ level. The effects of this difference was further shown to be significant at the .01 level of confidence as well.
Figure 16. - MEAN SCORE OCCURRENCE OF STEREOTYPIC BEHAVIOR IN EACH ENVIRONMENT BY GROUPS

Experience Group =

Non-Experience Group =

ENVIRONMENTS

CLASSROOM

EXAMINATION

POOL
Environmental Effects by Sex - The results for the mean score occurrence of stereotypic behavior in each environment by sex (Figure 17, Table 9) indicates that the occurrence varied. The variation reveals that the occurrence of stereotypic behavior was considerably higher for males in two of the environments under investigation.

The results for the classroom indicate that the mean score occurrence of stereotypic behavior in males was nearly twice that of females. A similar pattern of stereotypic behavior between males and females was also observed in the gymnasium.

The aquatic area was the only one of the three environments under investigation in which the mean score occurrence of stereotypic behavior was higher in females than for males. The overall results for males indicate the highest occurrences of stereotypic behavior took place in the classroom followed by the gymnasium and aquatic environments. However, the female results indicate the highest occurrence taking place in the classroom followed by the aquatic and gymnasium environments.

The sex of the subjects was not of primary concern in this investigation. However, in an effort to further analyze the data for statistical significance between sex, a comparison in the occurrence of stereotypic behavior by means of an analysis of variance was conducted (Table 10, p. 94).

The analysis revealed in the summary table shows that a significant difference does exist between the males and females. Further, the difference was shown to be significant, $F(1, 180) = 3.89$, $p > 0.05$ which permits one to conclude that the frequency of stereotypic behavior occurrence was significantly higher in males than females.
Figure 17. - Mean score occurrence of stereotypic behavior in each environment by sex.
Between Environments Results - In an effort to further analyze the data for statistical significance between environments, a comparison in the occurrence of stereotypic behavior by means of an analysis of variance was conducted (Table 11). Examination of the summary table reveals that a significant difference does exist between the classroom, gymnasium, and aquatic environments. Further, the difference was shown to be significant, $F(2, 20) = 3.49, P > .05$ which permits one to conclude that these data best described the behavior occurrence of all subjects in the environmental settings. In addition, there was a statistical difference between subjects, $F(6, 20) = 2.60, P > .05$.

Since the relationship between environments proved to be significant, $F(2, 20) = 3.49, P > .05$, post hoc multiple comparisons using the Dunn method were performed. Thus, pairwise mean differences that exceed 2.42 will be significant by this procedure. The results indicate that no significant differences appeared between the classroom and gymnasium. However, a statistically significant difference does appear between Classroom - Pool and between Gymnasium - Pool environments.

Therefore, the results of this analysis indicate a relationship between environments and subjects; however, the environmental efforts were significantly different enough to formulate their own behavior occurrences.
TABLE 1

SUBJECTS' AGE, SEX AND CLINICAL DIAGNOSIS

<table>
<thead>
<tr>
<th>Subject</th>
<th>CA</th>
<th>Sex</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
<td>Male</td>
<td>Profoundly Mentally Retarded</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>Male</td>
<td>Severely Mentally Retarded</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>Female</td>
<td>Severely Mentally Retarded</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
<td>Female</td>
<td>Severely Mentally Retarded</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>Male</td>
<td>Severely Mentally Retarded</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>Male</td>
<td>Profoundly Mentally Retarded</td>
</tr>
<tr>
<td>7</td>
<td>25</td>
<td>Male</td>
<td>Severely Mentally Retarded</td>
</tr>
<tr>
<td>8</td>
<td>22</td>
<td>Female</td>
<td>Profoundly Mentally Retarded</td>
</tr>
</tbody>
</table>

The information concerning each client's clinical diagnosis was made available through the Director of Education (previous evaluation results were not assessable).
### TABLE 2

**THE MEAN PERCENTAGE OF INDIVIDUAL SESSION OCCURRENCE OF STEREOTYPIC BEHAVIOR IN THE CLASSROOM**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean Percent Per Session/Day</th>
<th>Performance Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>83</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>67</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>58</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>42</td>
<td>50</td>
</tr>
</tbody>
</table>
### TABLE 3

THE MEAN PERCENTAGE OF INDIVIDUAL SESSION OCCURRENCE OF STEREOTYPIC BEHAVIOR IN THE GYMNASIUM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean Percent Per Session/Day</th>
<th>Performance Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>73 45 64 25 55 36 45 45 36</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>55 64 45 36 45 45 55 36 36</td>
<td>45</td>
</tr>
<tr>
<td>3</td>
<td>0 36 45 9 36 18 18 36 18</td>
<td>25</td>
</tr>
<tr>
<td>4</td>
<td>0 0 0 0 0 0 0 0 0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>45 55 45 55 64 45 73 73 55</td>
<td>82</td>
</tr>
<tr>
<td>6</td>
<td>55 45 64 25 55 64 18 25 45</td>
<td>45</td>
</tr>
<tr>
<td>7</td>
<td>36 55 36 36 36 25 36 64 18</td>
<td>55</td>
</tr>
</tbody>
</table>
TABLE 4

THE MEAN PERCENTAGE OF INDIVIDUAL SESSION OCCURRENCE OF STEREOTYPIC BEHAVIOR IN THE AQUATIC ENVIRONMENT (POOL)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Mean Percent</th>
<th>Per Session/Day</th>
<th>Performance Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18</td>
<td>9</td>
<td>27 10 18 36 36 36 0 9</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
<td>0</td>
<td>18 0 27 9 9 9 27 9</td>
</tr>
<tr>
<td>3</td>
<td>73</td>
<td>27</td>
<td>73 27 45 55 64 73 46</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0 0 0 0 0 0 0 0</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>36</td>
<td>55 45 18 82 55 9 55</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
<td>9</td>
<td>9 9 0 0 0 9 0 0</td>
</tr>
<tr>
<td>7</td>
<td>27</td>
<td>27</td>
<td>18 10 18 18 18 18 9 9</td>
</tr>
<tr>
<td>Subject</td>
<td>Classroom</td>
<td>Gymnasium</td>
<td>Pool</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
<td>-----------</td>
<td>------</td>
</tr>
<tr>
<td>1</td>
<td>83</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>45</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>25</td>
<td>27</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>42</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>6</td>
<td>33</td>
<td>45</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>42</td>
<td>36</td>
<td>18</td>
</tr>
</tbody>
</table>
TABLE 6

THE MEAN PERCENT OCCURRENCE OF STEREOTYPIC BEHAVIOR FOR THE GROUP PER WEEK

<table>
<thead>
<tr>
<th>Environments</th>
<th>Sessions</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td></td>
<td>57</td>
<td>37</td>
<td>64</td>
<td>66</td>
<td>5</td>
<td>34</td>
<td>24</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Gymnasium</td>
<td></td>
<td>47</td>
<td>44</td>
<td>47</td>
<td>3</td>
<td>46</td>
<td>33</td>
<td>36</td>
<td>4</td>
<td>47</td>
</tr>
<tr>
<td>Aquatic</td>
<td></td>
<td>47</td>
<td>47</td>
<td>47</td>
<td>2</td>
<td>2</td>
<td>33</td>
<td>33</td>
<td>29</td>
<td>21</td>
</tr>
</tbody>
</table>
### Table 7

**Mean Score Occurrence and Standard Deviations of Stereotypic Behavior in Each Environment by Groups**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Classroom</th>
<th>Gymnasium</th>
<th>Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experience</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>4.60</td>
<td>4.33</td>
<td>2.25</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>4.26</td>
<td>2.40</td>
<td>2.57</td>
</tr>
<tr>
<td><strong>Non-Experience</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Score</td>
<td>4.67</td>
<td>5.00</td>
<td>2.67</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.91</td>
<td>1.70</td>
<td>2.27</td>
</tr>
</tbody>
</table>
### TABLE 8

AN ANALYSIS OF VARIANCE BETWEEN THE EXPERIENCE GROUP
AND
THE NON-EXPERIENCE GROUP

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>134.88</td>
<td>1</td>
<td>134.88</td>
<td>14.97**</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1,622.61</td>
<td>180</td>
<td>9.01</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,757.49</td>
<td>181</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P > .05

** P > .01
TABLE 9

MEAN SCORE OCCURRENCE OF STEREOTYPIC BEHAVIOR IN EACH ENVIRONMENT BY SEX

<table>
<thead>
<tr>
<th>Sex</th>
<th>Classroom</th>
<th>Gymnasium</th>
<th>Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>5.75</td>
<td>5.25</td>
<td>2.25</td>
</tr>
<tr>
<td>Females</td>
<td>3.00</td>
<td>2.33</td>
<td>2.67</td>
</tr>
</tbody>
</table>
**TABLE 10**

**AN ANALYSIS OF VARIANCE OF STEREOTYPIC BEHAVIOR BY SEX**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>192.87</td>
<td>1</td>
<td>192.87</td>
<td>25.61**</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1355.18</td>
<td>180</td>
<td>7.53</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1548.65</td>
<td>181</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P .05

**P .01
### TABLE II

AN ANALYSIS OF VARIANCE BETWEEN THE CLASSROOM, GYMNASIUM
AND
AQUATIC ENVIRONMENTS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Environments</td>
<td>23.01</td>
<td>2</td>
<td>11.51</td>
<td>7.28*</td>
</tr>
<tr>
<td>Between Subjects</td>
<td>48.27</td>
<td>6</td>
<td>8.05</td>
<td>5.09*</td>
</tr>
<tr>
<td>Error</td>
<td>19.01</td>
<td>12</td>
<td>1.58</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90.29</strong></td>
<td><strong>20</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P > .05
Results from this investigation demonstrated that individuals who have been classified as severely and profoundly mentally retarded, and who engage in stereotypic and self-injurious behaviors, display these behaviors at a lower rate of occurrence in an aquatic setting as compared to the classroom and gymnasium environments.

The multielement design answered the questions brought forth in this study. The first question asked, "What effect does three different environments have on the frequency of stereotypic and self-injurious behavior of a group of severely and profoundly retarded individuals over a period of eight weeks?" The findings indicate differences between individual and group results within all three environments under study. In the classroom there were inconsistent patterns of performance. However, the results indicate that while there were inconsistencies, an overall reduction pattern occurred. This was evident by a score of 57% in Week One increasing to a peak of 66% in Week Three, then averaging out at approximately 30% during Week Eight.

In the gymnasium the group's pattern of behavior was varied. The results indicate a slight reduction in stereotypic behavior when the overall scores in Week Two are compared to the scores of Week Seven.

Effects by environments indicated the aquatic environment ranked highest in producing a lower percentage occurrence in stereotypic behavior displayed by subjects. The second highest ranking in reducing stereotypic behavior goes to the classroom, followed by the gymnasium,
which showed the overall highest occurrence of stereotypic behaviors of the three environments under investigation. It should be pointed out, however, that the actual amount of floor space and the closeness of working conditions in the gymnasium may have affected the final results.

The second question asked, "What effects does exposure to three environmental settings (classroom, gymnasium, pool) have upon individuals that display stereotypic and self-injurious behavior?" During the course of this investigation, the subjects displayed inconsistent patterns of stereotypic behavior. However, based on individual analysis, the results indicate a reduction in the occurrence of stereotypic behavior with the greatest reductions appearing in the aquatic environment for six of the seven subjects.

The final question asked, "What effects does exposure to three environmental settings (classroom, gymnasium, pool) have upon groups of experience subjects (individuals with prior water experience) as compared to non-experience subjects (individuals with no prior water experience)?" It was statistically determined that in all environments, the group that had prior exposure to an aquatic experience, displayed lower rates in their occurrences of stereotypic behavior.

Discussion

The major purpose of this study was to investigate the differences in the occurrence of stereotypic and self-injurious behavior exhibited among institutionalized severely and profoundly mentally retarded
individuals in three environmental settings (Classroom, Gymnasium, Pool). It further sought to identify differences in performance occurrence of stereotypic behavior according to aquatic experiential background and sex of the subjects. 

The analysis of data using the multielement design revealed that most subjects had a reduced rate of stereotypic behavior when placed in the aquatic environment. However, the reductions observed in most subjects were not shown by Subject 3 of the experience group. Subject 3's behavior in the aquatic environment increased primarily because the movements of the water seem to stimulate her stereotypic actions. Therefore, it can be concluded that her higher rate in the aquatic area was environmentally induced.

With respect to general results, it can be concluded that the aquatic environment acted as a positive agent in the reduction of stereotypic behavior for the majority of subjects. This conclusion is further substantiated when we consider the possible therapeutic effects of the water on the body. The aquatic environment offered a comfortable environment temperature, a sensory stimulation by virtue of the texture and movement of water against the subjects' bodies and the feeling of security offered by being totally or partially submerged and surrounded by stimulus they could manipulate.

Numerous investigations in the past have shown ways of reducing stereotypic behavior through the use of behavior management techniques and/or aversive treatment. The information contained in the literature review chapter sought to examine the work that has been done in the behavioral area. While the traditional behavioral techniques have
shown much success, these approaches have not been proven to work with any consistency. Thus, the essence of this investigation was concerned more specifically with the occurrences of stereotypic behaviors after subjects were placed in specific environmental settings rather than the changing of their behaviors through the use of behavior management techniques.

The inconsistencies in research results have caused many researchers to try combinations of approaches, and attempt through experimentation to determine the most effective methods. Thus, experimentation has indicated that some behavioral techniques are more effective than others. However, many of those results have been proven to be situation specific with short-lived periods of effectiveness.

The use of aversive treatment (shock) as a means of reducing stereotypic behavior has shown great success when used appropriately. However, this type treatment (aversive) always leads to ethical concerns of why many researchers resort to such aversive measure to treat inappropriate behavior. The results of aversive treatment appears to offer an alternative but at no point with this approach can it be justifiably said the person has learned the appropriate behavior or that the behavior was changed due to the fear of physical pain.

The intent of this investigation was to study the stereotypic and self-injurious behavior of individuals in three environmental settings. The order of environmental presentation was pre-planned using an alternating weekly schedule. The classroom environment was presented on Monday and Wednesday morning during Weeks One, Three, Five and Seven for a total of eight sessions. While the gymnasium and aquatic
environments were presented on Monday, Wednesday, and Friday afternoons on alternate weeks.

The subjects were exposed to the classroom environment on a daily basis. However, the aquatic and gymnasium environments were not a part of the subjects' daily activity program. While in the aquatic, classroom and gymnasium environments, no behavioral management techniques were applied. This same condition was true for the classroom environment only during the observational period required for the recording of behavior during the investigation.

The novelty of being placed in a different or new environment may have had its effect in the first few sessions. However, the data seems to indicate a gradual reduction in behavior, a reduction that was most consistent in the aquatic environment. Thus, the results of this study may have important implications when developing educational programs for severely and profoundly mentally retarded individuals.

Individual Data

The overall results on an individual basis revealed marked patterns of inconsistencies among subjects. These results of inconsistent performances were further proven through the use of an Analysis of Variance (Table 7, Figure 16).

While total results show a reduction trend, there are numerous factors that may have impacted upon each individual at various periods during the investigation. Although many of the factors to be discussed are assumptions, these effects may have had a meaningful impact upon the occurrence of stereotypic behavior displayed by each subject.
The use of an individual instructional plan was implemented to aid in providing consistency in the activities being taught in each environment. The alertness of teachers to maintaining the instructional plan may have altered results, however. If activities were done according to the plan, there was very little time for the subjects to have engaged in additional amounts of stereotypic behavior above their normal occurrences.

A second factor that worked simultaneously with the lesson plan was the teacher's instructional approach. The literature is filled with studies supporting the fact that teacher reactions make differences in any learning environment. The teachers involved were the regular classroom teachers, and aids that worked regularly with the subjects, or had worked with the subjects in the past. The availability of such personnel made for less novelty when the subjects were placed in the new environments.

In an effort to control for teacher approach inconsistency, the same subject-teacher pairing was used each time except when a teacher was away due to various reasons. This occurred two times during the investigation. The arrangement used when a teacher was absent was to pair the subject with someone else that was familiar with their behavior and thus worked using a 1:2 teaching ratio. The extent to which this affected the results are unknown. However, the occurrence of stereotypic behavior did not seem to change in pattern when teacher changes and exchanges were necessary.

In any behavioral study, the question of behavior change due to medication must be considered. In this investigation a form
(see Appendix E) was used to record medications and any changes in medication that may have occurred during the study. During the study a change in medication was reported for only one individual, Subject 2. The change in medication was reported to be a trial change and was to take place between the third and seventh week of the study. The effects of the medication change for Subject 2 appears to have been negative, because an increase in the amount of stereotypic behavior was also noted during the trial medication period. In Subject 2, the change was negative, however, any changes in medications during a behavioral study are worthy of note, because of the effects that may be revealed in behavior results.

The introduction of any new or different environment will always have a novel effect upon the behavior occurrence of the individual being placed in those surroundings. The assumption in this investigation was that the novelty of the new environments would be removed by the second session in that environment. Thus, the results appear to support this assumption for the gymnasium and aquatic environments.

The findings of this investigation support the results of a reduction trend, and further indicate that the experience group maintained a lower rate of stereotypic behavior occurrence than the non-experience group. The fact that a reduction trend was indicated gives rise to the underlying factor that along with the novelty of the new environment being removed, subjects may have also become acclimatized to the gymnasium and aquatic environments over the period of the investigation. Thus, in Week Seven when all the environments were presented, there
appears to be a closer range of scores than those displayed during the first two weeks of the study.

The results by sex indicate a higher occurrence being displayed by males in the Classroom and Gymnasium environments. However, the females showed the higher rate of stereotypic behavior in the Aquatic environments. Further study of the data revealed statistically significant difference by sex in two environments.

Discussion of Classroom Data

The evidence would seem to suggest that in the classroom the trend in stereotypic behavior occurrence declined gradually throughout the investigation. With respect to individual performances, Subject 2 and Subject 7 showed their most inconsistent patterns in the classroom. In terms of group performances, all subjects in the experience group showed a decline in stereotypic behavior. However, a consistent decline was observed with only two of the three subjects in the non-experience group.

Although all subjects were observed in their individual classrooms, some variation in stereotypic behavior frequency may have occurred due to the fact that Subjects 1 and 4, had student-teacher ratios of 1:3 in the classroom as compared to a 1:1 ratio for all other subjects.

Discussion of Gymnasium Data

The results for the gymnasium environment showed the highest occurrence of stereotypic behavior. The behaviors of all but one, Subject 4, showed inconsistent patterns in this environment.
The limitation of having fourteen-to-sixteen persons in such a small area (33' X 35') may have affected the results. It has been noted that when the amount of social interaction increased between subject and teacher (the closeness of the area promoted increase interaction) there was more interference with subject interest in and attention to the learning task. However, one should recognize that in normal conditions when individuals are participating in a motor activity there is, or should be, a teacher or supervisor in close proximity to the task or skill being performed. In this study, the investigator (teacher) was very much a part of the learning environment.

The Gymnasium environment was presented on Weeks Two, Four, and Six alone, which was unlike Weeks One, Three and Five when two environments were presented during the week. Based on the scores in Week Seven, the results would appear to indicate that an environment being presented alone had no effect on the occurrence of stereotypic behavior in the gymnasium. However, of more importance was the space limitations under which the group participated.

The teacher-subject ratio of 1:1 in the gymnasium was most effective for subject involvement. While the teacher-subject ratio was most beneficial, the condition of space restraints in the gymnasium may have affected freedom of movement.

The results of the performance of the experience and non-experience groups in the gymnasium revealed an inconsistent pattern throughout the study. Thus, fluctuating patterns were evident for all subjects except Subject 4.
Subject 4 also was one of three that maintained a low rate of occurrence.

Discussion of Aquatic Data

The pool was the environment of primary concern in this investigation. It is interesting to note that the rate of stereotypic behavior for all but one, Subject 5, decreased and maintained itself at a lower rate in the pool environment than in the other two environments throughout the investigation.

The data indicated that the experience and non-experience groups both benefited from exposure to this environment. The aquatic environment appeared to offer some relaxing and comforting effect which in turn reduced the occurrence of stereotypic behavior. However, in the case of Subject 5, her increase may partly be explained by the fact that movement action such as those made by water served to increase the occurrence of her stereotypic behavior.

In conclusion, several statements can be made summarizing the discussion of this study. First, the stereotypic behaviors exhibited in the classroom environment were inconsistent but showed a gradual decline in occurrence. Second, the results for the gymnasium environment indicated that this environment produced the highest occurrence of stereotypic behavior. And third, with respect to all but one subject, being placed in the aquatic environment proved to be a viable means of reducing stereotypic behavior without the use of direct behavior management techniques or aversive treatment.
Thus, the findings by Horner (1980) and other researchers investigating environmental influences are further substantiated by this study. Therefore, these results lend additional support to environmental change approaches and enrichment techniques as possible viable alternatives to the present management techniques now being used by personnel serving the severely and profoundly retarded population.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Whether or not an individual's stereotypic behavior increases or decreases in some particular respect depends on his past experiences that have modified his behavior. Some researchers would advocate the use of aversive treatment to reduce stereotypic behavior (head-banging, self-biting, excessive body rocking, etc.). However, this investigation has shown that reduction can be achieved without the use of aversive treatment.

Restatement of the Problem

The purpose of this investigation was to compare the differences in the occurrence of stereotypic and self-injurious behavior exhibited among institutionalized severely and profoundly mentally retarded individuals in three environmental settings (classroom, gymnasium, pool). More specifically, the investigation attempted to distinguish the quantitative differences in performance occurrence of stereotypic behavior between two groups in three environmental settings. The results of this study have practical implications for program administrators of institutions.
The literature is replete with studies examining stereotypic and/or self-injurious behavior through the use of behavioral management approaches and aversive treatment techniques. However, there are fewer studies that have dealt with the use of environmental conditions to reduce stereotypic behavior. Similarly, studies pertaining to the use of an aquatic environment as a viable alternative to some of the more traditional methods used to reduce stereotypic behavior occurrence are extremely sparse.

Horner (1980) studied the effects of procedures designed to enrich the physical and social environment of an institutional ward on the adaptive and maladaptive child, adult, self and object-directed behaviors of five profoundly retarded females. The results from Horner (1980) support the fact that environmental enrichment programs can affect the behaviors of retarded individuals. This type study support the results revealed in this investigation.

**Procedures**

The subjects, eight severely and profoundly mentally retarded adults, was located at the Orient Developmental Center, Orient, Ohio. The subjects were randomly selected and assigned to one of two groups, experience subjects (individuals with prior exposure to the aquatic environment) and non-experience (individuals with no prior exposure to the aquatic environment). The subjects worked as one class (all
eight subjects) in the gymnasium and aquatic environment. However, because subjects were from different educational programs, they were taped individually in their regular classroom environment.

The subjects were observed in their classrooms between the hours of 8:15 - 11:30 a.m. two times per week. Within the morning timeframe each subject had a scheduled three minute and 45 second for individual video taping.

The subjects were brought to the gymnasium and aquatic environments from 1:00 - 2:00 p.m. three times per week. The order of environmental exposure was changed such that every condition both preceded and followed every other condition at least once per week through the course of the study.

The data was collected by transcribing video tapes accompanied by a cassette tape of the sessions through an interval recording system and a multiple behavior code. The length of the interval was ten seconds. Reliability of the tape and the percent of agreement was satisfactory.

Inter-observer reliability checks were made during all environments under study to insure reported behavior changes were due to changes in observer perceptions. Inter-observer reliability checks were calculated every third session throughout the study. Reliability levels of 95% were established for all observer activity.

Results

The data was analyzed by graphical interpretation, a multielement design and an analysis of variance. These findings emerged:
1. The percentage occurrence of stereotypic behavior was lower for the experience group in all environments when compared to the non-experience group.

2. There was a significant difference at the .05 level of confidence in the occurrence of stereotypic behavior between environments.

3. There was a significant difference at the .05 level of confidence in the occurrence of stereotypic behavior between subjects.

4. There was a significant difference at the .05 level of confidence in the occurrence of stereotypic behavior between groups.

5. The occurrence of stereotypic behavior for the eight subjects involved was reduced and maintained during performance maintenance without the use of aversive treatment.

6. The environment showing the highest occurrence of stereotypic behavior was the gymnasium.

7. The behavior patterns displayed in the gymnasium were the most inconsistent of the three environments under investigation.

8. For all but one subject, the occurrence of stereotypic behavior was reduced in the aquatic environment.

9. There was a significant difference at the .05 level of confidence in the occurrence of stereotypic behavior between males and females.

Conclusions

Within the limitations of this investigation, the following conclusions seem justified:
1. The use of a multielement baseline design was appropriate for this investigation, for it allowed the varying of three environments at the same time.

2. The aquatic environment should be given a high priority when institution administrators are developing programs for individuals that display stereotypic and self-injurious behavior.

3. The overall trend in the occurrence of stereotypic behavior was downward for all subjects.

4. The non-experience group was unable to display a lower occurrence of stereotypic behavior than the experience group in any environment.

5. The lesson plan outline used to structure environmental activities, may have altered the occurrence (in a reductive manner) of stereotypic behavior, due to continuous involvement.

6. The placement of Subject 3 in the aquatic environment served to reinforce her stereotypic behavior. Therefore, the pattern displayed was environmentally induced.

7. No evidence was examined to determine if length of time in the institution had any effects on the occurrence of stereotypic behavior.

8. The greatest difference in performance occurrence was between the aquatic and gymnasium environments.
The following recommendations may be of assistance, in pursuing additional research:

1. Consider investigating younger and older severely and profoundly mentally retarded individuals so that an age span profile can be developed.

2. A study investigating the occurrence of stereotypic behavior with moderately mentally retarded individuals should be conducted.

3. In order to better understand the total environmental effects, the stereotypic behavior performances of institutionalized versus non-institutionalized retardates should be examined.

4. Various environmental sizes should be evaluated to determine the effects of space relationships on the occurrence of stereotypic behaviors.

5. A study should be conducted which places individuals in the environments for the investigation period, then a follow-up implemented at six and nine months to examine the effects of any behavior change.

6. A replication of this investigation should be conducted but expanded over a longer period of time.

7. Research should be carried out analyzing the effects of the environment, and teacher related actions upon the stereotypic behaviors of retarded individuals.
8. Research should be conducted to investigate the effects of two environments as compared to three environments and their effects on stereotypic and self-injurious behavior.
BIBLIOGRAPHY

Books


Periodicals


BIBLIOGRAPHY

Books


Denny, Michael "Reducing self-stimulatory behavior of mentally retarded persons by alternative positive practice." American Journal of Mental Deficiency, 1980, 84, 6, 610-615.


APPENDIX A

CORRESPONDENCE WITH THE EDUCATIONAL DIRECTOR
March 27, 1981

Andrew H. Lewis
1242 Neil Ave.
Apt. M
Columbus, Ohio 43201

Dear Ann:

The purpose of this letter is to formally request the services of Orient residents to participate in a research study. The project is designed to study characteristics of individuals that exhibit stereotypic and/or self-injurious behaviors within three environmental settings.

The proposal calls for transportation of clients to and from the activities be arranged by Orient’s Aquatic director, Judy Hug (this has not been confirmed at this point). If the educational department can offer assistance in this area it would be greatly appreciated. The permission form discussed in our meeting of March 25, 1982 is adequate and can be used to gain parent/guardian consent for participation in the project.

This study will require the use of videotaping to be observed later by trained individuals who will record the frequency of stereotypic and/or self-injurious behaviors displayed in each environment. The taping process will involve:

Classroom: Due to the fact that clients selected into the study will come from different classrooms and can not be combined to form one group, each student will be video taped for approximately four to five minutes in the educational classroom, three (3) times per week April 20 through June 5, 1981.

Pool & Gym: The clients selected will be combined to form one group in both the pool and gym environments. The video taping within these environments would involve recording a client’s behavior for approximately 20 seconds every four to five minutes. The total time observed while in the environments would be approximately 4 to 5 minutes per session. The total number of sessions would be nine (9) in the pool and nine (9) in the gym which will be divided into three sessions per week beginning April 20 continuing through June 5, 1981. The scheduled times of when the clients will be in which environment will alternate weekly, three sessions in the pool, three sessions in the gym.

All activities involving this project are schedule to take place on the grounds of Orient Development Center and would not pose any psychological, social or physical risk to the clients involved. Thus, the material collected on tape will be upheld with the strictest of confidentiality and all information contain on the video tapes will be erased upon completion of the study.

If additional information is needed concerning this project, please feel free to contact me at 422-6226.

Thank You,

Andrew H. Lewis, M.S.
Graduate Teaching Associate
The Ohio State University
MEMO:

TO: Andrew Lewis

FROM: Ann B. Fowble, Ph.D., Director, Education & Training

SUBJECT: Research Study

You have asked permission to conduct a research study involving eight (8) Orient students. Each student will be involved in an afternoon session from 1:00 - 2:00 P.M. on Monday, Wednesday and Friday at the Activity Therapy Building (alternating swimming and gym sessions) using activity therapy staff, yourself and other students and education staff. Each client will be videotaped in classroom, gym, and swimming pool for a total of 15 minutes per week. Sessions will be conducted over the six (6) week period April 20th through May 29th.

I have read your letter dated March 27th, and feel that we can cooperate with you in this study. As we discussed, I will contact Social Service to obtain permissions for the eight (8) clients selected for participation in the study, videotape and swimming permission (if needed). This will be completed prior to initiation of the study.

It is my understanding also, that Dr. Soforenko’s approval will be obtained by you, prior to initiating the study.

ABF:isy
APPENDIX B

CORRESPONDENCE WITH THE AQUATICS DIRECTOR
TO: Andrew H. Lewis
FROM: Judith L. Hug
SUBJECT: Research Study

This is to inform you that permission is being granted to conduct research on "The Effects of an Aquatic Environment upon Stereotypic and Self-Injurious Behaviors of Handicapped Individuals" at the Orient Developmental Center swimming pool.

The Aquatic staff has been consulted and have agreed to assist as needed.

Pool time has been scheduled from 1:00-2:00 p.m., Monday, Wednesday and Friday, exclusively for use in research on the previously named topic. This schedule is to be effective April 20, 1981 through May 29, 1981, on alternate weeks.

It is understood that eight O.D.C. clients with picture permission, and fitting the criterion for the study, will be involved in the research and, as such, will be videotaped fifteen minutes per week.

The Aquatic staff of O.D.C. are looking forward to assisting with your study.

Sincerely,

Judith L. Hug, RTRP
Aquatics Director
APPENDIX C

CORRESPONDENCE WITH ORIENT DEVELOPMENT CENTER'S SUPERINTENDENT
March 30, 1981

Dr. A.Z. Soforenko
Superintendent
Orient Developmental Center
Orient, Ohio 43146

Dear Dr. Soforenko:

I am a graduate student and degree candidate in Adapted Physical Education at The Ohio State University. The purpose of this letter is to explore the possibility of using resident clients at the Orient Development Center as subjects in a proposed research project. The study would involve work done in partial fulfillment of the requirements for the Doctor of Philosophy degree. This study entitled The Effects of an Aquatic Environment Upon Stereotypic and Self-Injurious Behaviors of Handicapped Individuals, as proposed would involve the use of eight (8) severely and profoundly stereotypic and/or self-injurious clients.

The research project is designed to study client reactions through the use of video taping within three environmental settings, these video tapes would be reviewed by trained observers to count the frequencies of stereotypic and/or self-injurious behaviors emitted in each environment. The environments of concern in this investigation are: a) the educational classroom, b) the gymnasium, and c) the aquatic setting (pool). From an educational and therapeutic standpoint, this proposal and its findings can be of particular benefit to the use of additional environments in programming for severely and profoundly retarded clients.

The scheduling of necessary facilities has been discussed with the director of Recreational Therapy, Sue Combs, educational director Ann Fowels, and your director of Aquatics, Judy Hug, and all have indicated a willingness to aid and states that scheduling and use of facilities posed no problem (see attached letters).

I am very enthusiastic and look forward to doing this research, and sincerely hope that Orient can assist me in the completion of this very important study. My advisors and I extend a courteous thanks in advance for your time and consideration in this matter.

If additional information is needed concerning the proposed study please see attached proposal.

Sincerely,

Andrew H. Lewis
Graduate Teaching Associate
Dear Mr. Lewis,

We have reviewed, with great interest, your study proposal, "The Effects of an Aquatic Environment Upon Stereotypic and Self-Injurious Behaviors of Handicapped Individuals," and find it quite satisfactory to be utilized with our population.

If we can be of assistance to you, please advise.

Sincerely,

A. Z. Soforenko, Ph.D.
Superintendent

A. Z. Soforenko

cc: Dr. Ralph Becker
APPENDIX D

RESEARCH CONSENT AND VIDEO TAPE AUTHORIZATION FORM
April 3, 1961

Ms.
95 Beam Road
Columbus, Ohio 43205

RE:

Dear Ms.:

We have received a request that participate in a research study. The purpose of this study, is, to see if stereotypic and/or self injurious behaviors decrease while an individual is in the swimming pool. All the activities will take place on grounds at Orient Development Center. We feel participation in these activities will be beneficial to the clients.

The activities are:

1. One hour three(3) times a week in the swimming pool at Orient Development Center. Supervision will be on 1:2 or 1:3 basis.

2. Videotapes to be made of the clients in three(3) settings: classroom, pool and gym for the purpose of taking data.

We would like your approval for to participate in this study.

Please contact me if you have any questions

Please return the attached form by April 13th, 1961.

Sincerely,

(Mrs.) Karen Moore
Social Worker
Social Services Department

Albert Z. Soforenko, Ph.D.
Superintendent

cc: Education & Training Department
I do not approve participation of _____ in a study to see whether stereotypic and/or self injurious behaviors decrease while an individual is in the swimming pool. I understand that this study involves videotaping of clients to take data on his/her behavior.

The information obtained from the video tapes will remain confidential and anonymous without identifying the individuals by name. The videotapes will be taken three (3) times per week between April 13th and May 29th, 1981, and all information contained on the tapes will be erased after they are viewed by the researchers and the data is recorded from them, no later than June 5th, 1981.

I acknowledge that I read and understand this consent form. I have signed it freely and voluntarily and understand a copy is available upon request.

Date __________________________ Signature __________________________

(Investigator)
Andrew H. Lewis

Indicate whether guardian, Parent, or other relative
April 13, 1981

TO: Cottage Coordinator,

FROM: Judith L. Hug, R.T.R.S.
Aquatics Director

RE: Research Study

The client(s) named below have been selected for involvement in a study being conducted by Andrew H. Lewis, a doctorate candidate from The Ohio State University. The research study, entitled "The Effects of an Aquatic Environment Upon Stereotypic and Self-Injurious Behaviors of Handicapped Individuals", will incorporate data collection in three settings: 1) the educational classroom, 2) the swimming pool, and 3) the gymnasium.

In order to preserve the health and fitness of the client(s) involved, I require additional information prior to the beginning of the data collection. Please have a medical person from your cottage (nurse, nursing associate, or physician) complete this form, and return it to me as soon as possible. If there are any questions, please feel free to call me.

Thank you for your cooperation and assistance.

Judith L. Hug, R.T.R.S.
Aquatics Director
Ext. 455, 456

JLH:ac
Physician Approval Form
Research Study - Andrew A. Lewis

Client Name_________________________  Cottage____________________

Physician______________________________

1) Describe briefly any behavioral problems this client demonstrates: i.e., abusive or stimulatory behaviors.

________________________________________________________________________

2) Does this client have seizures, or receive medication for controlling seizures?

Yes____ No____

Type of Seizure________________________

Frequency____________________________

3) Does this client have any additional chronic health problems? Ex: heart condition, skin disease, asthma, etc.

Yes____ No____

Explain________________________________________________________________________

4) Is this client currently being treated by a physician for any temporary medical condition? Ex: ear or throat infection, respiratory condition, anemia or other form of dysentery, scabies / ringworm or other skin diseases, etc.

Yes____ No____

Explain________________________________________________________________________

5) List the current medications (including doses and intervals) of this client.

________________________________________________________________________

________________________________________________________________________
6) Do you give permission for this client to participate in gymnasium and swimming pool activities during the period of April 70 - June 5, 1981?

Yes______  No______

Explain__________________________________________

______________________________________________

(*Be advised that adequate and trained supervision will be provided at all times during the activity periods.)

___________________________________________

Signature

___________________________________________

Title

___________________________________________

Date
APPENDIX F

SUBJECT SPECIFIC BEHAVIOR HANDOUT SHEET
This information sheet contains a listing of behaviors that are client specific. The client may exhibit one, two, or any combination of the behaviors outlined, also keep in mind that this list may not be 100% inclusive of all the clients inappropriate Stereotypic and/or Self-Injurious behaviors. Thus, this listing should serve as a guide and observers are to please be aware that other stereotypic and/or self-injurious behaviors may occur.

**Subject 1**
- a. Body rocking, most times forward and backward motions.
- c. Crying sounds (recorded classroom only).
- d. Holds both hands and arms up in air in "V" position.
- e. Interlocks fingers, sometimes.
- f. May strike out at others or objects.

**Subject 2**
- a. Rubbing of upper lip, teeth or movement to both areas.
- b. Stroking the hair, shoulder, etc. Finger to face.
- c. Rapid hand movements in front of face and placing fingers to shoulders.
- d. Hand flipping and/or hand watching.
- e. *Under water hand flipping when face down position.*
- f. Will fixate on lights some times.
- g. Continuous jumping up-down and arm slapping.

**Subject 3**
- a. Body rocking and/or head rocking, most times side-to-side motion.
- b. Holds hands together in front of chest.
- c. Self-injurious, many different ways.

**Subject 4**
- a. Rapid hand and/or finger movements.
- b. Watches hands and put them to face.
- c. Body rocking, may or may not lift feet off floor.

**Subject 5**
- a. Self-injurious, beats and/or taps head with hand or finger.
- b. Some body rocking - finger to lips.
- c. Beats water in the pool will upset, redirected self-injurious behavior.
- d. Scratches self and may bang body against objects.
Subject 6
a. Self-injurious, beats self in face with back of hand but may differ.
b. Watches backward and forward hand movements of other.
c. Pushing of fingers into mouth and/or face.
d. Places both hands over ears, may only be one hand sometimes.
e. Will fixate on sunlight when in classroom.
f. Will fixate on her hands at times, also has had flipping action.
g. Tough thrusting.
i. Rocking in set.

Subject 7
a. Self-injurious, beats his head and/or face with hand.
b. Hand and/or finger flipping motion (watch closely in pool).
c. Will beat body parts against objects.
d. Will fixate on objects for more than 2 seconds.
e. Body rocking.
f. Turns in small circles when left alone at times.
g. May strike out at others.
h. Settled position with excessive forward lean.

Subject 3
a. Chin taps, one or both hands.
b. Hand gazes.
c. Hand flapping.
d. Picks at cuticles (hands usually together).
e. Hands to mouth.
APPENDIX G

GENERAL INSTRUCTIONS

AND

AQUATIC ENVIRONMENT LESSON PLANS
**General Instructions**

1. All attempts of independent performances should be given social/and/or physical reinforcement. Be quick to give praise with appropriate responses/behaviors.

2. Use a calm, well-controlled voice, rather than an excitable one when speaking to the clients.

3. Use both, verbal explanations and demonstrations.

4. Give a chance to experience some success every class period.

5. When teachability falls off; change to another activity in the same area.

6. All activities to be covered and the time schedule is outlined below, please try to adhere to this schedule.

7. In the instructional plans the clients with swimming experience will be referred to as the control group and the non-experienced as the experimental group.

---

**Aquatic Environmental Lesson Plan**

*April 20, 22, & 24*

<table>
<thead>
<tr>
<th>Time</th>
<th>Area of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00-1:10</td>
<td>Clients Dressing</td>
</tr>
<tr>
<td>1:10-1:20</td>
<td><strong>Physical Adjustment</strong>: Instruct and assist the clients to:</td>
</tr>
<tr>
<td></td>
<td>1. Put water over arms, shoulders and head; self-washing.</td>
</tr>
<tr>
<td></td>
<td>2. Practice sitting on pool bottom at different levels.</td>
</tr>
<tr>
<td></td>
<td>3. Facial Orientation - dip chin then chin-mouth, then face washing activities, with assistance.</td>
</tr>
<tr>
<td>1:20-1:35</td>
<td><strong>Lead-Up Swimming Skills</strong>: Experimental Group:</td>
</tr>
<tr>
<td></td>
<td>1. Begin developing independence by having clients stand alone, with teacher 3-4 feet away for 5, 10, &amp; 15 sec. 2 times.</td>
</tr>
<tr>
<td></td>
<td>2. Have clients walk across pool holding teacher's hand, progress from waist to chest high water.</td>
</tr>
</tbody>
</table>
3. Clients walk across pushing kickboard with assistance.

Control Group:
1. Facial orientation - dips chin then chin-mouth then washes face, w/without assistance.
2. Blow bubbles in hand and in the water, 2-3 seconds, 4 times.
3. Touch bottom or toes with hand causing face to go under, 1/5 times.
4. Put face under with verbal instruction, 1/5 times.

1:35-1:40 Client Exploration: Avoid physical contact during this time unless absolutely necessary. This is an unstructured free movement period. The teacher should stay about arms length away at all times and keep clients in the pool.

1:40-1:50 Recreational Games: The games for this lesson are: activities, running skills, and follow the leader games.

1:50-2:00 Clients Redressing

Aquatic Environment
May 4, 5, 6, 7

<table>
<thead>
<tr>
<th>Time</th>
<th>Areas of Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:00-1:10</td>
<td>Clients Dressing</td>
</tr>
<tr>
<td>1:10-1:20</td>
<td>Physical Adjustment: Same as outlined in week one:</td>
</tr>
<tr>
<td></td>
<td>1. Self washing</td>
</tr>
<tr>
<td></td>
<td>2. Sitting on pool bottom at different levels.</td>
</tr>
<tr>
<td></td>
<td>3. Facial orientation</td>
</tr>
<tr>
<td>1:20-1:35</td>
<td>Lead Up Swimming Skills: Experimental Group:</td>
</tr>
<tr>
<td></td>
<td>1. Face washing activities, with verbal instruction and/or demo.</td>
</tr>
<tr>
<td></td>
<td>2. Blow bubbles in hand and water 3-5 sec., 8-10 times.</td>
</tr>
<tr>
<td></td>
<td>3. Walk and run across pool holding teacher's hand, waist to chest high water four(4) times.</td>
</tr>
<tr>
<td></td>
<td>4. Walk and run pushing kickboard across pool, 2 times.</td>
</tr>
<tr>
<td></td>
<td>5. Creep through water - using animal walks, seal, etc.</td>
</tr>
</tbody>
</table>
Control Group:
1. Put face in water for 2-3 sec., 1/5 times.
2. Work on retrieving objects from pool bottom.
3. Floats: towing with assistance in horizontal (back) position.

1:35-1:40 Client Exploration: Same as outlined in week one.

1:40-1:50 Recreational Games:
1. Moving inside and outside hoops.
2. Two persons pushing hoop and/or tubes across pool.
3. Relay races across pool with sponges or toys.

1:50 Recreation Games:
1. Moving inside and outside hoops.
2. Two persons pushing hoop and/or tubes across pool.
3. Relay races across pool with sponges or toys.

1:50-2:00 Client Redressing

Aquatic Environment
May 13, 20, 22, & June 1

Time

Areas of Instruction

1:00-1:10 Client Dressing

1:10-1:20 Physical Adjustment: Promote independent performance of the following using verbal cues and demo.
1. Self washing
2. Sitting on pool bottom at different levels.
3. Facial orientation.

1:20-1:35 Lead Up Swimming Skills: Experimental Group:
1. Blow bubbles two (2) times for 5-8 sec., 1/5 times.
2. Towing activities in prone and supine positions.
3. Creep through water - using animal walks.
4. Assume horizontal (prone & supine) positions with assistance and use some type kicking motion.

Control Group:
1. Independently put face under with verbal instruction 2/3 times.
2. Put face under and blow bubbles 1/3 times, 6-10 seconds.
3. Assumes horizontal (back) float position for 2-3 seconds independently.
4. Assumes horizontal (back and supine) position with assistance and use some type of kicking motion.
1:35-1:40  **Client Exploration:** Same as outlined in week one.

1:40-1:50  **Recreational Games:**
1. Circle activities.
2. Ping pong; blow/push relay.
3. Running and tub push relay.

1:50-2:00  **Client Redressing**
APPENDIX H

GYMNASIUM ENVIRONMENT LESSON PLANS
Gym Environment Lesson Plans  
April 27, 29, May 1

Time  

1:00-1:10  
**Client Dressing**

1:10-1:15  
**Warm-up Exercises:** Instruct and/or assist client in:  
1. Bending at waist forward and backward 10 times each way  
2. Windmills (arms extended to shoulder height, twisting from side to side) 10 times.  
3. Move body parts through full range of motion if possible. Area - head, neck, arms and trunk.

1:15-1:25  
**Physical Fitness:** Assist or work as a team (the teacher and client is a team)  
1. Run around gym area 3 times.  
2. 10 rowing activities.  
3. 10 modified push-ups.  
4. Jumping in place for 1 minute (up and down action).

1:25-1:35  
**Individual Skills and Body Awareness:** Assist when needed.  
**Mon & Fri**  
1. Do log rolls (arms extended over head and arms at side) individually up and down the mat, 2 each position.  
2. Balancing activities: Balance on 3, 2 then 1, body part for 3 seconds w/without assistance.  
3. Body parts: Name and touch the body part, then say to client "touch __ now touch your ___ identification of parts by touch head, eyes, nose, back, stomach, legs and knee.

**Wed.**  
1. Throwing and catching activities: using nerf or play ground balls 6-8 inches engage in a game of throw and catch.  
   A. Pass ball to client ask client to pass back.  
   B. 3-5 feet apart bounce ball to client, have client bounce back to teacher with catch.  
   C. 3-5 feet apart throw ball and ask client to throw back to teacher with catch.  
   D. 3-10 feet apart same as in "C" above.  
   E. Using bean bag have client throw at wall as hard as they can (3E SAFE) over-hand throwing motion.
1:35-1:40 Client Exploration: Avoid physical contact during this time unless absolutely necessary. This is an unstructured free movement period. The teacher should stay within arms reach and not allow client to disrupt others or leave the gym area.

1:40-1:50 Recreational Activities: W/without assistance.
1. Dodge ball - group
2. Basketball - individual and/or group
3. Relay race - group

1:50-2:00 Client Redressing

Gym Environment
May 11, 13, 15

Time Areas of Instruction

1:00-1:10 Client Dressing

1:10-1:15 Warm-Up Exercises: Same activities that were outlined for April 27-May 1.

1:15-1:25 Physical Fitness: Assist or work as team.
1. 10 bent knee sit-ups w/without assistance.
2. 10 rowing exercises.
3. Run around gym area 4 times.
4. Jump in place for 2 minutes.

1:25-1:40 Individual Skills and Body Awareness: w/without assistance
1. Balancing activities using 2 inch by 6 foot floorline
   A. Walk forward and backwards
   B. Walk sideward
   C. Balance on one foot 3 seconds
2. Kicking: Client sitting in chair have them kick 5 balls to teacher (teacher standing 5-7 feet away).
   A. Same as above but teacher is 3-10 feet away
   B. Have client stand (place ball at client's feet repeat activities above)
3. Body Awareness: Using a hoop instruct and or assist client to move their body and/or body parts.
   A. Over the object
   B. Under the object
Wed.
1. Review kicking activities as outlined above.
2. Body Awareness: activities as outlined for Mon. and Fri of this week.

1:40-1:50 Recreational Activities: w/without assistance.
1. Obstacle course - group
2. Parachute activities - group

1:50-2:00 Clients Redressing

Gym Environment
May 27, 29 & June 3, 5

Time
Areas of Instruction

1:00-1:10 Clients Dressing

1:10-1:15 Warm-Up Exercises: Instruct and/or assist client:
1. Same activities as outlined in lesson plan for April 27-May 1.

1:15-1:25 Physical Fitness: Assist and/or work as a team
1. Run around gym area 5 times.
2. 15 rowing activities.
3. 15 modified push-ups.
4. Jumping in place for 1 minute w/wo assistance.

1:25-1:35 Individual Skills and Body Awareness: w/without assistance
May 27, 29
1. Throwing and catching activities using nerf of play ground balls.
   A. Pass ball back and forward between client and teacher
   B. 3-5 feet apart bounce ball back and forward with a catch
   C. 3-5 feet apart throw ball into client ask to catch, then throw back to teacher.
   D. 3-10 feet apart, same as in letter "C".
   E. Using bean bag have client throw at wall as hard as they can (BE SAFE) using overhand throwing motion.
2. Log roll up and down mat 4 times, two with arms extended above head and two with arms at side.

C. Through the object and
D. Around the object
June 3, 5

1. Kick three stationary balls from the following distances into the listed areas:
   A. Standing 5 feet away kick into 15 foot area.
   B. Standing 10 feet away kick into 10 foot area.

2. Body Awareness: Touch the body part then demonstrate the directions of movement (move like I move or move your arm in direction). Instruct and/or assist in movements.
   A. Call the direction then say; move right then left arm in any three directions.
   B. Move right then left leg in any three directions.
   C. Have clients move to right then left 5-10 steps in each direction.
   D. Have clients walk in small circles going right then left.

1:35-1:40 Client Exploration: Same as outlined previous week.

1:40-1:50 Recreational Activities:
   1. Basketball - individual and/or group
   2. Jumper - individual and/or group
   3. Parachute activities - group

1:50-2:00 Clients Redressing
APPENDIX I

SCORE SHEET
This sheet will be used to record the occurrence of non-occurrence of stereotypic and/or self-injurious behaviors in all environments.

**Recording Codes:**

1. ✓ The behavior occurred and was observed in the interval.

2. ◯ The behavior was not observed during the observing interval.

3. / The subject was absent from the environment this day.

4. The Environmental Codes: "C" - Classroom  "G" - Gym  "P" - Pool

**Note:** Interval number 12 on the classroom tapes is only five (5) seconds in length and ends the taping of that session.

**Taping Date:** _______  **Session:** _______  **Environment:** Circle one only  "C"  "G"  "P"

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