Utilizing Daily Repertoire Behavior to Facilitate the Acquisition of Generalized Imitation in Profoundly Mentally Retarded Adults

Scott A. Kremser
UTILIZING DAILY REPERTOIRE BEHAVIOR TO FACILITATE THE ACQUISITION OF GENERALIZED IMITATION IN PROFOUNDLY MENTALLY RETARDED ADULTS

by

Scott A. Kremser

A Thesis Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Master of Arts Department of Psychology

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Two procedures were compared in teaching the skill of generalized imitation. One procedure incorporated some of the subject's daily behavior repertoire into the imitation training paradigm. Another similar procedure utilized non-repertoire responses during training. Two male profoundly mentally retarded adults were trained with each procedure. Overall, the acquisition of generalized imitation was facilitated by incorporating daily repertoire behaviors into the imitation training packages. Statistical analysis revealed a significant difference in levels of generalized imitation as a function of training condition. Results were variable across subjects however, and it is questionable whether the difference is clinically significant. Further and more refined research is needed to compare the two procedures adequately. Suggestions were made for incorporating the studies assessment strategies and research methodology into future research conducted in this area.
ACKNOWLEDGEMENTS

I would like to dedicate this thesis to my loving wife Linda, and to my parents, Horst and Irmgard Kremser. Without their support and encouragement throughout the years, none of this would have been possible.

My appreciation also goes to my master's committee members, Alan Poling, Wayne Fuqua, and Malcolm Robertson, for their support and advice with this project, and for the excellent quality of instruction they have provided to me over my years at Western.

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Scott A. Kremser
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Utilizing daily repertoire behavior to facilitate the acquisition of generalized imitation in profoundly mentally retarded adults

Kremser, Scott A., M.A.
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CHAPTER I

INTRODUCTION

Imitation has long been presumed to play an important role in the development of normal children. Unfortunately, many severely and profoundly mentally retarded individuals do not exhibit this skill at any significant level without extensive training (Baer, 1978; Bry & Nawas, 1972; Guralnick, 1976). Deficits in imitative behavior may account in part for the failure of many severely and profoundly mentally retarded individuals to develop extensive behavioral repertoires (Bijou & Baer, 1965; Gewirtz & Stingle, 1968; Lovaas, 1967). However, research supporting the notion that imitation is essential for subsequent skill acquisition is lacking (McCuller & Salzberg, 1982).

Research in the area of training imitation to mentally retarded people is abundant. Most of the studies have investigated the environmental conditions necessary to establish imitation in nonimitative individuals. Other studies have attempted to show how imitation training procedures can be utilized in developing adaptive skills (e.g., language, utensil usage). In addition, a great deal of research has looked at how generalized imitation develops in severely mentally impaired people. Investigators in this area assume that if generalized imitation can be taught to severely mentally retarded individuals, it will quicken their acquisition of
a broad range of socially significant behaviors when compared with the traditional process of shaping individual behaviors into the person's behavior repertoire.

Baer and Sherman (1964) were the first to demonstrate the operant control of imitation by training preschool children to copy certain socially acceptable behaviors. Perhaps the most adequate definition of imitation was provided by Bijou and Baer (1978), who described imitation as a process whereby a modeled response serves as the discriminative stimulus for a similar response, the imitation, which is in turn strengthened by some subsequent event, the reinforcer. Prior and subsequent researchers have characteristically accepted this definition in training the skill of imitation.

Generalized imitation refers to the imitative performance of behaviors which have never been reinforced for imitation, but which can be maintained as long as other imitative responses continue to be reinforced (Striefel & Eberl, 1974). Generalized imitation is very important because it appears that children may acquire a great deal of behavior that matches a model's behavior without direct reinforcement for imitating the modeled response (Lovaas et al., 1966; Risley, Hart, & Doke, 1972).

There has been some controversy as to how generalized imitative behaviors develop. A popular notion is the one first proposed by Gewirtz and Stingle (1968), who believed that after the initial imitative responses are established through extrinsic reinforcement, a class of functionally equivalent behaviors are acquired and
maintained by extrinsic reinforcement on an intermittent basis. Inherent in this approach is the notion that the model serves to provide the imitator with all the discriminative stimuli necessary to signal the occurrence of a topographically similar set of behaviors by the imitator. Steinman's (1970) research tends to refute this concept. He has shown that environmental stimuli—other than the model's behavior (e.g., various components of the experimental setting) also determine whether or not a model's response functions as a discriminative stimulus for an imitated response. Steinman refers to those additional cues as second-order or superordinate stimuli. Peterson and Whitehurst (1971) and Furnell and Thomas (1976) have provided evidence that almost any stimulus may become discriminative for imitation under certain environmental conditions, and that it is not just the experimenter's behavior that determines the probability of imitative behavior occurring. For example, Furnell and Thomas (1976) showed that ball size could be made a superordinate discriminative stimulus by providing reinforcement for correct imitation in the presence of a large ball and failing to reinforce correct imitation in the presence of a small ball. Eventually, subjects imitated only in the presence of the large ball. This research suggests that subjects may fail to generalize their imitative responding to new locations because of the absence of certain critical superordinate cues in the new environment which were present in the experimental setting when the behavior was trained.

A number of researchers (Rincover & Koegel, 1975; Schreibman
& Lovaas, 1973; Lovaas, Schreibman, Koegel, & Rehm, 1971) have shown that mentally retarded individuals may only respond to a select portion of the relevant stimulus complex. This pattern of stimulus control has been referred to as "stimulus overselectivity." The failure of many severely mentally retarded individuals to acquire the skill of generalized imitation may be linked to the fact that they often fail to attend to all of the dimensions of the model's response when presented with novel demonstrations of behavior to imitate. Current imitation training procedures typically do not deal systematically with the problem of stimulus overselectivity often seen with mentally retarded individuals.

A number of other problems are apparent in the imitation training research literature. McCuller and Salzberg (1982) indicated that studies concerned with developing generalized imitation generally involve three steps, (1) subject selection, (2) selection of behaviors to be trained, and (3) training. Many studies appear to be deficient in one or more of these areas. A brief synopsis of typical deficiencies follows.

The Problem of Selecting Appropriate Subjects

Most of the studies in the area of imitation training fail to adequately describe the prerequisite behaviors necessary for the subject's meaningful inclusion in the imitation training research. Striefel (1974) identified some of the important prerequisites to include sitting facing the trainer, eye contact, hands in lap, and looking at (tracking) objects. Other important characteristics
include the absence of overselective responding and competing or interfering behaviors (e.g., tantrums, stereotypy, rumination).

Another factor in selecting appropriate subjects is their pre-intervention level of imitation exhibited in their behavior repertoire. A few studies (Baer et al., 1967; Bry & Nawas, 1972; Garcia, Baer, & Firestone, 1971) attempted to assess pretraining imitative-ness in their subjects, but the great majority of the research failed to adequately control for the possibility of high levels of imitative behavior occurring prior to intervention.

Perhaps the best assessment of baseline imitation was conducted by Bry and Nawas (1972). They used as models attendants well known to the subjects. The model presented a response along with a "Do this" command. Each of three simple responses was presented five consecutive times as the attendants attempted to elicit imitation by offering candy and physical prompts. Although this investigation offers needed structure in the baseline assessment of imitation, it is apparent that the attendants were inadvertently training imitation during baseline by offering the reinforcers contingent on imitative behavior. Nevertheless, the notion of repeated baseline assessment of particular imitative responses to be trained later during intervention appears justified. Also, the use of the instruction "Do this" during baseline was appropriate because it was the same verbal stimulus used during the intervention phase. It is, however, important to note that imitative responding by some subjects may not be controlled by "Do this." It is possible that commands such as "Do as I do" or "Try this," or other commands
based on the subjects idiosyncratic learning history may have gained instructional control over the individual. Baseline assessment should incorporate a wide variety of such instructions, delivered in a wide variety of environmental settings, in hopes of determining accurately whether or not the individual truly possesses the skill of imitation.

Baer (1978, 1980) and Guess, Sailor and Baer (1978) have reported that roughly 33-40% of the mentally retarded subjects they have worked with failed to acquire the skill of imitation even after one to two years of intensive training. The reasons for this rather large percentage are probably varied, but success rates could possibly be improved by developing more adequate screening procedures to identify those individuals most likely to succeed in training. Training in prerequisite skills, not just exposure to imitation training, appears warranted for those individuals lacking the skills necessary to immediately benefit from imitation training.

Methodological Issues in Training Imitation

A wide variety of techniques have been utilized in teaching generalized imitation. These include positive reinforcement utilizing the Premack principle (Premack, 1959), physical guidance (Foxx & Azrin, 1972), shaping (Skinner, 1953) and fading (Terrace, 1963 a,b). Unfortunately, an experimentally verified general imitation training procedure has yet to be developed, although most researchers have adopted the Baer, Peterson, and Sherman (1967) model (see Method section for further description of this tech-
Two deficiencies evident in previous research in this area are (1) the failure to control for the effects of stimulus overselectivity in research participants and (2) the lack of rigorous pre-intervention assessment of imitative behavior. Although the control of stimulus overselectivity in imitation training requires further investigation, some data (Schroeder & Baer, 1972) indicate that by intermixing trials of concurrently trained imitative responses the effects of overselective responding may be minimized and acquisition of generalized vocal imitation enhanced. According to this research, intermixing training trials of different responses has the effect of developing local (i.e. trial-by-trial) stimulus comparisons, which may possibly be important to the enhancement of generalized imitative skills.

It appears that better research control can be established by requiring pre-intervention measurement of imitative responding. In addition, the use of more sophisticated experimental design features to ensure more powerful interpretations of the resulting data appears warranted. Typical research design in this area has involved the mere implementation of an intervention without the prior systematic collection of appropriate baseline data. The multiple-baseline across subjects design (Hersen & Barlow, 1976) is a means of successfully implementing repeated baseline measurement across sessions, and is also a tool for trying to systematically replicate the effects of intervention across different research participants. This design appears to be a logical choice for future
research in this area since it offers the experimental control necessary for researchers to make more powerful interpretations of outcome data.

Selecting Appropriate Behaviors to be Trained

Several researchers (e.g., Baer et al., 1967; Lovaas et al., 1966) have suggested that developing generalized imitation in mentally retarded individuals can be greatly expedited if training responses are selected from the subject's daily behavior repertoire. The basis for their proposition came from the theoretical analysis of Miller and Dollard (1941), who distinguished between two types of behavior, matched-dependent behavior and copying (i.e., imitation). Matched dependent behavior is evident when the behaviors of two individuals is topographically similar at a given moment, however, the response topography of one individual does not serve as a discriminative stimulus signalling the occurrence of a similar response topography by the other individual. The behaviors of the two individuals may look alike, but their occurrence is signalled by different environmental stimuli. Copying slowly occurs as the follower comes to bring his response to approximate that of the model through his refinement of the behavior under similar stimulus conditions. The follower eventually "knows" when he has produced an acceptable reproduction of the model act.

Miller and Dollard (1941) cited an example of this process:

It was six o'clock in the evening, the hour when father usually returned home, bearing candy for the two children. While playing in the bedroom, Jim heard a footfall on the stairs; it was the familiar sound of father's
return. The younger child [Bobby], however, had not identified this critical cue. Jim ran to the kitchen to be on hand when father came in the back door. Bobby happened on this occasion to be running in the direction of the kitchen and behind Jim. On many other occasions, probably many hundreds, he had not happened to run when Jim did. He had, for instance, remained sitting, continued playing with his toys, run to the window instead of the door, and the like; but on this occasion, he was running behind his brother. Upon reaching the kitchen, Jim got his candy and Bobby got his.

On subsequent nights with similar conditions, the younger child ran more frequently at the mere sight of his older brother running. When he ran, he received candy. Eventually, the behavior, under pressure of continued reward, became highly stabilized, and the younger child would run when the older ran, not only in this situation but in many others where time and place stimuli were different. He had learned in this one respect to imitate his older brother, but he had not learned to run at the sound of his father's footfall. (pp. 94-95)

In their analysis of this example, Miller and Dollard failed to identify operant conditioning as the process responsible for the eventual occurrence of the copying (i.e. imitative) behavior. Nevertheless, the implication that the acquisition of imitation may be facilitated in training by utilizing responses in the subject's daily repertoire was the critical point extracted by subsequent research.

Imitative responding of mentally retarded individuals may likewise be facilitated by incorporating such everyday behaviors into training. It has been suggested (McCuller & Salzberg, 1982) that by using these daily repertoire behaviors in imitation training, the subject will somehow acquire the ability to generalize his imitative behavior to responses that have never been trained, thus facilitating the acquisition of generalized imitative behavior. Unfortunately, exactly how this transformation process takes place
would still be an unanswered question. It does appear, however, that utilizing daily repertoire behaviors will increase subject success in earning reinforcement. Any good training program must ensure that the desired behavior (imitation) occurs and is reinforced, and the use of behaviors in the daily repertoire should allow this to be accomplished easily.

The purpose of the present study was to investigate whether incorporating daily repertoire behaviors into an imitation training package expedites the acquisition of generalized imitation in profoundly mentally retarded adults. A rigorous screening process for identifying nonimitators was employed, and potential subjects were limited by screening to those exhibiting prerequisite behaviors likely to increase their chances of succeeding in an imitation training program.
CHAPTER II

METHOD

Subjects

The subjects were four adult male mentally retarded individuals, ages 30, 31, 43, and 52 years. Each had been formally classified as profoundly mentally retarded. According to the Vineland Social Maturity Scale (Doll, 1965), none of the participants had a social age equivalent above 2.7 years, and all mental ages as determined by either the Slosson Intelligence Test (Slosson, 1971) or the Stanford-Binet Intelligence Scale (Terman & Merrill, 1973) were below 2.2 years. Prior to being selected as a participant in this study, each subject passed each of the 8 screening areas on the "Checklist of Desirable Prerequisites for Inclusion in an Imitation Project" form (see Appendix A). The list was developed on the basis of recommendations made by Striefel (1974). Informed consent to participate in the study was obtained from the legal guardian of each of the subjects beforehand.

Setting and Equipment

The study was conducted at an adult day activity program for the developmentally disabled that is affiliated with Western Michigan University. Two experimental rooms were utilized in this
study. The rooms measured 6m x 8m, and 10m x 12m respectively. Each room was removed from the daily proceedings of the day activity center, and each was equipped with one or two 2m x 1.5m tables, and two or more metal chairs.

Materials included a variety of toys, utensils and other objects needed to satisfy the list of imitation responses found in Appendix B. A videocamera, videoplayer, and a television set were also utilized at various points during this study.

Independent and Dependent Variables

The independent variable manipulated in this study was the training technique used with each group of subjects. One group received imitation training utilizing responses that already existed in their daily repertoire of behaviors. The other group received the same general imitation training procedure except that responses that were trained were not in the subjects' daily behavior repertoire (see Pre-baseline daily repertoire assessment section).

The dependent variable chosen was the independent imitation of responses that the subjects were unable to imitate prior to intervention (see Imitative behavior assessment section). Outcome data depict the repeated sampling of generalized imitative behavior that occurred across subsequent phases of the investigation.

Experimental Design

The absolute effectiveness of each method of training generalized imitation was evaluated within a multiple baseline across
subjects design. The relative efficacy of each approach was judged by visually comparing the magnitude of dependent variable change for the two subjects who received training utilizing daily repertoire behaviors versus the two subjects who received training with behaviors outside of their everyday repertoire (see Figure 1).

Reinforcer Selection Process

Reinforcers effective for training new skills to each subject were identified through review of the subject's case record at the day activity program. In addition, consultation with the staff at the center was conducted to ensure that reinforcers used in this study differed from those concurrently used during day activity programming. This was done to guard against the possibility of a satiation effect developing from the subject's repeated exposure to the same reinforcing stimulus during both day activity programming and study participation. A list of reinforcers identified for each subject is included below:

Subject 1: Pop, milk, orange juice, pudding, M & M's, potato chips, peanuts, crackers, handshakes.

Subject 2: Pudding, ice cream, playing with a nerf ball, verbal praise (e.g. "good job"), music.

Subject 3: M & M's, crackers, potato chips, cupcakes, popcorn, pop, orange juice, pudding.

Subject 4: Crackers, popcorn, pudding, M & M's, handshakes, verbal praise (e.g. "very good ___"), manipulating pegs.

Since most of the reinforcers listed were consumable, sessions were
conducted in mid-morning during the weekdays. This time slot was approximately 1.5 to 2 hours after morning breakfast and always preceded lunch for each subject. Bite sized chunks of food and sips of liquid were provided contingent on correct responding. Consumable reinforcers offered were altered occasionally within sessions in order to guard against the possibility of satiation developing for that stimulus over time.

Data Collection and Reliability

A videocamera was periodically used to tape the target behaviors during each phase of the investigation. Two assistants were trained to evaluate correct and incorrect videotaped samples of each target behavior with its criteria level behavior definition (see Appendix C). For example, for a response such as "raise left hand above head," the experimenter had observers first read the appropriate behavior definition (see Appendix C) and then had them watch two videotaped examples of the experimenter putting his left hand in two locations relative to his head. Observers scored a behavior that was in accordance with the prescribed behavior definition with "+" (signifying a correct example of the behavior). Other responses were scored with a "−" (signifying an incorrect example). Observers were required to accurately assess 25 examples of correct and incorrect behaviors, and were also required to read all of the listed behavior definitions before the initial observations commenced. Periodic retraining utilizing these videotaped examples and the list of behavior definitions was conducted during the study.
Both assistants independently scored 20% of the sessions videotaped for each subject. Agreements were scored if both observers agreed that a targeted imitative or generalized imitative behavior did or did not independently occur by the subject within 10 seconds in response to the cue and model given by the experimenter during each trial. Each observer scored each trial with either a "+" (indicating correct independent imitation of the behavior) or a "-" (indicating an incorrect imitation or no response). Interobserver agreement was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%.

Interobserver agreement on the occurrence or nonoccurrence of targeted imitative and generalized imitative behaviors ranged between 86-96% for each phase of the investigation with a mean of 91%. Interobserver agreement for the occurrence and nonoccurrence of pre-baseline daily repertoire behaviors was calculated at 78%.
CHAPTER III

PROCEDURE

Pre-Baseline Daily Repertoire Assessment

Initially, data were collected in order to determine which of a list of simple gross motor behaviors (see Appendix B) were in each subject's daily repertoire and which responses were not. The process involved the direct observation of each subject in a free play situation with the necessary materials placed in front of the subject on a table. Occasional verbal prompts and hand gestures toward the materials were used to keep the subjects on task. No behaviors were systematically consecutively during this period. Observations of free play behavior occurred over six separate sessions of 20 minutes each. Data were recorded on whether or not any of the targeted responses occurred over any of the observation periods. Targeted responses that occurred at any point during these observations were considered to be components of the individuals daily repertoire of behaviors. Behaviors in Appendix B that did not occur over these observation periods were not considered to be behaviors in the individual's daily repertoire.

Imitative Behavior Assessment

Daily repertoire data collection was followed by the assessment of each potential subject's imitative repertoire with respect to the
list of responses found in Appendix A. During each of three separate sessions the experimenter paired three cues (i.e., "Do this," "Try this," "Do as I do") individually with each response to be imitated. The presentation of a specific cue and a response to be imitated occurred in a random fashion, and no experimenter arranged consequences were delivered. Subjects who were unable to independently copy more than 20% of the responses found in Appendix A were deemed deficient in the skill of generalized imitation and were selected for later stages of this study.

Baseline Assessment

Multiple baseline assessment commenced following the completion of the imitative behavior assessment phase. First, subjects were randomly assigned to one of two groups, each comprised of two subjects. Next, the repeated probing of generalized imitative responding was undertaken in order to evaluate the pre-intervention level of generalized imitative behavior for each subject. Probe responses were taken randomly from those listed in Appendix B, and were also responses that the subject was unable to copy during the previous phase. Probe responses may or may not have been behaviors previously assessed as being in the individual's daily repertoire of behaviors. During each baseline session, each subject was presented with five different responses to be imitated after the experimenter modeled each response and presented the cue "Do this." As in the previous phase, no experimenter arranged consequences were delivered.
Baseline assessment utilized a multiple probe technique (Horner & Baer, 1978) whereby assessment was conducted every third day. This was done in order to minimize the possibility that the subjects might develop levels of generalized imitative behavior above those of a true baseline as a result of daily baseline exposure to the experimenter, the modeled behaviors, and the "Do this" command. A percentage of the five responses correctly imitated during each baseline session was calculated (see Figure 1). Baseline continued for each subject until a relatively stable pattern of responding was observed.

**Intervention**

The intervention phase involved operantly conditioning sets of three gross motor responses taken from the list of behaviors found in Appendix B; these were responses which the subjects were unable to imitate during previous assessment. The general training process closely followed the one outlined by Baer, Peterson, and Sherman (1967):

1. A trainer sits across from the subject and says "Do this," and then demonstrates the response.

2. If the subject correctly imitates the response with 10 seconds in accordance with the prescribed behavior definition (see Appendix C), he is given a reinforcer.

3. If the subject fails to correctly imitate the response within 10 seconds, the experimenter reintroduces the "Do this" command along with the response to be imitated, and then physically
guides him or her through the appropriate response topography. A reinforcer was presented at the end of the prompted trial.

4. Physical guidance was gradually withdrawn over succeeding prompted trials (fading) and the reinforcer was delivered contingent upon successively closer approximations to the target response.

Training involved conditioning each response to a criteria of 80% correct independent imitation for the five trials of the response that were trained in a session. Sets of three responses were trained at a time. When a subject reached criteria responding for a particular response, it was replaced by a new response in the following session. In the early phases of training, the five trials for each response were trained in order until the subject was able to reach criteria level imitation for at least one response. At that point, trials for the set of three responses were intermixed during training. Training sessions lasted approximately 20 minutes each. At five random points during each session, the experimenter probed for generalized imitation by pairing the cue "Do this" with a response that was not in the subject's pre-intervention imitative repertoire and had not been trained. Probe responses were also taken from the list in Appendix B, and thus may or may not have been responses assessed as being in the individual's daily repertoire. Intervention continued until a relatively stable pattern of generalized imitative responding was observed.
Follow-Up Daily Repertoire Questionnaire

In order to further evaluate each subject's daily repertoire of behaviors in relation to those responses listed in Appendix B, a questionnaire was constructed (see Appendix D) and distributed to two day activity center staff and two home staff who regularly interacted with each subject on a daily basis. The purpose of this questionnaire was to correlate the pre-baseline assessment of daily repertoire behaviors with informal observations made by clinical staff of each subject's daily repertoire of behaviors with respect to Appendix B.

Respondents were asked to indicate whether or not they had observed the subject exhibiting the behaviors listed in Appendix B at any point throughout their daily interactions with them. Respondents were required to read the list of behavior definitions (Appendix C) prior to filling out the questionnaire.

Percentage agreement was calculated between the answers of each respondent and the results obtained from the pre-baseline daily repertoire assessment by the experimenter for each subject. Agreements were scored if both respondent and experimenter agreed on the occurrence or nonoccurrence of a particular response from Appendix B. Percentage agreements were calculated for daily repertoire behaviors, nonrepertoire behaviors, and overall agreement between the experimenter and each respondent. If the respondent agreed with the experimenter that a response was in or not in the daily repertoire, an agreement ("+) was scored. If disagreement occurred, a "-" (nonagreement) was obtained. Agreements were
toted for daily repertoire and nonrepertoire behaviors and these totals were divided by the total number of daily or nonrepertoire behaviors assessed by the experimenter during pre-baseline. Results were multiplied by 100 to arrive at a percentage agreement. Outcomes of this process are summarized in Table 1.

Table 1 summarizes the results of computations of agreement obtained between questionnaire respondents and experimenter observations for both daily and nonrepertoire behaviors for each subject. Overall mean percentage was 87.5 percent. Mean percentage agreement across respondents for daily repertoire behaviors was 88.0 percent. Mean percentage agreement across respondents for nonrepertoire behaviors was 87.5 percent. These results indicate consistently high experimenter-respondent agreement on the occurrence or nonoccurrence of behaviors listed in Appendix B.
Table 1

Percent Agreement of Daily Repertoire and Nonrepertoire Behaviors Between Questionnaire Respondents and Experimenter Observations

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<tr>
<th>Subject</th>
<th>Respondent</th>
<th>% Agreement In-Repertoire (A)</th>
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CHAPTER IV

RESULTS

The results for subjects receiving training utilizing responses in their daily repertoire (group 1) and for subjects receiving training with behaviors other than those in their daily repertoire (group 2) are shown in Figure 1. Prior to training, the mean percentage of correctly imitated novel responses for subjects in Group 1 was 12.0 and 5.0, respectively. With training, subject 1 in group 1 achieved near perfect (i.e., 100%) generalized imitative responding after only 16 sessions. Mean level of correct responding for subject 1 during training was 71.8%. Subject 2 in group 1 did not achieve nearly the same level of generalized imitative behavior as subject 1 during training, and consistently averaged around 40% generalization by the end of intervention. Nevertheless, with training subject 2 increased his level of generalized behavior nearly 500% from a baseline mean level of 5.0% to an intervention level of 24.0%.

Overall, both group 2 subjects did not achieve as high a level of generalized imitative behavior as their group 1 counterparts. Baseline levels of correctly imitated novel responses for subjects 3 and 4 were 0.0 and 17.5, respectively. Subject 3 did show an increase in mean generalized responding over training (to 8.4%), however, peak levels of generalized imitative behavior were consis-
tently below those achieved by both subjects in group 1. Interestingly, subject 4 (group 2) actually showed a mean level decrease from baseline (17.5%) through intervention (13.3%). Mean level responding for both groups under both baseline and treatment conditions are summarized in Table 2.

Table 2

Mean Percentage of Novel Responses Correctly Imitated

<table>
<thead>
<tr>
<th>Group 1. Training with Daily Repertoire Behaviors</th>
<th>Group 2. Training with Non-Repertoire Behaviors</th>
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<tr>
<td>Subject</td>
<td>Baseline</td>
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<tr>
<td>S1</td>
<td>12.0</td>
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<tr>
<td>S2</td>
<td>5.0</td>
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Statistical analysis revealed that percent correct generalized imitation for the two groups did not differ significantly in the baseline condition. This comparison yielded an unpaired + value of 0.18 (df = 21, p > .05). Comparing intervention data for the two groups revealed significantly improved performance for group 1 in relation to group 2. The unpaired + value for this comparison was 6.8 (df = 61, p < .01).

Figure 2 depicts the cumulative acquisition of imitative responses across intervention sessions for each subject. Although all subjects acquired new imitative behaviors through training, group 1 subjects mastered more responses overall than did their
Subjects 1, 2, and 3 mastered a comparable number of responses (10, 8, and 7 respectively), whereas subject 4 was able to master only 4 responses through training.
Figure 1. The Percent of Novel Responses Correctly Imitated in Baseline and Treatment Conditions by Subjects Receiving Training Utilizing Daily Repertoire Behaviors and Other Subjects Receiving Training With Non-Repertoire Behaviors
Figure 2. Cumulative Record of Imitative Responses Mastered Across Intervention Sessions for Each Subject
CHAPTER V

DISCUSSION

In the present study, subjects who received training utilizing their everyday behaviors developed levels of generalized imitative behavior that were significantly higher than those of subjects who received training with behaviors other than those in their daily repertoire. These results empirically support the contention of Baer et al. (1967) and Lovaas et al. (1966), who asserted that generalized imitation seemed to be expedited when daily repertoire behavior was incorporated into early training.

A possible explanation for this effect is that performing responses in the daily repertoire is intrinsically reinforcing to the subject, which accounts for their repeated emission. When these daily responses are subsequently utilized during imitation training, they have the added advantage of providing simultaneous sensory reinforcement to the subject as they are being shaped by the experimenter into the subject's imitative repertoire. Responses outside of the subject's daily repertoire may not offer this luxury. If acquisition of imitative behavior is increased by this process, it is also possible that the acquisition of generalized imitative behavior will be facilitated because generalized imitation seems to occur after initial imitative responses are in the repertoire (Gewirtz and Stingle, 1968).
This study extends previous research conducted in this area by (1) more rigorously assessing imitation prior to intervention and (2) conducting ongoing assessment of generalized imitation across both baseline and intervention phases. Prior research had failed to adequately control for the possibility of high level imitation and generalized imitation occurring with participants prior to treatment. The multiple baseline across subjects design was used as a means of insuring ongoing evaluation of generalized imitation acquisition across both baseline and intervention phases.

The findings should be interpreted cautiously for a number of reasons. First, the number of subjects exposed to each treatment condition was relatively small, making replication of the reported effects mandatory. Interestingly, the available subject pool for this study was rather large (>40); nevertheless, pre-baseline screening effectively ruled out eight subjects who already possessed a great deal of imitative behavior in their repertoire, while prerequisite behavior screening (Appendix A) eliminated another 30 potential candidates. The subjects selected were only those who successfully passed both of the initial screens.

Improvements could also be made in the way daily repertoire behaviors are initially assessed. In the present study, observations were conducted of each subject's daily behaviors under the confines of the experimental environment. The conditions under which certain daily behaviors may be exhibited could differ significantly from those arranged here. Future research should arrange for a wider variety of environmental settings in which to observe an
individual's daily behaviors. The list of behaviors used in this study is by no means exhaustive, and future investigators should employ behaviors readily seen in the subject's natural environment without restricting themselves to a predetermined list of behaviors. The follow-up daily repertoire questionnaire was an attempt to remedy this situation. Although high correlations were found between baseline and follow-up observations of daily repertoire behaviors, assessment should ideally be made a priori.

Consideration should also be given to the imitation training format employed in this study. The Baer et al. (1967) imitation training procedure was utilized throughout this investigation. Whether imitation training procedures that differ from this strategy would produce similar or conflicting results is open to future investigation.

Another area of concern is the intragroup variability observed in group 1. Although both subjects improved across intervention, Subject 1 achieved by far the highest level of generalized imitative responding of any subject in this study. Reasons for this are not readily apparent, although a possible factor may be the level of uncontrolled stimulus overselectivity exhibited by each subject. Subject 1 may have been much less selective to the cues that controlled his responding than the other subjects who may have confined their imitation to situations in which certain select and irrelevant environmental cues were present. More research is warranted on the effects of stimulus overselectivity when training the skills of imitation and generalized imitation.
Further improvement could also be made in the way generalized imitation was assessed. Only five responses were sampled each session for generalized imitative behavior. A larger sample of such responses assessed during each session would probably give a more accurate account of the acquisition of generalized imitative behavior across time, especially if the collection of behaviors in the probe group is balanced with both simple (i.e., one-step) and more complex (i.e., two or more step) responses. Functional imitation is not limited to topographically simple responses.

Finally, future research should extend the length of the intervention phase beyond that used here. It is possible that a higher level of generalized imitation may have been established with subjects 2, 3, and 4 if intervention had been extended further. Also, the maintenance of the observed effects following intervention would also be important data for this area of research.

The notion that the acquisition of generalized imitation may be accelerated by incorporating daily behaviors into training has positive implications for the profoundly mentally retarded. Foremost, it may further increase the rate at which these people develop socially significant behaviors. To date, the treatment of choice in developing new behaviors has been the individual shaping of component behaviors deemed appropriate for the profoundly mentally retarded individual. This process can be very time consuming, and often ends in frustration for both trainer and client. Generalized imitation training may prove to be a time and cost effective alternative, one that merits attention as a primary intervention strategy with profoundly mentally retarded people.
APPENDICES
Appendix A

Checklist of Desirable Prerequisites for Inclusion in an Imitation Training Project
CHECKLIST OF PREREQUISITES FOR INCLUSION
IN AN IMITATION TRAINING PROJECT

SUBJECT: EVALUATOR:

DATE: SOURCES:

1. Subject will sit in a chair facing a trainer for a period of at least 15 minutes. yes/no (circle one)

2. Subject will consistently focus eyes on the trainer when the trainer states: "Look at me." yes/no (circle one)

3. Subject will consistently track moving objects. yes/no (circle one)

4. Subject will hold hands in his/her lap and in a neutral position for a period of at least 5 seconds when prompted to do so. yes/no (circle one)

5. Subject exhibits an absence of maladaptive behaviors that might interfere with training. yes/no (circle one)

6. Subject is assessed as being either severely or profoundly mentally retarded. yes/no (circle one)

7. Subject has at least one readily identifiable and functional reinforcing stimulus. yes/no (circle one). Please list reinforcers here:

8. Subject is free of any major type of psychoactive medication (i.e. all antipsychotic, anticonvulsant, antidepressant, antimanic, and stimulant medication is included here). yes/no (circle one)

* In order for a subject to be included in later phases of this study, a "yes" must be answered for all of the above prerequisite skill areas.
Appendix B

Menu of Simple Imitation Training Responses
MENU OF SIMPLE IMITATION TRAINING RESPONSES

1. Raise left hand above head.
2. Tap chest with left hand.
3. Touch nose.
4. Stand up.
5. Touch chair seat.
7. Drop paper in wastebasket.
8. Touch desk.
10. Tap wall.
11. Move wastebasket.
12. Place box in chair.
13. Put head on desk.
14. Ring bell.
15. Put towel in front of face.
17. Move toy car on table.
18. Place circle in form board.
20. Rotate egg beater.
22. Put two blocks in ring.
23. Place string of beads around neck.
24. Put on kitchen glove.
25. Move rolling pin.
26. Push button on tape recorder.
27. Lift cup off table.
28. Drop a cube in a cup.
29. Rattle a spoon in a cup.
30. Tap a peg into a pegboard with a plastic hammer.
31. Tear a piece of paper.
32. Shake a rattle.
33. Shake a tambourine.
34. Tap drum.
35. Turn on TV.
36. Throw nerf ball into modified basketball hoop.
37. Roll ball.
38. Pick up phone.
39. Wipe table with sponge.
40. Bounce basketball.
Appendix C

Behavior Definitions
BEHAVIOR DEFINITIONS

1. Raise left hand above head: The subject must raise the entire left hand above the plane of his head as the subject is seated facing the trainer with his head up.

2. Touch chest with left hand: The subject must make contact with any portion of his front torso from the bottom of the neck to above the waistline, using any part of his left hand.

3. Touch nose: The subject must make contact with any portion of his nose with any portion of either hand.

4. Stand up: The subject must remove himself entirely from the chair and stand in a near vertical position with both feet on the floor.

5. Touch chair seat: The subject must make contact with any portion of his chair with any portion of either or both hands.

6. Move chair: The subject must move the training chair away from its current position using either or both hands only. If the subject moves the chair away from and then back to its original location in one continuous move, that is also considered an example of moving a chair.

7. Drop paper in wastebasket: The subject must take the paper and release it into the training wastebasket in order that the paper alone makes contact with the bottom of the container.

8. Touch desk: The subject must make contact with any portion of the training desk using any portion of either hand.

9. Put on baseball cap: The subject must place the open end of the cap on his head and then remove his hands from the cap so that the cap will stay independently on his head for at least 3 consecutive seconds. Cap position is irrelevant.

10. Tap wall: The subject must make contact with any portion of the training wall using any portion of the hand closest to the wall when the subject is seated facing the trainer.

11. Move wastebasket: The subject must move the training wastebasket away from its current position using either or both hands only. If the subject moves the wastebasket away from and then back to its original location in one continuous move, that is also considered an example of moving a chair.

12. Place box on chair: The subject must remove the box from the training table and place it on the training chair seat within
10 seconds of cue onset. The box must sit independently on the chair for at least 3 consecutive seconds.

13. Put head on desk: The subject must make contact with any portion of the training desk with any portion of his head. If the subject's hair just touches the desk, that is also considered a response.

14. Ring bell: The subject must use any portion of either hand to make the bell ring so that it can audibly be heard from at least 10 feet away.

15. Put towel in front of face: The subject must place a towel in front of his face so that it covers his entire face for at least 3 consecutive seconds. The towel may make contact with the face during this period.

16. Scribble: The subject must make a discernible mark on the training paper with the purple crayon provided.

17. Move toy car on table: The subject must move the toy car on its wheels away from its current position on the training table using either or both hands. If the subject moves the car away from and then back to its original location in one move, that is also considered an example of moving a car.

18. Place circle in form board: The subject must independently place the circle in the form board so that it makes contact with the entire inner rim of the empty circle of the form board.

19. Open and close book: The subject must open and then close any portion of the training book within 10 seconds, using either or both of his hands.

20. Rotate egg beater: The subject must rotate the beater at least one full revolution by turning the beater handle only using either hand.

21. Build two block tower: The subject must place one block on top of another block so that they make contact with one another and so that the tower can stand independently for at least 3 consecutive seconds.

22. Put two blocks in ring: Subject must place both blocks completely within the ring. The blocks may touch the inner edge of the ring and may also be stacked one on top of the other.

23. Place string of beads around neck: Subject must place the string of beads over his head and down and around his neck so that the entire strand hangs independently around the neck.
24. **Put on kitchen glove:** The subject must independently put on the kitchen glove so that the entire right hand is contained within the glove.

25. **Move rolling pin:** The subject must move the rolling pin by continuously rolling it away from its current position (in either direction) to a new position on the training table. The subject may move the pin in any manner, as long as it is rolled. If the subject moves the rolling pin away from and back to its original location in one move, that is also considered an example of moving a rolling pin.

26. **Push button on tape recorder:** The subject must push any button on the tape recorder with any finger so that the button locks into place.

27. **Lift cup off table:** The subject must use any portion of either or both hands to lift cup completely off of the training table surface for at least 1 second.

28. **Drop a cube in a cup:** The subject must take a cube and release it into the cup so that the cube alone makes contact with the bottom of the cup.

29. **Rattle a spoon in a cup:** The subject must move the spoon back and forth within the cup with either hand so that an audible sound of the spoon rattling in the cup can be heard from at least 10 feet away.

30. **Tap a peg into pegboard with a plastic hammer:** The subject must tap the peg into the pegboard with the hammer so that the small end of the peg is entirely contained within the hole in the pegboard. If the subject uses only his hand or any other object to force the peg into the hole at any point, the entire response is considered incorrect.

31. **Tear a piece of paper:** The subject must take a clear sheet of paper and tear it in at least one location using either or both hands so that a noticeable tear can be observed in the paper.

32. **Shake a rattle:** The subject must move the rattle in a way with either or both hands so that an audible sound can be detected from at least 10 feet away for at least 3 consecutive seconds.

33. **Shake a tambourine:** The subject must shake the tambourine with either or both hands so that an audible sound from the tambourine can be detected from at least 10 feet away for at least 3 consecutive seconds.

34. **Tap drum:** The subject must take a drumstick with either or both hands and touch the top of a drum so that an audible sound can be detected from at least 10 feet away.
35. **Turn on TV:** The subject must turn the on/off knob on the TV in a clockwise direction with either hand in order that the picture on the TV screen comes into view.

36. **Throw nerf ball into modified basketball hoop:** The subject must take the nerf ball with either or both hands and release it so that it falls through the basketball hoop which is situated two feet away and at a height of 3 feet.

37. **Roll ball:** The subject must move the ball by continuously rolling it away from its current position to a new position on the training table. The subject must roll the ball with either or both hands. If the subject rolls the ball away from and back to its original location in one continuous move, that is also considered an example of rolling a ball.

38. **Pick up phone:** The subject must remove the phone entirely off of the receiver for at least one second using one or both hands.

39. **Wipe table with sponge:** The subject must move the sponge away from its current position with either or both hands keeping it in constant contact with the top of the training table. The subject may move the sponge in any direction, as long as the long edge of the sponge remains in constant contact with the table surface.

40. **Bounce basketball:** The subject must take a basketball and throw it on the floor with either or both hands so that it bounces at least once off of the floor. No requirements are made for the subject to catch the basketball once it has bounced.
Appendix D

Daily Repertoire Behavior Questionnaire
**Daily Repertoire Behavior Questionnaire**

Please indicate whether or not you have ever observed any of these behaviors for ___________ in your everyday encounters with him/her. Place a "Y" next to the behavior if you have observed it or a "N" next to the behavior if you have not observed it.

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