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Training Third Grade Educated Women to Teach Cognitive Skills to Disadvantaged Children

Michael D. Roberts
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TRAINING THIRD GRADE EDUCATED WOMEN
TO TEACH COGNITIVE SKILLS
TO DISADVANTAGED CHILDREN

by

Michael D. Roberts

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

Western Michigan University
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INTRODUCTION

The behavioral demands made by the modern, industrial, urban society upon its members, are greater than those ever conceived by any previous society. Bloom (1965), pointed out that as society develops more and more rapidly, the skills and abilities necessary for even minimal individual functioning, economic security, social maturity and independence must increase at the same rate. Toffler, in his widely read Future Shock (1970), elegantly reiterates this concept and states that rather than decreasing or at least progressing at the same rate, society's rate of development is increasing and, in fact, the rate of increase itself is accelerating. It is Toffler's premise that in the near future even those persons who presently function well in society, must be prepared to assimilate new concepts and learn new skills. What then will the impact of the future society be upon those persons who cannot cope with the present one?

The awareness of present and future problems of so-called socio-cultural-economically "deprived" people has led to increasing scientific research in this area, especially with regard to the race of those people involved. Stimulated by the emerging modern civil rights movement of the late 1950's and the early 1960's, evidence mounted that the effects of "deprivation" on educational potential and
progress, intellectual functioning and children's cognitive development, were devastating to blacks and other groups. Shuey (1966) found that across eighty-one different tests of intellectual ability, blacks averaged one standard deviation (15 I.Q. points) below the average of the white population. He reported that the longer these children remain in school, the further behind they fall. This cumulative deficit has been noted on tests of general intelligence (Deutsch & Brown, 1964; Kennedy, Van de Riet, and White, 1963; Pettigrew, 1964), and also on measures of academic achievement (Deutsch, 1960; Kennedy et al., 1963). Frost and Hawkes (1966), reported that children from low income families (less than $3,000) drop out of school at a much higher rate than those from middle income (greater than $7,000) families. And, as might be expected from their test performance, a disproportionate number of disadvantaged children are placed in special classrooms for the mentally retarded, although few suffer any apparent neurological defects (Frost and Hawkes, 1966).

What are the causes for the lower I.Q.'s, higher rate of retardation, and poorer rate of academic success among disadvantaged children? There are several views.

Evidence, accounting for these deficiencies, may be found in the educational setting of the children: the environment of poverty (Riessman, 1962; Deutsch, 1960, 1967),

Presumably, if these conditions were radically altered, the learning deficits shown by disadvantaged children would be quickly remediated, if not eliminated altogether. While the conceptulizations offered to account for these deficits may be correct, it remains unclear as to how one can remediate or prevent these deficits without the aid of reliable procedures and techniques.

Fortunately, recent findings from behavioral research indicate that such procedures and techniques may already be available. Developed in extensive laboratory experimentation (Skinner, 1938; Sidman, 1960; Ferster and Skinner, 1957), these operant principles, derived from the animal laboratory, have been successfully extended to a variety of applied settings (psychiatric hospitals: Ayllon and Michael, 1959; Ayllon & Azrin, 1968; public schools: O'Leary & Becker, 1967; Madsen, Becker & Thomas, 1968; private homes: Wolf, Risley, & Mees, 1964; nursery schools: Baer & Sherman, 1964). These methods are not dependent upon
highly sophisticated psychological tests nor upon trained clinical judgment, but define behavior and its consequences in operational terms (Ayllon & Roberts, 1971). They are therefore well suited to usage by paraprofessionals (See Ayllon & Wright, 1971, for a complete review and description).

Previous experimenters have used operant techniques to modify the language of disadvantaged and normal children. These efforts, however, have largely been concentrated in increasing certain parts of speech (descriptive adjectives: Hart & Risley, 1968; Lahey, 1971; comparative and superlative adjectives: Baer & Guess, 1971; quantity of verbalization: Reynolds & Risley, 1968). Some efforts have involved the use of reinforcement to modify the context of verbalizations (Guess, Sailor, Rutherford, & Baer, 1968; Wheeler & Sulzer, 1970). Due, in major part, to the difficulty of definition and observation, the cognitive aspects of verbal behavior have been largely avoided by operant research. The importance, however, of these cognitive aspects of behavior, "recognition, understanding, expression, synthesis, etc." cannot be ignored.

Until recently, these operant techniques have largely been applied by professionals. Currently, however, these techniques are being used by paraprofessionals with middle-class educational backgrounds, to remedy the behavioral problems presented by their children (Zeilberger, Sampen,
& Sloane, 1968; Gardner, Pearson, Bercovici & Bricker, 1968) or increase non-verbal, easily observable, appropriate behaviors (Hall, Cristler, Cranston, & Tucker, 1970). Indeed several books, designed as guides for parents to manage their children's behavior, are available (Becker, 1971; McIntire, 1970; Zifferblatt, 1970). The systematic extension of paraprofessional training in operant methods of teaching children, to lower class, inadequately educated or even illiterate individuals, has not previously been reported.

The origins of this apparent neglect probably lie in the nature of the problems presented by these children and the communication and educational handicaps of their parents. As stated above, the cognitive deficits of disadvantaged children are behaviours which present grave problems of definition and observation. Parents of lower economic class themselves present problems to training through the usual methods. They have little or no language or reading skills. They typically have no familiarity with books as a means of acquiring new skills.

Yet it seems obvious that the need for effective educational remediation is so great, that any attempts at solving these problems would clearly be a step in the right direction.

The present research represents an attempt to devise (a) an effective method of training paraprofessional personnel, with relatively low educational backgrounds to implement
(b) procedures suitable to develop (and remediate where needed) the cognitive skills of disadvantaged preschool children.
EXPERIMENT I

The initial problem involved in developing procedures is that of defining target behaviors. With young children, and especially deprived children, there exists a multitude of behaviors which the child either lacks or possesses only minimally. It was determined that the behaviors to be selected should meet two general requirements: (a) they must be cognitive in nature. The research previously presented concludes that it is in cognitive skills, especially in the verbal area, that these children are most deficient. And (b) they must be functional, not only in the child's present environment, but also the classroom environment he will soon enter. Four behavioral areas were selected, all involving instructions (mands) or questions involving an implied response. All four make contact with events usually termed "cognitive," are all response modes common to developmental and intelligence tests, and all are functional in home and school environments. They are:

Receptive language. The child is required to respond to an instruction in a non-vocal manner, as used here, to identify a verbally named pictured object by pointing to it. It represents a behavior which contains verbal and pre-verbal understanding of the child's environment.

Expressive language. The child is required to respond
to instructions in a vocal-verbal manner, as used here, to vocally identify a pictured object. It represents not only understanding of the instruction and knowledge of the environment, but also the ability to verbalize and communicate this knowledge.

**Prepositional language.** The child is required to position an object according to a specified spacial arrangement, as used here, to place a figure relative to a box according to verbally presented instructions. It represents a high order receptive response form requiring not only knowledge of the environment but also knowledge of the interrelationship of parts of the environment.

**Body awareness.** The child is required to identify parts of his own body, as used here, to respond to combined vocal and non-vocal instructions, by vocally identifying a portion of his own anatomy. It represents a high order expressive response form requiring cognitive knowledge of himself as a part of the identifiable environment and the ability to synthesize mixed modality stimulation. (See Church, 1961, for an analysis of "active" and "passive" language.)

In order to develop effective methods of teaching these cognitive skills to children, two approaches were considered: (a) Repeated presentation of the cognitive material by an adult (thus maximizing child-adult interaction) which may facilitate the learning of the material.
(b) The use of techniques of reinforcement which may facilitate the learning. Since an obvious critical factor in the child-adult interaction approach is the identity of the adult (in relationship to the child), who is interacting with the child, it seemed necessary to have several adults work with the child: (a) a white male professional, (b) a black female professional, and (c) the child's own mother.

Certain methodological problems are raised when one attempts to deal with several independent variables at one time; the major one being the determination of the causal factor in a behavioral change. While the traditional pre and post test, with control groups, indicates the presence or absence of change, this design does not indicate the specific causal factor involved. In order to control for this problem, a multiple base-line research design was selected (Baer, Wolf & Risley, 1968; Hall, Crestler, Cranston & Tucker, 1970). This design requires that pre-experimental baseline measurements be taken on several behaviors. The experimental variable is then applied to only one behavior at a time, while continuing baseline measurement of the other behaviors. If a change is noted in the behavior paired with the experimental variable, while no changes are observed in the other behaviors, evidence is accumulated which supports the causal nature of the experimental variable. The evidence becomes
more compelling as the other behaviors are successively paired with the experimental variable, with the same result.

The present study employed the multiple baseline technique in a like manner except that periodic (every second or third session) measurement was substituted for continuous measurement, at certain times in order to decrease session length. During original baseline measurements, each of the four behaviors was assessed at each session. With the initiation of the experimental conditions, however, only two behaviors were assessed at each session; the behavior under the experimental condition and only one of the remaining three behaviors under baseline conditions. The experimental condition was applied for several continuous sessions to a single behavioral area and behavioral changes were noted. Sessions at which all four behaviors were measured, i.e. during the original baseline, lasted approximately 30 minutes. Sessions at which one behavior was assessed under experimental conditions and one behavior was assessed under baseline conditions, lasted approximately 15 minutes.
METHOD

Subject and Setting

The subject of this study was Johnnie Lee, a 37-month-old black male child, whose family were participants at the Center. The child's mother was present during all sessions and received minimal training in the presentation of stimuli. Sessions were conducted by either of two professionals, who were graduate students in psychology, one a white male and the other a black female.

All work was conducted at the Edgewood Parent and Child Center in urban Atlanta, Georgia. Funded by state and federal governments, the Center offered child day care, monetary incentives and social services to Edgewood community residents. Center participants were admitted to the program on the basis of income of the family (must be below current government-determined "poverty level"), the membership of at least one child under 5 years of age in the family, and a score, by the child, less than standardized means on certain developmental and intelligence measures (The Bayley Scales of Infant Maturity and the Stanford-Binet). The participating families had from 1 to 4 participating children. Less than 50 percent of the families included fathers. The mean age of the participating mothers was 28 years, and their approximate mean educational history was third grade.
(Educational data was unreliable due to self-report being the only available measure).

**Procedure**

The procedures were similar in all four behavioral areas:

**Receptive language.** The adult presented the child with three pictures of different common objects and asked the child to point to the object named verbally. For example, "Point to the cow." Ten pictures of common objects were presented at each session: cow, ball, car, baby, block, key, girl, drum, leaf, and bird. Pointing to the appropriate picture was recorded as a correct response. The child's response of placing his finger on the picture of the cow, for example, was considered the correct response to the mand "Point to the cow." The adult allowed the child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds, as well as pointing to an inappropriate picture and not responding were recorded as incorrect responses. The adult recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response.

**Expressive language.** The adult presented the child with a picture of a common object and asked him to name the object. Ten pictures of common objects were presented at each session: horse, shoe, bus, dog, turtle, sock, kite, clock, flower, and boy. The clear and audible response by the
child was recorded as correct. "Car," was the correct response to the mand given while the adult was showing the child a picture of a car. The adult allowed the child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds, as well as inappropriate responses, inaudible responses, and not responding were recorded as incorrect responses. The adult recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response.

**Body awareness.** The adult placed her finger on a particular part of the child's anatomy and asked the child, "What is this called?" Ten different body awareness mends were presented at each session: ear, eye, nose, hair, hand, mouth, teeth, finger, leg, and neck. The appropriate clear and audible response by the child was considered and recorded as correct. "Ear," therefore, was the correct response to the mand given while the adult was touching the child's ear. The adult allowed the child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds as well as inappropriate responses, inaudible responses, and not responding were recorded as incorrect responses.

During baseline procedures the adult recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response.
During reinforcement procedures, however, the adult, following a correct response, praised the child (such as saying "Very good.") and reinforced him with a piece of sweetened cereal. Following incorrect responses, the adult verbalized, or modeled the correct response while holding the body part (such as "Ear" while holding the child's ear).

Prepositional language. The adult presented the child with a verbal instruction requiring him to place a small wooden figure of a boy according to some spatial relationship to a box on the table before him. The child had 10 seconds within which to respond to the mand appropriately. Each of five relationships, on top, in, under, behind, and in front, was presented twice at each session. Placing the figure on top of the box, for example, was the correct response to the mand "Put the boy on top of the box." Any response occurring outside of 10 seconds was recorded as "incorrect" as was placing the figure incorrectly and not responding. The adult recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response.

Determining the reliability of the children's responses presented situational and ethical problems. Recording receptive response forms, receptive language and prepositional language, presented no difficulty as the correct responses were defined in easily observed spacial terms with very little
possible overlap. The expressive response forms, expressive language and body awareness, however, presented ethical and functional questions. The dialect used by the middle class professionals differed from that used by the lower class population. Thus, the word dog may be pronounced "dog" by the professional but "dawg" by the trainee. Is it ethically appropriate to record the lower class pronunciation as incorrect and only accept the middle class pronunciation? In addition, the environmental reinforcement for "correct" pronunciation must be considered. If most individuals in the child's environment differentially reinforce a particular dialect, is it appropriate to shape another dialect which will not be maintained by the child's environment? These questions were resolved through a procedure of reliability checks for each verbal response made, by the trainee and the professional. Following each of the child's responses, the person recording (the trainee or the professional) would glance at the other adult (the trainee or the professional) who would indicate "correct" or "incorrect" via a head nod. If the recorder was in agreement with the observer, the response was recorded. If there was disagreement the response was not recorded and the stimulus was repeated. In cases of consistent disagreement on a particular response, the opinion of the trainee was accepted over that of the professional.
In general, either middle class or lower class pronunciations of response words was acceptable, if judged correct by the observers. This reliability method did not allow for systematic analysis but proved quite workable.

The white male professional presented stimuli from all four behavioral areas during the first 4 sessions. He then presented receptive language stimuli and one of the other areas during each of the next 3 sessions. The child's mother presented expressive language stimuli and one of the other three areas during each of the next 3 sessions. The black female professional presented body awareness stimuli and one of the other three areas during each of the next 3 sessions. During each of the remaining sessions (sessions 14 through 26) the white male professional reinforced responses to body awareness stimuli while assessing one of the other three areas under baseline conditions.
RESULTS

Repeated stimulus presentation alone, without reinforcement, did not improve the child's cognitive skills. However, when reinforcement was used, the child's skills were immediately developed.

Johnnie Lee's original baseline measurements showed low rates of responding in all four areas. Receptive language ranged from 0% to 30% with a mean of 13%, expressive language ranged from 0% to 20% with a mean of 10%, body awareness ranged from 0% to 20% with a mean of 10%, and prepositional language ranged from 0% to 20% with a mean of 13%.

Intensive exposure to each individual area resulted in no behavioral change over baseline observations. Nor was there any change in any of the other three behaviors which were monitored concurrently.

When body awareness, which was assessed at the lowest level of all four behaviors, was then selected for reinforcement, the 80% level of performance was reached in 8 sessions and the behavior remained stable thereafter. No concurrent increases were noted in any of the non-reinforced behaviors.

In the course of observing and recording behaviors, as well as implementing the training procedure, no systematic effects were associated with any of the trainers.
Figure I. The percentage of correct responses as a function of stimulus presenter, reinforcement, and no reinforcement.
DISCUSSION

The use of a multiple baseline experimental approach as suggested by Baer, Wolf, and Risley (1968), appears to be particularly useful in identifying the specific variable responsible for behavioral change. It is apparent that neither long-term repeated stimulus presentation nor the adult-child interaction (according to sex, race, education, and relationship to the child) are critical in the process of cognitive learning. Although not completely demonstrated, it is equally apparent that as others have suggested (Hart, and Risley, 1968; Reynolds and Risley, 1968), reinforcement of the language responses of disadvantaged preschool children, is effective in strengthening these behaviors. The effectiveness of the reinforcement procedure is realized in a very short time and increases in cognitive skill is immediate, when food is used as a reinforcer. The increases are specific too, only having an effect on the behavior reinforced. The use of periodic, rather than continuous measurement, seems to be promising as a methodological device for time-saving purposes. Behaviors periodically assessed remained stable and there was no apparent loss of data. Their use, therefore, with young children may be recommended in solving problems associated with long sessions and short attention spans.
The demonstration of the effectiveness of reinforcement to develop behavior in children confirms previous findings (Coleman, 1970; Hopkins, Schutte, & Garton, 1971). The literature in the operant area would suggest reinforcement to be effective when applied by a professional. The pertinent question raised by this demonstration is: Can persons averaging a third grade education be trained to use reinforcement procedures to teach children cognitive skills? Experiment II addressed itself to this issue.
EXPERIMENT II

The outcome of Experiment I indicated that a trained professional can use reinforcement techniques to teach cognitive skills to deprived children. While it might be desirable to use professionals to achieve similar objectives, the cost of such personnel to a community-sponsored program is prohibitive. An obvious alternative would be the use of trained paraprofessionals to teach the children. Indeed, paraprofessionals are already involved in such programs. Typically they work as aides who care for the children and expose them to various experiences: art, music, personal care, group and interpersonal social behaviors, directed play and psycho-motor activities. This traditional "exposure" method, however, has been found to be largely ineffective in modifying the verbal behavior of children (Hart & Risley, 1968). In addition, each aide must be responsible for the physical needs of 15 to 20 preschool children (dress, undress, change diapers, take to bathroom, feed, administer first aid, clean up after, etc.), and therefore have little time to do individual, concentrated work with the children.

An untapped source for paraprofessional psychological training in deprived communities is the children's mothers. These individuals differ, however, from the educated middle-class mothers who have previously been trained. Their formal
education has usually extended no more than the third grade. Their reading ability is inadequate. They are not responsive to lecture methods of training or learning. Their history does not lead them to expect that they could be effective teachers to children. They usually communicate in terms and dialects different from that used by professionals. In summary, they seem totally unsuitable for training in imparting cognitive skills to children. There is, however, an urgent need for persons to teach these skills to disadvantaged children and the children's mothers seem to be the only available group for training. Furthermore, these mothers are individuals most directly effected by the success or failure of their children. The critical question is: Can these mothers be trained to use reinforcement procedures effectively?

In order to avoid some of the more troublesome aspects of training paraprofessionals to teach children: lack of rapport, the child's fear of strangers, the trainee's self-consciousness in teaching someone else's child, racial differences, etc., it was decided to attempt the training with a person whose relationship with the child avoids these problems: the child's own mother.

The method of training to be attempted with the mother was tailored to her needs and skills. Although she had only a minimal academic background, training was thought to be possible as the reinforcement techniques depend upon the
specification of: (a) the stimulus material as presented by the trainee to the child, (b) the response of the child to the stimulus and (c) the differential consequences provided by the trainee according to the child's response.

The techniques, therefore, involve only observable events and do not require any conceptualizations or analysis of these events.

The differences between academic and topographical behavior training are most clearly evident in the difference in teaching methods used by a teacher and those used by an athletic coach. The teacher deals with abstract conceptual responses which the student can learn and emit only in a verbal form, i.e. spoken or written. The coach, on the other hand, deals exclusively with concrete physical responses. His student can learn and emit topographically appropriate responses without any conceptual orientation. The coach demonstrates the behavior and the student then attempts to match it. He may try a back flip off the high board after watching the coach or another member of the swimming team perform the dive. As he practices matching his behavior to that of the coach, he is given feedback by the coach as to his performance, such as, "Keep your feet together next time." As he observes, practices and re-defines his dive, under the coach's guidance, he may be instructed to observe critical environmental contingencies of his behavior. "Do you see how you go higher when you
bend your knees more?" The coach may indicate how the 
student can tell when he has made the appropriate response.
"Remember, the less splash you feel yourself making, the 
better your dive was." The coach does not expect a perfect 
dive on the first try but requires closer approximations 
with practice. All along the way he praises his student's 
efforts, given less and less advice, and successively raises 
his criterion for praise, until the target response is 
made. The student does not need to attain a knowledge of 
aero-dynamics, water surface tension, or coaching methods 
to successfully perform. All he needs is to observe the 
behavior, someone to give him feedback as he attempts to 
match the observed behavior, and someone to draw his 
attention to the "natural" environmental consequences of 
the behavior.

It was this "coaching" method of training, which includes 
the use of modeling, shaping, social reinforcement, response-
contingent behavioral feedback and fading which was attempted 
to train the mother in the reinforcement procedures. Thus 
the paraprofessional would gradually assume more and more 
of the teaching behaviors utilized by the professional.

Since the objective of the training was to bring about 
an increase in the child's behavior, the trainee's competence 
in behavioral procedures was evaluated in terms of the child's 
performance. Based on subjective judgement and the objective 
behavior of the subject in Experiment I, the child's criteria
for success in each behavioral area was defined in terms of level competence; 80% correct or greater, and variability; for at least 2 consecutive sessions.
METHOD

Subject

The subject of this study was Delvin, a 30-month-old black male child, whose mother was a participant at the Center. The child's mother was present during all sessions and was trained in the teaching procedures. She had attended school through the fourth grade and was able to read well.

Training was conducted by the white male professional.

Procedure

Paraprofessional training. The major objective in developing a training method for individuals in this setting was the emphasis on "cook book" type procedures. For this purpose, the concepts of stimulus, response, and reinforcement were translated into specific, tangible and observable events. Thus, all materials presented to the child, as well as all verbal prompts to be made by the trainee, were explicitly defined and taught as the first step toward determining what the child's reaction to this stimulation would be. ("Place one of these ten pictures on the table in front of the child like this." Trainer models. "Then say, 'Delvin, what is this a picture of?'") The second step consisted of observing the child's reaction to the stimulus and accompanying instruction. ("As soon as
you finish telling what to do, remember say it only once, start your watch. Wait exactly 10 seconds, then mark down 'Yes' or 'No' on this piece of paper. Mark 'Yes' if he said exactly what you told him to say. Mark 'No' if he said anything else or if he did not say anything during the 10 seconds."). The third step required that the trainee apply a differential consequence to the child's response ("If he said exactly what you told him to say and you marked the paper 'Yes', give him one piece of cereal and say 'Good boy!' If you marked 'No,' either because he said the wrong thing or did not say anything at all, do not praise him or give him any cereal. Instead, put your finger on the picture you asked him about and say 'This is a car.' Do this only once, then put the next picture on the table and start again."

The trainee initially only observed the professional presenting stimuli, consequating, timing and recording responses. She then was encouraged to record responses, then time and record, then present and consequate, and finally present, consequate, time and record. As the professional gradually faded himself out of the teaching role, he shaped the appropriate behavior of the trainee by praising her attempts, suggesting improvements and drawing her attention to those behaviors of the child that necessitated critical observation. Only the functional aspects of the reinforcement procedure were taught to the trainee.
No verbalization of the methodological or theoretical implications of the procedure were required of her. In order to maximize the mother's realization of the relationship between her behavior and that of her child, certain contingencies were pointed out in common language, e.g. "Did you see how Delvin tried harder the next time he was asked a question, after you rewarded him for getting the right answer?" It was made clear to the trainee that she was not being "tested" and that the child's performance, or lack of it during baseline, was no reflection upon her as a mother, nor upon her child's intelligence. The procedure was described as "a good way to teach things to children" that she might find useful in helping her child to learn many things he "needs to know." The trainees were specifically asked to avoid any use of punishment or threat to control the subject's behavior.

**Child teaching.** The procedures for teaching skills to the child were similar to those used in Experiment I:

**Body awareness.** The trainee placed her finger on a particular part of the child's anatomy and asked the child, "What is this called?" Ten different body awareness mands were presented at each session: ear, eye, nose, hair, mouth, teeth, finger, leg, neck, and hand. The appropriate clear and audible response by the child was considered and recorded as correct. "Ear," therefore, was the correct response to the mand given while the trainee was touching...
the child's ear. The trainee allowed the child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds as well as inappropriate responses, inaudible responses, and not responding were recorded as incorrect responses.

During baseline procedures the trainee recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response. During teaching procedures, however, she, following a correct response, praised the child (such as saying "very good.") and reinforced him with a piece of sweetened cereal. Following incorrect responses, the trainee verbalized or modeled the correct response while holding the body part (such as "ear" while holding the child's ear).

Expressive language. The trainee presented the child with a picture of a common object and asked him to name the object. Ten pictures of common objects were presented at each session: horse, shoe, bus, dog, turtle, sock, kite, clock, flower, and boy. The clear and audible response by the child was recorded as correct. "Bus," was the correct response to the mand given while the adult was showing the child a picture of a bus. The trainee allowed the child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds, as well as inappropriate responses, inaudible responses, and not responding were recorded as incorrect
responses. The trainee recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response, during baseline. During teaching procedures, however, the trainee, following a correct response, praised the child (such as saying "Very good.") and reinforced him with a piece of sweetened cereal. Following incorrect responses, the trainee verbalized, or modeled, the correct response while showing her child the appropriate picture. (Such as "bus" while showing the picture of a bus.)

Prepositional language. The trainee presented the child with a verbal instruction requiring him to place a small wooden figure of a boy according to some spatial relationship to a box on the table before him. The child had 10 seconds within which to respond to the mand appropriately. Each of five relationships, on top, in, under, behind, and in front, was presented twice at each session. Placing the figure on top of the box, for example, was the correct response to the mand "Put the boy on top of the box." Any response occurring outside of 10 seconds was recorded as "incorrect" as was placing the figure incorrectly and not responding. The trainee recorded the response and then proceeded to the next mand without differential comment to the correctness of the child's response.
Receptive language. The trainee presented the child with three pictures of different common objects and asked the child to point to the object named verbally. For example, "Point to the cow." Ten pictures of common objects were presented at each session: cow, ball, car, baby, block, key, girl, drum, leaf, and bird. Pointing to the appropriate picture was recorded as a correct response. The child's response of placing his finger on the picture of the cow, for example, was considered the correct response to mand, "Point to the cow." The trainee allowed her child 10 seconds after the presentation of the mand within which to respond. Responses occurring outside of the 10 seconds, as well as pointing to an inappropriate picture and not responding were recorded as incorrect responses. The trainee recorded the response and then proceeded to the next mand without differential comment as to the correctness of the child's response.

The professional presented stimuli for all four behavior areas at each of the first 6 sessions. The trainee then reinforced body awareness while assessing one of the remaining three areas under baseline conditions. After body awareness had attained the performance and variability criteria of 2 consecutive sessions at 80% or greater correct, the trainee began teaching expressive language, while periodically assessing the other areas, until it reached criteria.
RESULTS

When Delvin's mother used the reinforcement procedures she had learned, the cognitive skills of her child increased significantly over baseline levels.

Delvin's baseline measurements were characterized by variability. Body awareness ranged from 0% to 80% with a mean of 30%, expressive language ranged from 40% to 60% with a mean of 52%, prepositional language ranged from 0% to 30% with a mean of 15%, and receptive language ranged from 0% to 80% with a mean of 48%.

After receiving training, Delvin's mother began reinforcing her child's body awareness. Within 4 sessions, body awareness had reached the competency and variability criteria (80% or greater for 2 consecutive sessions). She then reinforced expressive language and it reached criteria in 3 sessions, the last two being 100%.

No concurrent increases were noted in any of the non-reinforced behaviors which were also measured by the mother.
Figure 2. The percentage of correct responses as a function of reinforcement and no reinforcement. Delvin's mother conducted sessions 7 through 15.
DISCUSSION

It appears that the "cook book" method of training was effective as Delvin's cognitive skills, which were reinforced by his mother, clearly improved. The trainee learned to use the procedure quickly (approximately two total hours of training time), and was able to conduct all phases of the procedure; present stimuli, time, record, and consequate responses. The consequences used, praise and sweetened cereal, appeared to have been effective in reinforcing cognitive skills and the criteria used to judge their development (80% or greater for two consecutive sessions) seemed to be an appropriate and sensitive measure for cognitive responses.

Some problems were encountered, however, in the trainee's subjective reactions to her child's performance. During baseline, she seemed to be embarrassed by Delvin's poor performance. Although this embarrassment was changed to pride as the child performed well during reinforcement, it appeared that the mother had felt that her qualifications "as a good mother" were somehow being evaluated. It seemed that more training emphasis should have been placed on the reason baseline was taken, that is, "to get an idea of what Delvin does not know now so that we will know what to teach him."
The training procedure itself, though effectively demonstrated as appropriate in Experiment II, remained only "promising" as certain questions of its effectiveness were left unanswered by Experiment II: (a) Was training effective only because of certain characteristics of Delvin's mother, such as, high intelligence, strong motivation, etc.? (b) Is the training method dependent upon the mother-child relationship? And, (c) can the mother teach skills successfully to any other child besides the one she was trained to teach? Experiment III was designed to answer these questions.
EXPERIMENT III

Experiment II showed that mothers can be trained to use the reinforcement procedures effectively in teaching cognitive skills to their own children. Wide applicability of such procedures, however, is still open to question. If the mother alone can work effectively with her own child, the usefulness of the procedure is highly limited. Some children do not have mothers. Many mothers work outside the home if jobs are available. Even if the mother does not work, the number of children she could help would be limited to her own offspring. If any mother however, could be trained to work with any child, the usefulness of the procedure to a community center would be greatly increased. Trainees would not be limited to working with their own children, but could work with many children during a single day.

Before endorsing the reinforcement procedure, the para-professional training, and the evaluation procedures for each as an effective "teaching package" for community centers, therefore, two central questions must be answered: First, can trainees use the procedure with children who are not their own? Second, once trained while working with one child, can the trainee generalize her skills to teaching the material to another child?
To answer the first question, the training of two new trainees, with children who were not their own, was attempted. To answer the second question, two trainees, Delvin's mother and one of the new trainees, were instructed to teach a second child once they had finished teaching their initial one. Once again, the trainees' criteria for achieving competence was defined as improvement in the behavior of the particular child with whom they worked.
METHOD

Subject

The subjects of this study were three black children, two females and one male. Stephy was 33 months old, Maria was 36 months old and Delvin was 37 months old. Three women were trained to use the reinforcement procedures. They were selected to maximize the possibility of the effects, if any, of trainee reading ability upon the outcome of training. T₁, who was trained in Experiment II, had attended school through the fourth grade and was able to read well. T₂ had attended school through the third grade and was able to read with difficulty. School attendance data on T₃ was unavailable but she could not read.

Training was conducted by the white male professional.

Procedure

Paraprofessional training: Training was similar to that conducted in Experiment II.

Child teaching. The procedures for teaching the cognitive skills to the children were similar to those used in Experiment I with the addition of reinforcement procedures for prepositional language and receptive language:

Prepositional language. Baseline procedures were similar to those previously conducted. During reinforcement procedures, however, the trainee, following a correct response,
praised the child (such as saying "Very good.") and reinforced the S with a piece of sweetened cereal. Following incorrect responses, the trainee modeled the correct response while giving its verbal description. (Such as, "The boy is on top of the box.")

Receptive language. Baseline procedures were similar to those previously conducted. During reinforcement procedures, however, the trainee, following a correct response, praised the child (such as saying "Very good.") and reinforced the S with a piece of sweetened cereal. Following incorrect responses, the trainee modeled the correct response while giving its verbal description. (Such as pointing to the car and saying "This is the car.")

The professional presented stimuli for two behaviors to each child until sufficient baseline measurements were obtained (4 to 6 sessions per child).

A trainee then reinforced one of the behaviors while assessing the other under baseline conditions for each child. After the first behavior had reached criteria, the trainee began reinforcing the other until it too reached criteria (80% or greater for two consecutive sessions).

T₁ and T₂ each worked with one child. T₃, however, was instructed to work with a second child after she had brought her first S to criteria on two behaviors.
RESULTS

After receiving training, all three trainees were equally able to increase the cognitive skills of children by using the reinforcement procedure. No increases were observed in the absence of reinforcement.

Delvin's mother reinforced Stephy's receptive language, which had previously been assessed by E as ranging from 20% to 40% with a mean of 26% under baseline conditions. While Stephy's receptive language did not reach criteria during 6 reinforced sessions, all of these sessions exceeded baseline limits, the last two points being 80% and 70%. T1 later assessed receptive language under reinforcement conditions, resulting in percentages of 80% and 90%.

Concurrent with her reinforcement of receptive language, T1 conducted two measurements under baseline conditions, of the S's prepositional language and observed it at 20% and 40%, which was respectively, at, and 20 percentage points higher than, baseline limits of 0% to 20% with a mean of 8%. When she made reinforcement contingent upon Stephy's correct prepositional language responses, the behavior reached criteria within 7 sessions, the last two being 90% and 80%.
Figure 3. The percentage of correct responses as a function of reinforcement and no reinforcement. T1 conducted sessions 17 through 30.
T2 reinforced Stephy's expressive language, which had previously been assessed by E as ranging from 20% to 50% with a mean of 34% under baseline conditions.

The S's responses to expressive language appeared to have leveled off at 70% by session 10. Although this level was below prearranged criteria, it was more than twice the mean percentage observed under baseline conditions and was stable. Responses to body awareness, assessed by E1 as ranging from 0% to 90% with a mean of 38% under baseline, reached criteria in the minimum of 2 reinforced sessions, both at 90%.
Figure 4. The percentage of correct responses as a function of reinforcement and no reinforcement. T2 conducted sessions 6 through 29.
Maria's baseline measurements were nearly non-existent. During 4 sessions (80 stimulus presentations), she emitted only one correct response.

Reinforcement of her receptive language stimuli presentation by T₃ resulted in a drastic change in the response rate as the S attained criteria in the minimum of 2 sessions and reached 100% during the third reinforced session. Responses to prepositional language stimuli presentations by T₃ reached criteria in 9 sessions. The last 2 both being 80%.

An assessment of prepositional language taken under baseline conditions by T₃, concurrent with the reinforcement of receptive language, resulted in 0% responding.

A subsequent measurement under reinforcement conditions by T₃ of receptive language, indicated that it remained at criteria level.

When T₃ applied the reinforcement procedure to Maria's prepositional language, criteria was reached within 9 sessions, and remained stable at this level, 80%, for 2 more sessions.
Figure 5. The percentage of correct responses as a function of reinforcement and no reinforcement. T3 conducted sessions 5 through 19.
At this point $T_3$ was instructed to discontinue working with Maria and reinforce Delvin's prepositional language which had previously been assessed by $E$ as ranging from 0% to 30% with a mean of 15% and been observed to increase 10 to 20 percentage points during subsequent measurements. $T_3$ brought the S's prepositional language to criteria within 4 sessions.

Concurrent with her reinforcement of Delvin's prepositional language, $T_3$ assessed, under baseline conditions, the S's receptive language and observed it at 10%, well within baseline limits. When she applied reinforcement to his receptive language previously assessed by $E_1$ as ranging from 0% to 80% with a mean of 48%, the behavior reached criteria in the minimum of 2 sessions, both at 90%.
Figure 6. The percentage of correct responses as a function of reinforcement and no reinforcement. T₃ conducted sessions 16 through 21.
DISCUSSION

Experiment III confirmed the effectiveness of the "cook book" training method demonstrated in Experiment II. Furthermore, the training was extended to persons with only a third grade (T₂), or possibly even less (in the case of T₃, on whom educational data was unavailable) education. This effectiveness does not appear to be dependent of trainee characteristics such as, high intelligence or strong motivation, nor more importantly, on the mother-child relationship. It is clearly evident, through the performance of Delvin's mother and T₃, that once trained, irrespective of whether their training was conducted via their own or some other child, the trainee can generalize her teaching skills to other children.
DISCUSSION AND CONCLUSION

The study demonstrates that the training of minimally-educated individuals in the application of reinforcement procedures can be accomplished if the training is specifically modified to the needs and abilities of this population. It is obvious that many of the seemingly complex and technical behaviors, now exclusively performed by professionals, can be learned by paraprofessionals. Although the systematic development and evaluation of such procedures relied upon professional expertise, the procedures themselves, presentation of the stimulus material, observation and recording of the child's response and differential consequation of the response, are topographical behaviors and as such can be learned and applied, through imitation, by non-professionals. While the analysis of the data requires professionals, the actual implementation of the procedures can, and in the case of the present study should, be accomplished by paraprofessionals. When the needs of any given population far outstrip the physical capabilities of the professionals available, it is the responsibility of those professionals to devise ways of meeting these needs. That is, professionals must give their skills to those who need skills most (See Miller, 1969, for an expansion of this view). This is not to suggest that paraprofessionals will or can replace
professionals. It is suggested rather, that the appropriate use of the paraprofessional will serve to extend the services of the professional and also allow him greater opportunities to develop and analyze new procedures and techniques (See Ayllon & Wright, 1971).

Across all subjects, the introduction of contingent reinforcement resulted in the strengthening of responses. The number of sessions to reach criteria varied widely, however, even within the same subject. Maria's receptive language, for example, went from 0% during baseline to 80% during the first reinforced session, while her prepositional language took much longer to reach criteria levels. For some of the children, on some behavioral areas, there obviously was some pre-reinforcement "knowledge" which, however, was not reflected in baseline measurements. It is, therefore, suggested that in some cases reinforcement did not function as a learning incentive, but as an incentive to emit already learned responses. Since disadvantaged children are disproportionately placed in special classrooms for mentally retarded, without apparent neurological defects (Frost and Hawkes, 1966), this placement must be based on some other observable behavior such as test performance or verbal performance. Neither the first grade teacher not a standardized test can differentiate between the child who does not "know" the answer and the child who "knows" but does not emit the required
behavior. Functionally, there is no difference. The functional aspects of the contingent reinforcement procedure, therefore, in either case, were to enhance the child's further development in relation to his environment.

In the present study, new ways of defining and improving procedures for the improvement of the cognitive behavior of disadvantaged children were demonstrated. It is clear that these kinds of behavior are suited to manipulation by operant procedures. So-called "mentalistic" concepts, which are of great concern to most people, need not be avoided as the subject of behavioral research. When operationally defined, these concepts become as observable, and therefore measurable, as a bar-press or an "out-of-seat" response. It is appropriate and necessary that the specific needs and intrinsic behaviors of any given population be considered in the application of applied psychology.

Through the course of the present study several interesting and perhaps population-specific relationships were observed. In the present setting paraprofessional training was a requirement of the Center's administration rather than an expressed desire of the trainees. Although daily appointment schedules were agreed upon by the trainees a week in advance, they came to the training session only about 8% of the time. If, however, the professionals found and reminded them of their appointments at the time they
were scheduled, this percentage rose to about 77%. (The remaining 23% of total represented instances in which trainees could not be found or were engaged in some other Center activity which precluded training. No trainee ever refused to come.) This phenomenal nonattendance in the absence of contingent material reinforcement has previously been observed in similar, low-income groups (Miller & Miller, 1970). An effort to alleviate this problem was attempted with one trainee, in the form of a "verbal contract." The terms of the contract stated that for each day she came to the room used for the training and teaching sessions at or prior to her scheduled time, she would earn $1.00, payable at the end of the week. The professional was never to remind or otherwise coax her to come. Furthermore, if she was "on time" each day during the normal 4-day week, she was to receive an additional $1.00 "bonus". It was therefore possible for her to supplement her income by an additional $5.00 a week for an approximate half-hour per day of work. The trainee was "on time" each of the first 3 days of the experiment. On the last day of the week, however, she did not come to the training-teaching session as she attended a special event involving all of the mothers at the center. The attendance procedure and this trainee's participation in the study abruptly ended the following week as she entered the hospital for minor surgery and was unable to attend the
Center during the rest of the study. Although this unfortunate event precluded the identification of any definite effect of the attendance procedure, it was noted that 3 consecutive days of "on time" behavior by this trainee, was a record not attained by any other trainee.

Although the use of punishment to promote the children's cognitive skills was strictly disallowed in experimental sessions, all mothers at the Center were commonly observed to rely upon aversive control to affect the behavior of their children, outside of the experimental setting. This method was never attempted by trainees who were not working with their own children, but on two or three occasions threats were used by trainees working with their own children in the experimental session. When used to gain the child's attention or response, aversive control always took the form of threats of physical punishment.

"Goin' to whup you boy, you don't stop cuttin' up," which was never carried out in experimental sessions and seldom carried out in other situations. When actually delivered, however, punishment was seemingly severe and excessive for children of this age. The fact that mere threats seldom resulted in any observable change in the children's behavior may well have been an effect of the inconsistency between threat and actual punishment. Supportive data for the use of "cook book" training methods may be found relative to the Center administration's efforts to reduce
this use of physical punishment. In the role of "staff member" the professional was required to conduct periodic lectures and discussions with the participants. If, for example, the required lecture concerned the alternative to using punishment as a means of controlling their children's behavior, few questions would typically be raised during discussion. The mothers would all agree to the effectiveness of these methods and verbalize that they might use them. If, however, an example was given, such as, "Suppose you found your child writing on the living room wall with crayons, what would you do?", the mother's typical response indicated a definite lack of understanding of the content previously discussed, such as "I'd bash him in the head."

Not only does this kind of response demonstrate the futility of lectures and discussions as a method of changing the behavior of this population, it also confirms the social approach taken by the authors. It is held that no professional should attempt to change the behavior of any population either against their will, or without their knowledge, nor merely to conform to the norms of some other group. The effort here, in regard to the use of aversive control with children, was not intended to preempt the mother's style of child rearing nor to change it to fit middle-class norms. Alternative methods of influencing children's behavior were presented because they are considered to be
more effective and potentially less harmful (physically and psychologically) to the welfare of the child. In any case, the final decision to use or abandon punishment remained the mother's once she had been exposed to alternative means. The observation that trainees working with their own children tended to rely on threat and punishment while trainees working with someone else's child never did so, suggests that for maximum effectiveness, training and subsequent paraprofessional activities should not pair a mother with her own child.

Some evidence of generalization of procedures and influence of principles was observed. One trainee excitedly reported that she had taught her child (who had not been involved in the study) to say "banana" at breakfast that morning by making the fruit available to her son contingent upon his verbalizing the name of the fruit, "banana."

On another occasion one of the subjects was tantrumming during a training session. This behavior was routinely placed on extinction as a method of reducing it (See Zimmerman & Zimmerman, 1962). The child's own mother, who was not a trainee, came into the room and removed the child. (This and similar behavior by the child's mother concluded in the S being dropped from the study.) Without prompting, both of the trainees present at the time expressed the opinion that the mother's behavior would only strengthen her child's tantrum response as she was reinforcing it.
(although not in technical jargon, of course).

This evidence of generalization is most encouraging. Although the present study did not include an attempt to produce generalization of the trainees' learned abilities to other settings, the desirability of such generalization is clearly great and should be the object of future research.

Although this study avoided the traditional use of large numbers of subjects, control groups and statistical analysis, the results and conclusions derived from the study are held to be general, reliable, and scientifically important. The experimental methodology used to arrive at these conclusions has been empirically (Hall, et al., 1970), and theoretically (Sidman, 1960) demonstrated. This method of research does not force the researcher to disregard the difference between individuals or to summate the performance of all of the individuals in order to make some general statement. Rather, through repeated measures and systematic application of the independent variable, critical relationships and empirical methods of influencing behavior are identified. The individuality of each research subject is accounted for and while the basic procedure remains constant, changes in detail, such as the type of reinforcer used, the number of sessions, etc., are altered to meet individual needs and requirements.
In summary then, what has been presented here is a means of training paraprofessionals with low academic qualifications, third grade or less, to effectively teach or remediate the cognitive skills of disadvantaged pre-school children. This is seen as fulfilling a critical social need in that this type of training enables many children to receive early help and perhaps thus prevent them from being social failures for the rest of their lives. This training is not limited to the mothers of these children. It is suggested that any community organization, a church, a club, a school, a political group, an economic group, or the Black Panthers could help their community in this way. By consolidating community interest and finances, providing a setting and people desiring this type of training, be they mothers, Neighborhood Youth Corps, or just interested neighbors, the group could help the community's children. If rapid social change is to be accomplished, it will be done this way; community people helping each other to build a better community.


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