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ABSTRACT

The report summarizes the second year of the Toddler Research and Intervention Project, which uses experimental research to devise and evaluate educational intervention techniques with approximately 28 normal or developmentally delayed children 1- to 4-years-old and their families. Described are researchers/teachers relationships, behavioral modification techniques taught to parents to reinforce their children's learning while at home, and program effectiveness. The etiologies of the 12 delayed children are said to include Down's syndrome, hydrocephalus, and brain injury. Classroom procedures, schedules (for two separate classes for younger and older children, four days per week), and activities (such as teacher giving directions which the child imitates with physical aid from parent or other teacher who sits behind child), are discussed. Presented in a lattice schema are the five sequential general curriculum areas of behavioral control, motor development, imitation, discrimination and classification, and language training. It is said that the third year's focus will be on social and self-help skills. Emphasized are independent walking procedures and expressive vocabulary training. Reported in five research studies are an operant approach to assessing toddlers' hearing acuity, an evaluation of new assessment instruments in the areas of receptive and expressive vocabulary, a comparison of receptive vocabulary skills in delayed and nondelayed toddlers, evaluation of a modified fading procedure in discrimination learning of delayed children, and the reliability and validity of a parental teaching style assessment scale. (For related information see EC 041 329 and EC 052 459). (MC)

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INSTITUTE ON MENTAL RETARDATION AND INTELLECTUAL DEVELOPMENT

A UNIT OF THE

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There can be no doubt that the Toddler Research and Intervention Project is a group effort and the accomplishments of the last two years are the result of the remarkable ability of the members of the group to communicate, cooperate, and always attempt to function in the best interest of their small charges. To the staff, students, and parents the writers wish to extend their gratitude and appreciation for making the project an exciting prospect for dealing with an important social issue, retardation.

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FOREWORD

At the writing of this report the Toddler Research and Intervention Project has completed its second year of operation. As stated in the first year report, the project "is a research program structured to devise and evaluate several different aspects of educational intervention with children who are between 1 and 4 years of age and who have moderate to severe developmental problems." This report covers the second year of that effort. The initial portion of the Year II report presents the theoretical orientation of the project with an emphasis on how this position has enabled the project to establish important educational goals.

During the second year the project was better able to evaluate the effect of the program on the normal developing or non-delayed children. The results are extremely encouraging. The final portion of the report focuses on the changes in the classroom schedule, program, and data collection procedures. Considerably more emphasis was placed on building a useable curriculum during this year and this emphasis will be pursued into the third year of the project.

During this year a film of the project was completed. The purpose of the film is to convey optimism to parents, professionals and the community-at-large as to the feasibility of: first, intervening with young handicapped children very early; second, the success of integrating delayed and non-delayed children into the same classroom; and third, the ability of these young delayed children to remain with their family without trauma to the child, his family or community. For information on this film write: Jeannie Williams, Box 75, George Peabody College, Nashville, Tennessee 37203.

Although the second year of the project has provided more useable information about young children than the first year, many problems still remain and much data is yet to be collected. The entire staff is looking forward to an exciting third year.

Introduction

The acceptance and support a society provides for its handicapped members varies from country to country. The United States has a record of variability of treatment depending on the handicapping condition. For example, the blind receive relatively adequate assistance while the retarded fare less well. The general cultural acceptance of a handicapping condition and willingness to segregate the individual seem to be highly correlated with I.Q. measures (Guskin, 1963). For example, few people would suggest a blind person be locked away for life, but institutionalization for moderately to profoundly retarded people is a prevalent expectation.

The history of the retarded people has been one of struggle to acquire services and even rights supposedly guaranteed to each citizen under our constitution. Within the past few decades substantial gains for the right to an adequate education have been made for the mildly retarded individual (Cruickshank, 1972; Dunn, 1968), and within the past few years this struggle has widened to demands by parents and professionals that all children regardless of the degree of retardation are entitled to an education (Gilhool, 1972).

A society faces a genuine challenge when the expectations are for all children to be educated. If the majority of retarded children are to be provided with some form of systematic educational experience, there is an urgent need to develop reasonable and workable materials and procedures that can serve that end. Those intimately associated with the problems of retardation would appear to be the individuals most qualified to build viable educational programs for the moderately to profoundly retarded child.

The recent literature indicates the development of many new educational procedures for the retarded child (Jones, 1970; Reger, Schroeder, & Uschold, 1968; Smith, 1968). This paper contains a description of the second year of a project proposed as one alternative approach to the education of young moderately to severely retarded children. The Toddler Research and Intervention Project has been operating for the past two years, and although the writers make no claim for establishing any entirely new and creative strategies, we hope the reader finds our innovative variations on some older themes to be stimulating and helpful in the development of additional educational procedures applicable to the needs of retarded children.

The Toddler Project is an experimental program that annually serves approximately 28 children and their families. The children range in age from 15 to 40 months and are divided into an older and younger group. Both groups attend four half-day classroom programs per week which focus on helping the child develop motor, language, and cognitive skills. Parents are trained to work with their children so that behaviors established in the classroom can be maintained within the home setting. The project also serves as a training base for community child-care workers, as a demonstration of effective classroom procedures with young children, and as a research base for several lines of laboratory investigations.

The Toddler Project was designed to meet five major objectives, which are: (1) to explore the extent to which service and research components can be successively blended into a single project; (2) to investigate early intervention with young developmentally delayed children to determine if such intervention is not only desirable but feasible; (3) to determine whether the integration of developmentally delayed and normally developing children can result in an effective educational

program for both types of children; (4) to examine how assessment procedures can be more useful in structuring intervention programs when they are linked directly to training procedures; and (5) to evaluate whether primary caretakers can be and/or should be included as an integral part of an intervention program.

The theoretical basis for these objectives is the experimental analysis of behavior (Baer, Wolf & Risley, 1968; Skinner, 1969). The behavioristic framework has been utilized in guiding not only the establishment of goals for the project, but also to provide a system for generating data on each of the selected goals.

Learning principles generated by the experimental analysis of behavior provide an ideal basis for combining service with research. In fact, within a system based on these principles service cannot exist without some objective measure of success. A service simply is not a service unless some tangible evidence exists that a child and/or his parents have benefitted from a particular program or procedure. The time has arrived when education can no longer assume the validity of an intervention approach. Documentation of procedures and content is necessary and subsequently provides the data for revising and developing more appropriate programs, for without research in its broadest sense, no objective information for program revision can exist. Many programs offer extensive global evaluation which can be most helpful in assessing the overall impact of a program; however, molar measures of a project's success generally provide no useful information as to what segment of a program made a contribution and which portions should be eliminated or revised. A service program, then, based on a research model can provide the type of data needed for detailed assessment and evaluation (Wolf & Risley, 1971). To date the teachers and researchers in

the Toddler Project have managed to cohabit without stress. The success can be partially attributed to the teachers' acceptance of quantitative data as a basis for decision making, and to the researchers' acceptance of studying issues which have somewhat immediate relevance to the training of children.

Principles derived from the experimental analysis of behavior also provide the rationale for the second goal of the project which is early intervention. The behaviorist does not take the position that appropriate behavior will be produced spontaneously by a child. Data available on many species of animals demonstrate that responses are elicited and maintained on the basis of environmental contingencies (Honig, 1966; Ferster & Skinner, 1957; Ullmann & Krasner, 1965). Fortunately most children learn from naturally occurring environmental conditions; however, the child who does not learn from "naturally" occurring environmental contingencies should be exposed to special prosthetic environments early in life. The more time that elapses before placement into a training program the longer the child may be without particular forms of behavior. Since development appears to progress in sequential stages (Piaget, 1963), the absence of a few critical responses can severely hamper a child's total development. For example, our staff has noted significant changes in a child's behavior after learning to walk. The walking response seems to allow a child more mobility, more freedom for hands to explore and manipulate, more social contact with peers (i.e. participating in chase-type games), and generally less dependence on the adult in the environment. A second reason for early intervention is the prevention or early detection of an inappropriate response such as stereotyped or self-injurious behavior. An inappropriate response maintained for three to four years is difficult

to control. Often a skilled shaper and carefully designed program are necessary components for eliminating an unwanted response (Allyon & Michael, 1965; Corte, Wolf & Locke, 1971). Valuable time and resources can be more profitably spent in helping a child acquire new, desired forms of behavior, than in eliminating firmly entrenched inappropriate responses. For this reason the Toddler Project focuses on the early entry of children into the program to assist the parent in establishing an effective training environment before much of the critical developmental period is past and the formation of many unwanted responses has occurred.

Behavior modification, the clinical application of principles derived from the experimental analysis of behavior, underlies the teaching approach used in the Toddler Project. Behavior modification consists of two major components: (1) the reinforcement of desired responses in combination with the extinction of undesired responses, and (2) the development of explicit programs of instruction (Bricker, 1970). These two basic principles provide the structure for the interaction that occurs between teacher and child. This basic structure allows for the successful integration of developmentally normal (non-delayed) and developmentally retarded (delayed) children which is the third goal of the project. Although the general principles are applied consistently across delayed and non-delayed children, the content of each principle depends upon a child's specific behavior. For example, a positive reinforcer for one child is not necessarily a reinforcer for another child. Two children who are learning to walk may be at different stages, so the eliciting stimuli and subsequent responses will be different. Behavior modi-

fication allows for the individualization of procedure, content and reinforcement.

However, the capacity for individualization does not suggest that all types of children should be included in a program. Although a wide range of developmentally delayed children can be served by a behaviorally based intervention program, the Toddler Project has chosen to select children who meet the following criteria: CA under three years; no gross physical or sensory impairments; no extremely bizarre forms of behavior; and indications of readiness to walk, such as attempts to pull up with support. These criteria were established to provide some minimal homogeneity within the group of children for two reasons. First, although the majority of the program is individualized, some group activities do occur in which all children should be able to participate at some level. Second, the non-delayed child has been included in part to serve as a "teacher" or "model" for the delayed child; if the developmental levels are too disparate, little meaningful interaction may result.

The evidence for the success of integrating nondelayed and delayed children comes from two sources. Each child is given a standardized intelligence test at the beginning and end of the school year (See Tables 1 and 2). All non-delayed children gained at least one month on the mental and/or motor scale for every month spent in the program. The second source is the parents' evaluation of the Toddler Project and its effect on their child. At the end of the school year the parents are given a questionnaire concerning certain aspects of the Project.

The parents of all nine non-delayed children in the first year and of 10 out of 12 non-delayed children in the second year were will-

ing to re-enter their children in the program. None of the parents in the first year felt their non-delayed child had suffered any negative effect from interacting with less capable children, while two out of 12 during the second year said perhaps their child had picked up some undesired responses from non-delayed children. All the parents of delayed children in both the first and second year expressed enthusiasm for integrating the classroom. These parents felt that their children benefitted from exposure to non-delayed children. We feel the parents' evaluations are important because the Toddler Project's development as a viable approach to early childhood education will largely depend on parents' willingness to participate in such programs.

The technological extension of the experimental analysis of behavior has taken many forms such as programmed instruction (Bijou, Birnbrauer, Kidder & Tague, 1966), precision teaching (Lindsley, 1964), and program latticing (Bricker, 1972). Intrinsic to each of these methods is a linked form of assessment. The fourth goal of the Toddler Project is to develop specific program materials with accompanying assessment procedures. Global diagnostic or assessment instruments provide little useful information for teachers or parents attempting to develop a training program in a specific area, nor were most standardized assessments constructed to do this. Repertoire assessment in a given area which is logically linked to a training program can be of value to teachers and parents. Many centers focusing on young delayed children seem to spend much of their resources on diagnosis, which is commendable if some useable information is generated. Often the only information coming from extensive diagnostic evaluation is labels which are of questionable help for children, teachers, or parents. Our approach

has been to specify in small hierarchical steps the content and its sequence for acquiring a specific behavior such as imitation. The programmed steps are presented until the child fails to emit the specified response at a certain level, thus providing the teacher with a detailed repertoire assessment (assuming the program is valid) of what the child can and cannot do in an area. The teacher also has the necessary information for beginning training as well as the subsequent training steps for reaching the terminal goal. Examples of programs used in the Toddler Project are presented in a later section of the paper.

The final goal of the Toddler Project is to include the parent or caretakers as an integral part of the Project. Acquisition and maintenance of responses are largely a function of a good program and consistent reinforcement. If the teacher shapes a response into a child's repertoire which is never reinforced at home, the response will probably occur only in the classroom. Conversely, extinction of temper tantrums becomes more difficult if the response is being maintained elsewhere. If a child is confronted with a systematic program at home and school, developmental progress should be maximized. Generalization of new responses to other environments is an important training step and the parent is the logical person to help the child make this critical transition. The type of parent training used in the Toddler Project has shifted from weekly meetings of a didactic nature to a direct training approach. Parents work side-by-side with staff members in individual training sessions with their child. The trainer attempts to provide immediate feedback for the mother as she responds to her child. Several of the staff have been intrigued enough by the parent-child training process to establish an entire line of re-

search concerning this topic. This research will be summarized below.

In summary, we have attempted to establish objective goals for the Toddler Project that are consistent with the tenets of the experimental analysis of behavior. After two years we are beginning to develop a pool of objective evidence which, for the most part, supports the validity of these goals. The evidence to date suggests that delayed and non-delayed children can comfortably and productively exist in a single project, that parents can become effective teachers, that assessment and training procedures should be directly linked, that early intervention is worth the expense and time, and that a research project can provide a service for children and their parents. However, much more data will have to be acquired before we can be sure that each of these goals is reasonable and obtainable.

Physical Setting, Children, And Staff

Physical Setting

The Toddler Project is housed in the Experimental School located in the John F. Kennedy Center for Reseach on Education and Human Development on the campus of Peabody College. The Center is one of the 12 major mental retardation research centers in the country. The Toddler Project occupies one of the double classrooms in the Experimental School. Three-fourths of the area is used for the classroom activities while the remaining one-fourth is used as a large observation area. Located in the vicinity of the classroom are several experimental rooms. A separate observation area is reserved for the children's parents. The classroom is divided into the typical preschool areas for activities such as housekeeping, group time, and quiet work. One corner of the room has been sectioned off for the teachers to use for individual training sessions with children. The outside play area is easily accessible and contains a variety of playground equipment.

Children

At the beginning of the school year children generally range in age from 15 to 36 months. During the first year of the Toddler Project, 11 delayed children with CAs from 15 to 30 months and nine non-delayed children with CAs from 12 to 30 months were included in the program. In the second year 12 delayed children with CAs from 16 to 38 months and 13 non-delayed children with CAs ranging from 17 to 29 months made up the population of the project. The remainder of this paper will be restricted to a description of the second year of the Toddler Project since the first year's program, population and results are described in detail elsewhere (Bricker & Bricker, 1971). In Table 1 are pre-

sented the age at entry into the program, the developmental quotient or I.Q., and the subsequent assessments following six, eight, 12 or 18 months in the program for each delayed child. Table 2 presents similar data for the non-delayed child who entered the program in September 1972. These data are presented only for information value and have not been analyzed for two reasons. First, the project has no non-intervention control group; consequently, no basis exists for comparing the gains made by our Toddlers until they get older. Second, the unreliability of infant intelligence tests is widely accepted (Gallagher & Bradley, 1972; Stott & Ball, 1965) and this unreliability is probably compounded when testing a developmentally delayed child.

Since the project has no funds for transportation, the majority of the families in the project can be classified in the middle to upper income levels; however, the project has several families whose income is at best modest. Although lack of transportation is an important factor for non-participation, one other notable factor exists. The middle class mother is probably more sensitive to developmental deviations in her child than a mother from a lower socio-economic background. Note that we did not say a lower class mother is less sensitive to her child, but she seems to be less sensitive to atypical development. Consequently, a child raised in an economically comfortable home may be detected as deviant earlier than the child living in less affluent surroundings (Mercer, 1965). A future goal of the Toddler Project is to acquire supplementary funding for transportation in order to broaden the population base and thereby more thoroughly evaluate this assumption.

Table 1

CAs, Bayley Developmental Quotients (DQ) and Months Gains after 12 and 18 Months in the Project for the Delayed Children

Subject	CA Months[a]	Developmental quotients[a]		Age placement[a] (months)		Age placement after approximately 12 months				Age placement after approximately 18 months			
		Mental	Motor	Mental	Motor	Mental	(gains)[b]	Motor	(gains)[b]	Mental	(gains)[b]	Motor	(gains)[b]
1	26	55	<50	16	14	22	(6)	21	(7)	25	(9)	24	(10)
2	25	<50	<50	16	16	24	(8)	18	(2)	29	(13)	25	(9)
3	22	<50	<50	12	9.5	21.5	(9.5)	18	(8.5)	27	(15)	22	(12.5)
4	16	50	87	11	13	19	(7)	21	(8)	25	(14)	25	(12)
5	23	<50	<50	14	9.5	23	(9)	20	(10.5)	26	(12)	23	(13.5)
6	18	<50	<50	11	10	16	(5)	15	(5)				
7	17	59	<50	10	8	19	(9)	13	(5)				
8	21	80	<50	19	12	30+	(11+)	12.5	(.5)				
9	18	<50	65	11	12	22	(11)	20.5	(8.5)				
10	20	<50	<50	10	8.5	12[d]	(2)[d]	11[d]	(2.5)[d]				
11	16	<50	58	11	10	15[d]	(4)[d]	12[d]	(2)[d]				
12	26	57[c]		15.5[c]		22[c]	(6.5)[c]						

[a]Measures obtained at time of entry into program

[b]Months gained since entry into program

[c]Cattell scores, second administration after 8.5 months

[d]Data for approximately 6 months interval

Table 2

CAs, Bayley Developmental Quotients (DQ) and Months Gains after 7 Months in the Project for the Nondelayed Children

Subject	CA[a] (months)	Developmental quotients[a]		Initial Age placement (months)		Age placement after approximately 7 months			
		Mental	Motor	Mental	Motor	Mental	(gain)	Motor	(gain)
1	17	122	115	20	20	30+	(10)	30+	(10)
2	18	111	88	20	17	30+	(10)	25	(8)
3	19	131	107	24	20	30+	(6)	29	(9)
4	23	139[b]	-	33[b]	-	42[b]	(9)	-	-
5	25	130[b]	-	33[b]	-	42[b]	(9)	-	-
6	29	112[b]	-	34[b]	-	47[b]	(13)	-	-
7	25	122[b]	-	30[b]	-	42[b]	(12)	-	-
8	22	97	93	22	21	30+	(9)	30	(9)
9	21	111	108	23	23	30+	(7)	30+	(7)
10	20	120	97	23	20	30+	(7)	24	(4)
11	22	94	97	21	21	30+	(9)	30	(9)
12	19	109	76	20	15	30	(10)	22	(7)
13	17	116	93	19	16	30+	(11)	23	(7)

[a]Initial measures obtained

[b]Binet scores

The non-delayed children generally come from middle to upper income homes. The majority of the fathers or mothers are either professionals or graduate students. Again this type of family seems eager to expose children to a variety of settings and experiences during the preschool years. The opinion of the staff is that these parents can be among the most difficult to please in terms of "good" programs for their children.

The etiologies of the 12 delayed children included seven with Down's syndrome, two with hydrocephalus, two with documented brain-injury at birth, and one with an unknown etiology. Eleven of these children have a clear genetic or physiological basis for their learning difficulties while the twelfth child who is severely delayed remains medically unremarkable. According to medical personnel no discernable biological basis exists for this child's retardation. In a behavioristic framework etiology is given little emphasis because it provided little prescriptive information for intervention. A behavioral description would be considered more useful. Table 3 provides a listing of some of the skills acquired so far by the delayed children in the Toddler Project, all of whom are under four years of age.

Staff Description

The staff is composed of the project director, the director of research, a classroom coordinator, a teacher, graduate level research associates, research assistants, and graduate, undergraduate and community practicum students. The program director's responsi-

bility is to coordinate the needs of the many components of the project. These include service to the children, training of parents and students, research investigations, daily classroom activities, communication with project visitors, community liaison, and development of assessment and curriculum materials for use by other agencies dealing with young delayed children.

The director of research coordinates the research investigations using the project's population. He acts as a clearing house for evaluation of the investigation, the research design, the data collection procedures, and subsequent analysis.

The classroom coordinator has the primary responsibility for directing classroom activities and contact with parents. The coordinator has a master's degree in Special Education plus two years of experience working with young handicapped children. Her duties center on four areas: developing program curricula, monitoring the application of learning principles within the classroom, coordinating the parents' involvement in the program, and training students assigned to the classroom. She has access to a talented group of doctoral level personnel in the areas of developmental, clinical, and experimental psychology, and special education.

The classroom teacher has been with the project since its inception. Initially, she had no experience with young delayed children or behavior modification; consequently, she has been trained in accordance with the philosophy of the project. Her duties are the application of behavior modification principles and the outlined curriculum to the daily classroom activities, to provide immediate feedback to students working in the classroom, and to communicate problems in the curriculum or procedures to the

Table 3

Skills of the 12 Delayed Children

Subject[a]	Walks without support	Says "Hi" and "Bye"	Vocabulary of several meaningful words	Meaningful phrases	Meaningful sentences	Partially toilet trained	Fully toilet trained	Drinks from cup unassisted	Feeds self with utensils	Partially dresses self
1	+	+	+	+	-	+	-	+	+	+
2	+	+	+	+	+	+	+	+	+	+
3	+	+	+	-	-	+	-	+	+	+
4	+	+	+	+	+	+	-	+	+	+
5	+	+	+	+	+	+	-	+	+	+
6	+	+	+	-	-	-	-	+	+	-
7	+	+	+	-	-	-	-	+	+	-
8	+	+	+	+	+	+	-	+	+	-
9	+	+	+	+	-	+	-	+	+	+
10	+	-	-	-	-	-	-	-	-	-
11	+	-	-	-	-	+	-	+	+	-
12	+	+	+	-	-	+	-	+	+	+
Total	12	10	10	6	4	9	1	11	11	7

[a] Subject order consistent with Table 1

coordinating and research personnel.

The research associates' and assistants' primary involvement lies in the experimental portion of the project; however, these people often provide major support in individual training sessions for both children and parents. The practicum students are assigned to the classroom to learn while assisting in the daily classroom operation.

Parent and Student Training

> The Toddler Project staff is convinced that the success of any intervention program with a group of moderately to severely handicapped children will depend on the involvement of the child's parent or guardian in that intervention program. If the people who are primarily responsible for the child's care are working at odds with the program, or not reinforcing and emphasizing what occurs within the program, the gains, if any, will probably not be maintained. The child is in the classroom for two hours a day while the remainder of the time is spent with the mother. Consequently, the project has attempted from the beginning to include the parent as an integral part of the program; however, the participation of the parent has shifted. (Bricker & Bricker, 1971, p. 37)

Parent involvement initially consisted of weekly meetings in which parents discussed their problems. After the first year of the program parents and staff agreed that meetings were not the answer to helping a parent become a better teacher.

> To help the parent become a more effective teacher with his own child, it was decided to train the mother as she trained her child. The mothers began bringing their children 30 minutes before class. One staff member (trainer) was assigned to one or two mother-child dyads to serve as a teacher-observer. With the trainer's help, the mother selected an educational task for her child. The children were generally trained on either motor imitation, receptive tasks, or naming tasks. An appropriate pretest was administered to the child and then training began with those

> items the child was unable to produce correctly. As the mother trained her child during these daily sessions, the trainer prompted the mother. The trainer pointed out principles the mother should be using (for example, reinforcement of an approximated behavior). The trainer demonstrated such things as better shaping procedures, how to reinforce the child more quickly, and how to identify an approximation, whenever necessary. During these sessions video tapes were made of the parent teaching her child. These tapes were used in weekly critique sessions. The tapes were re-run and the mothers were able to observe themselves in action. (Bricker & Bricker, 1971, p. 38-39)

Although these sessions seemed a big improvement over discussion meetings, the staff was still not satisfied with the results. The major obstacle seemed to be the need for a careful analysis of when and how the mothers' training was inappropriate. During the training sessions, trainers in the room with the mother and child found it impossible to be objective in isolating problems in procedure and content presentation. Consequently, the research staff launched a series of investigations to isolate the important training variables, to determine where professional shapers and parents differed, and finally to decide how to train parents effectively in areas where they demonstrated deficiencies. The first step was to build an assessment instrument that would reliably indicate in detail mother-child interactions during training sessions. This is described in greater detail in another report (Robinson & Filler, 1972). The initial data coming from these investigations suggest that mothers give many verbal directions which often may not be relevant to the child; they use too few instances of guidance, physical prompts and demonstration; they provide inadequate feedback for approximate responses; and they do not break tasks down into small manageable steps. These data will provide the basis for the development of specific training program that can be used with par-

ents in many different applied settings.

The procedure for training students in the classroom has also undergone substantial change during the past two years. Each semester at least three-fourths of the practicum students are new to the project. These students come from the school of nursing at Vanderbilt University, from departments of early education, human development, special education, and psychology at Peabody College, community mental health training programs, and from the training class for new aide level personnel at a large state institution located in the area. Initially the training program was unstructured and students were allowed to direct much of their own activity. As the laissez-faire approach resulted in unwanted outcomes, we gradually adopted the following method.

Each semester the week before classes begin is devoted to in-service training. Any student who does not attend this program is not allowed in the classroom. Each training session lasts two hours and the student has required reading to do before each session. The outline of the training sessions appear below:

Monday	Introduction to Toddler Project Pretest Film of the Toddler Project
Tuesday	Behavioral objectives Assessment procedures Curriculum
Wednesday	Behavior control Shaping techniques Data recording techniques
Thursday	Classroom procedures Programs for children Video training tape
Friday	Practicum goals Posttest Agenda for rest of semester

Following a brief introduction on Monday each student takes a pretest

covering the material to be presented the following four days. A posttest is given on Friday and the student is expected to achieve 75 percent correct responses or is asked to re-read the material before entering the classroom.

Following the week of in-service training, each student is responsibile for two hours of general observation of the classroom. The student is expected to know each child by name and what particular programs of instruction each child is currently working on. The classroom coordinator and teacher fill out a behavior rating sheet on each student every second week so that the student has an on-going evaluation of his performance in the classroom. The teacher also holds weekly meetings in order to discuss problems that develop within the classroom.

The last requirement of each student is an intervention project with an individual child. The project must meet certain design criteria. The objective of the project is to help the student acquire the necessary skills for validating his teaching techniques with children.

The more structure we have applied to the student training program, the more positive feedback we have received from the students. This phenomena suggests that the majority of students are not opposed to rigor and hard work if they can be convinced of its usefulness for the future.

Classroom Procedures And Curriculum

General Classroom Approach

For the past two years the Project has included non-delayed children in the classroom from September through May; however, the summer program is conducted for only delayed children. The staff and parents feel that continuing the program for the delayed children during the summer helps insure that the child's progress is maintained into the following school year. Other reasons exist for limiting programming to delayed children during the summer. With fewer children, the staff has more time to develop new curriculum programs and implement modifications in existing programs. Also, additional space is available for including new delayed children, and the staff has more time to assist the child's adjustment to the program.

As mentioned earlier, principles of behavior modification are used in the classroom as the primary training tool. Since many explanations of behavior modification exist in the literature (see Diebert & Harmon, 1970; Hall, 1971; Tharp & Wetzel, 1969), no attempt will be made here to discuss the approach in detail. However, these writers have encountered many individuals who classify behavior modification as a rigid, mechanical approach, or who think of behavior modification as a content area; consequently, some explanation seems necessary. First, applying the principles of behavior modification should not lead to a mechanized approach, but to a highly individualized and responsive system for training children. Principles of behavior modification dictate that teaching be based on sound principles of learning which include establishing goals or terminal states, breaking training sequences into small steps that can be managed by the

child, and providing reinforcement and immediate feedback. The rigidity, or misuse of the system comes when a teacher tries to insist that all children fit into the same program or when inappropriate goals or targets are established. Behavior modification is a tool that can be helpful or harmful depending upon how the user chooses to apply it.

A second point that many people still seem unable to grasp is that behavior modification is not a content area. Behavior modification does not provide the answer for deciding what activities or set of responses need to be included in a training program to reach a specified terminal goal. For instance, in teaching reading the principles of behavior modification do not tell the teacher which response should be elicited first, or what should be the subsequent hierarchy of responses. Behavior modification only provides the necessary information for making procedural decisions.

The overall approach used in the classroom is guided by three principles. First, teachers, staff, and parents try to reinforce a child's appropriate behavior. When a new response is being established, extrinsic reinforcement is used; as the frequency of a response increases, consequences are shifted to intrinsic reinforcement. Second, inappropriate behavior is generally ignored. If an unwanted response is maintained, the child is seated in a chair, told "No," and restrained for a few seconds. Appropriate behavior is the discriminative stimulus for release. Third, new responses are shaped into the repertoires of delayed children through careful programming. The curriculum program developed to date is discussed in the following section.

Classroom Schedule

The Toddler Project conducts two separate classes Monday through Thursday each week. The morning class operates from 9:00 to 11:30 for the younger children and the afternoon class operates from 1:30 to 4:00 for the older children. The breakdown of class activity periods is listed below.

Opening Group Time — Morning 9:00-9:15 Afternoon 1:30-1:45

1. Seat children in chairs.
2. Say "Hi" to each child and elicit a response--"Hi," wave, eye contact.
3. Sing songs
4. Practice motor imitation, e.g. touch feet, clap hands.
5. Have children push their chairs to the tables.

Puzzle Time — Morning 9:15-9:30 Afternoon 1:45-2:00

1. Seat children in their chairs.
2. Give each child a puzzle.
3. Prompt child to remove pieces.
4. Prompt child to replace pieces.
5. Prompt child to return puzzle and get another.

Programs — Morning 9:30-10:45 Afternoon 2:00-3:15

1. Each teacher takes her first group to the assigned area and begins work on the program.
2. When the first group is finished, tell the children they may play; find the children in the next group, take them to the assigned area and begin on the program.
3. Continue with each group on the schedule until all children have been through the program.

Free Play — Morning 9:30-10:45 Afternoon 2:00-3:15

(For children when not involved in a program)

1. a. Tell child to find a toy--prompt if he does not.
   b. Suggest an activity--slide, boat, housekeeping.
2. Move around the room giving attention to each child.

Gym Time or Outside — Morning 10:45-11:10 Afternoon 3:15-3:40

1. Announce that it is time to put away toys and go to the gym or playground.
2. Prompt children to pick up toys and put them away.
3. Have children gather at door.
4. When leaving the room have one teacher go first, one teacher help non-walkers, and one teacher check to make sure that all children get to the gym.

Activities in the Gym or Outside

1. Riding tricycles and any non-pedal toys
2. Playing with balls
3. Jumping and rolling on mats
4. Running
5. Games (Ring around the roses)

Juice Time — Morning 11:10-11:20 Afternoon 3:40-3:50

1. Seat children in chairs.
2. Elicit appropriate responses from each child before giving him juice.
3. Take the cup when a child is finished.

Closing Group — Morning 11:20-11:30 Afternoon 3:50-4:00

1. Sing songs.
2. Practice motor imitations.
3. Beginning at one end of group instruct each child in turn to say good-bye to the child seated next to him.
4. Have children say good-bye together.
5. Tell children to get their coats.

During group time the children are required to sit in chairs placed in a semicircle. The teacher faces the children and then gives directions that each child is to follow, such as "Touch your nose" or "Clap your hands". Other teachers, assistants, or mothers sit behind the children and physically prompt the response if the child does not emit it spontaneously or responds incorrectly. Following group time the children push their chairs over to small tables for a period of puzzle working or form discrimination. The degree of difficulty of the puzzle or shape box given to a child is slightly above his level of competency. For example, if the child has learned to insert a circle appropriately in a shape box, the next step would be to program inserting squares. If the task is too difficult, all holes except the square one can be taped shut. Gradually, as the child develops competency in inserting the square, the tape is removed to make the task more complex and the circle and square are presented simultaneously, thus making the task more difficult. This procedure is repeated if necessary with each new shape that is introduced. Often the teachers use backward chaining elp a child master a puzzle. That is, all the pieces are left in place

except one and the child's job is to insert that one piece. Since there is only one empty hole, the task is less complex than facing several empty holes with as many pieces. Once the child can consistently place the piece in the hole, two pieces are removed and the child's task becomes to insert both pieces. Again this procedure is repeated until the child can complete the entire puzzle.

After the table training tasks the children are allowed to select personally other activities. The teachers also use this time for specific skill training. To teach specific skills, programs need to be developed for each child and subsequently implemented by both parents and teachers. For example, a technique that has been employed in the individual training sessions has been to group children on the basis of similar performance in some developmental sequence and then work with small groups of youngsters. This procedure has been used with children learning to go up and down stairs. Although most of the delayed children could walk, several would not attempt to climb stairs except on their hands and knees. A program was initiated to encourage step climbing in a vertical position. Initially the teacher began by providing much physical support for the child as he ascended and descended the stairs. Gradually, she began withdrawing her physical support so the child had to depend more and more on his own balance.

The individual training sessions are followed by outdoor play, music, or physical activities in the gym, depending on the weather. This period is used to encourage following directions and large muscle activities which are particularly helpful in developing the poor muscle tonus of the Down's syndrome children. Outside play consists of swinging, playing in the sand box, and other similar activities.

Juice and snack time is used to elicit speech from each child. Children are required to emit some vocalization before getting a sip of

their juice. Since the children vary in their verbal ability some are required to say "Juice" or "More juice," while others are required to say /ju/ or /mo/, and others are simply asked to imitate a simple verbal sequence such as /wa wa/. As their speech develops, the children are requested to produce a more complex verbal utterance to gain their juice. After juice time, there is an art period during which the children are seated at small tables. Activities during this period center around using crayons, play dough and other similar media. The final activity is closing group time which is conducted like opening group time.

Classroom Curriculum

For many early childhood educators specifying a daily curriculum is both unnecessary and undesirable. The reasoning behind this position seems to be that a teacher or caretaker as well as the child should be free to respond to the situation from moment to moment. Since the Toddler Project is not a day-care program, but an attempt at educational programming for young handicapped children, a structured curriculum is both a desirable and necessary goal. The literature supports the use of a structured approach for both low-income and retarded children (Karnes, Hodgins & Teska, 1968; MacCubrey, 1971; Rhodes, Gooch, Siegelman, Behrns & Metzger, 1966; Weikart, 1970). By carefully specifying a curriculum, the teacher, parent or staff member can begin to validate the activities generated by this curriculum, whereas, unspecified sets of procedures and content would make validation difficult. Implementation of changes is simpler and more objective in a structured curriculum because one has more assurance that an activity has been consistently and repeatedly tried without success. In an open, unstructured system, the usefulness of a set of materials is more difficult to determine since the use of materials and procedures may vary from day

to day. If a curriculum area is programmed and used with several children, one can begin to collect systematic data on the effectiveness of the program or portions of a program across children. In an unstructured program, variability would make it more difficult to compare procedures and activities across subjects.

A structured curriculum also has important advantages for the untrained parent or teacher. Since the curriculum is spelled out, the new trainee can see the progression of activities. In a sense the trainee is provided with an overview of the educational program. A structured curriculum also may help eliminate training gaps. The act of attempting to specify program steps should result in thinking through the activities in order to cover all relevant areas for the acquisition of a specific behavior. A specified curriculum can certainly aid in conveying information to other individuals. A detailed outline provides much more information about how to reach a terminal state than do broad statements which provide little concrete information. Since one of the Toddler Project goals is to convey information on early intervention to parents and other interested people, the more detailed the curriculum, the more satisfactorily does it fulfil this function.

Although during the past two years many programs and much data have been generated, in general the curriculum outlined below has not been satisfactorily validated. The information offered in this section is an initial attempt at curriculum specification and no doubt, many changes will occur as the program is applied to new children. Currently the curriculum development extends to five basic areas: behavior control, motor development, imitation, discrimination and classification, and language training. The development of curriculum programs in social and self-help skills is an important goal which will receive attention during the next year.

The lattice presented in Figure 1 contains the five general educational curriculum area of the Toddler Project. The five boxes above the ascending diagonal line represent the terminal goal of each of these curriculum areas. The series of boxes located directly below each terminal state box represents the training program in a hierarchical sequence. For instance, in the area of imitation five boxes appear below the diagonal line. The first box is labeled as repertoire assessment which is true for each curriculum area. The first step in programming is to assess the child's performance capabilities in a given behavioral domain. Table 4 contains the motor imitation assessment for simple (Level I) and complex (Level II) tasks. The child's performance on the assessment instrument in a specific area will determine at which subsequent box to begin training. If the child demonstrates no imitation, training will be begun with simple motor imitation and proceed to subsequent training boxes until the terminal state is reached. In this particular instance the assessment instrument provides the content of the training activities, or in other words, provides the program of training. The lattice is a useful schema to represent a sequential arrangement of increasing developmental capabilities in educational programming from simple controlled behavior to cognitive uses of complex verbal behavior. The program boxes are placed to represent a hierarchial sequence in both the vertical and horizontal dimensions; however, programs often are begun within areas simultaneously. Horizontal lines connecting boxes indicate the program in the box to the left is a prerequisite to the subsequent box. For example, gross motor skills are precursors to simple motor imitation.

> ...the development of most handicapped persons does not occur without facilitation and it is the task of an educational theory to specify the content and the process by which such development can be facilitated. (Bricker , 1972, p. 63)

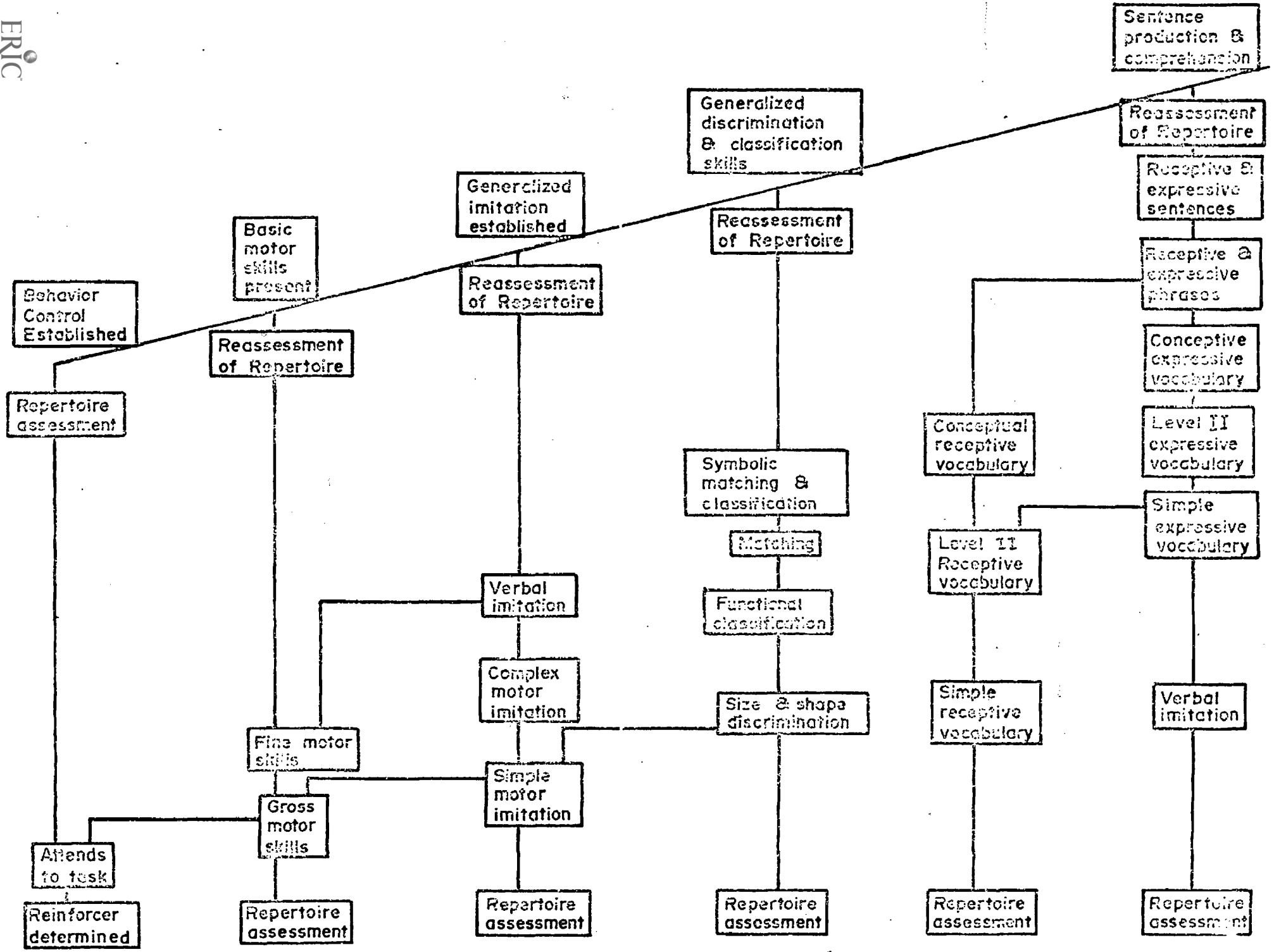

Fig. 1. The lattice of the educational curriculum areas.

Table 4

Motor Imitation Assessment and Training Sequence

Level I Simple Motor Imitation Test Items	Level II Complex Motor Imitation Test Items	
1. Ring bell	1. Hands on mouth	11. Open mouth
2. Beat drum	2. Hands on head	12. Tongue out
3. Squeak toy	3. Pat knee	13. Blow feather
4. Stack barrels	4. Finger on feet	14. Scribble
5. Pat board	5. Touch ear	15. Turn page in book
6. Roll ball	6. Raise foot	16. Turn around
7. Cups in cups	7. Walk in place	17. Arms waving
8. Put on hat	8. Clap hands	18. Bow up and down
9. Stir with spoon	9. Wiggle Fingers	19. Stand on one foot
10. Uncover dog	10. Rub tummy	20. Kick ball

In a sense, a program lattice can be thought of as a map of an educational theory which is attempting to specify the content for selected curriculum areas. The program lattice appearing in Figure 1 is an overview of the curriculum areas in the Toddler Project. Since each box represents an entire training program, expanding these boxes into procedural lattices is necessary in order to specify training steps. For example, the box referring to gross motor skills would contain programs on sitting, crawling, walking, stair climbing, grasping and other similar skills. Each skill area needs to have a procedural lattice developed such as the one on walking presented in Figure 2.

Five major steps are included in the procedural lattice for training independent walking. The first step is the training of pull stands. This teaches the child to support himself in a vertical position, a prerequisite to walking. Once the child has learned to pull to a standing position, he is trained to walk around tables, chairs, and other items of furniture while using them for support. In the next step, the child is moved to parallel bars or an alley of parallel chairs where he learns to support walk by putting one foot in front of the other rather than by the side-stepping movement he used to move around furniture. The fourth step involves training the child to walk with even less support through the use of a dowel stick. Figure 3 offers a detailed description of this phase of the training in the form of an implementation lattice. At this stage the child is taught to grasp one end of the dowel while the trainer holds the other end, offering support to the child as he moves forward. The trainer can vary the support by shifting his hand closer to or further away from the child's,

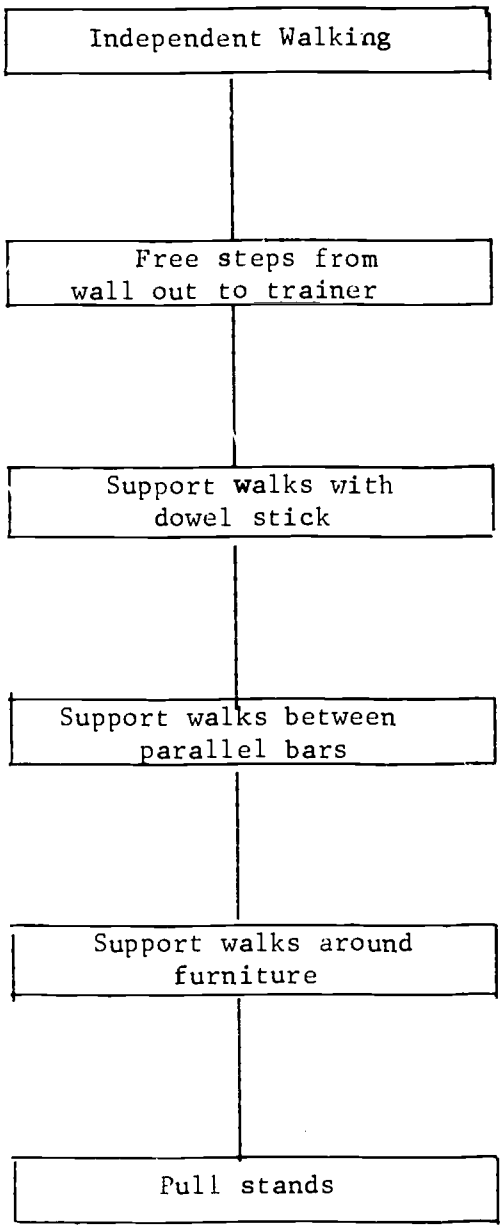

Fig. 2. Procedural lattice for walking program.

or by grasping the rod more or less firmly. The trainer gradually fades the support as the child gains balance and control over his stepping movements. In the final step, the trainer stands the child against a wall, moves a short distance away from the child and encourages him to step away from the wall. The distance between child and trainer is gradually increased, thus increasing the number of steps the child is required to take before he reaches the trainer, who subsequently reinforces the child for independent walking.

Figure 4 presents the data from the application of the dowel stick procedure with a toddler in the classroom. The data indicate that the number of steps taken with the support is increasing across sessions. When the child reaches criterion on this program, he will be moved to the next step which is free stepping from the wall. Consequently, the careful specification of a broad program lattice has provided the framework from which to generate more detailed procedural and implementation lattices that can be applied to individual children and within which data can be collected.

A second example of the use of lattices for developing and implementing curriculum goals in young children is in the area of sentence production and comprehension. Within this curriculum area is a training box noted on the program lattice as simple expressive vocabulary which refers to the process of naming objects, actions or situations (See Figure 1). It is not necessary to expand this training box to a procedural lattice since only

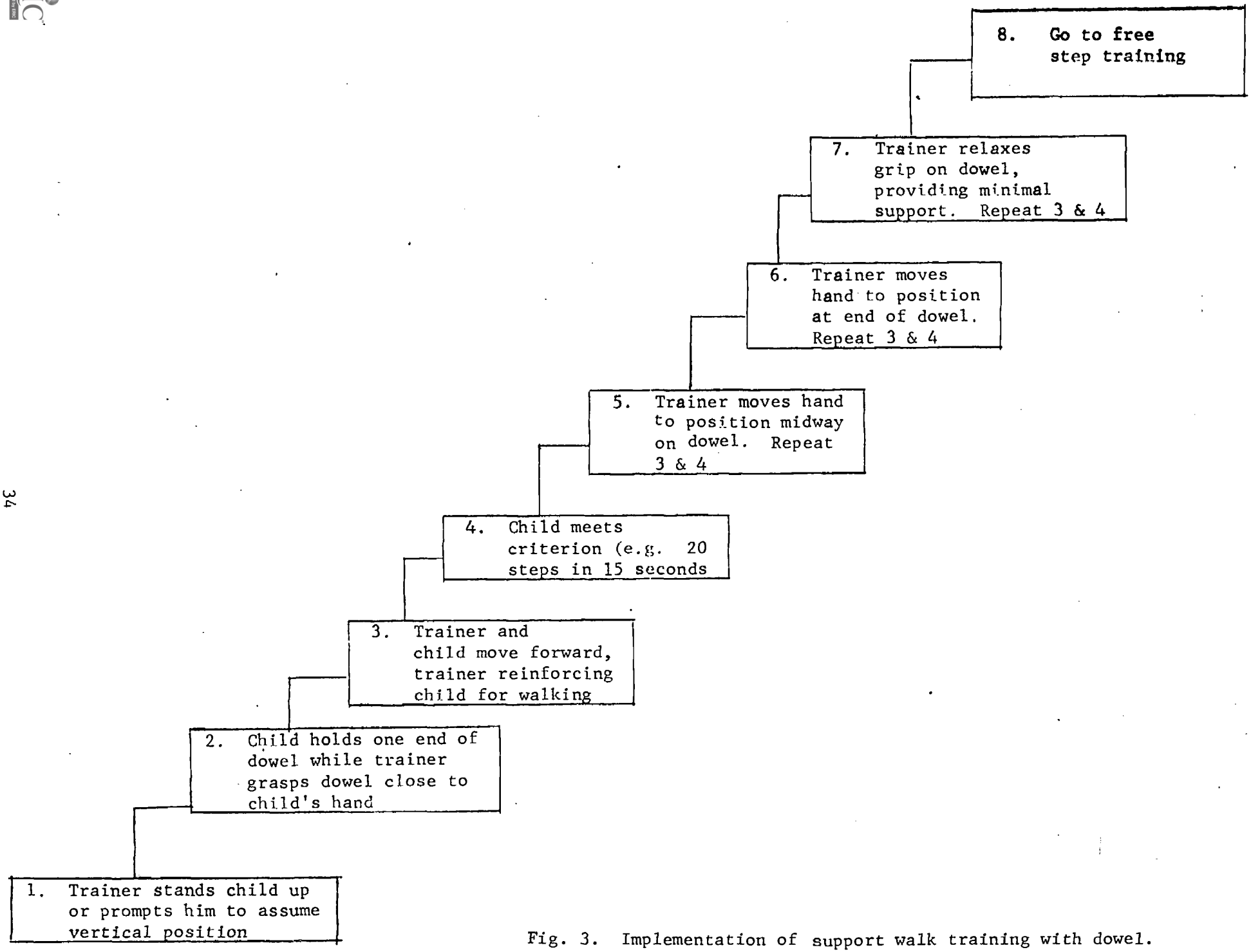

Fig. 3. Implementation of support walk training with dowel.

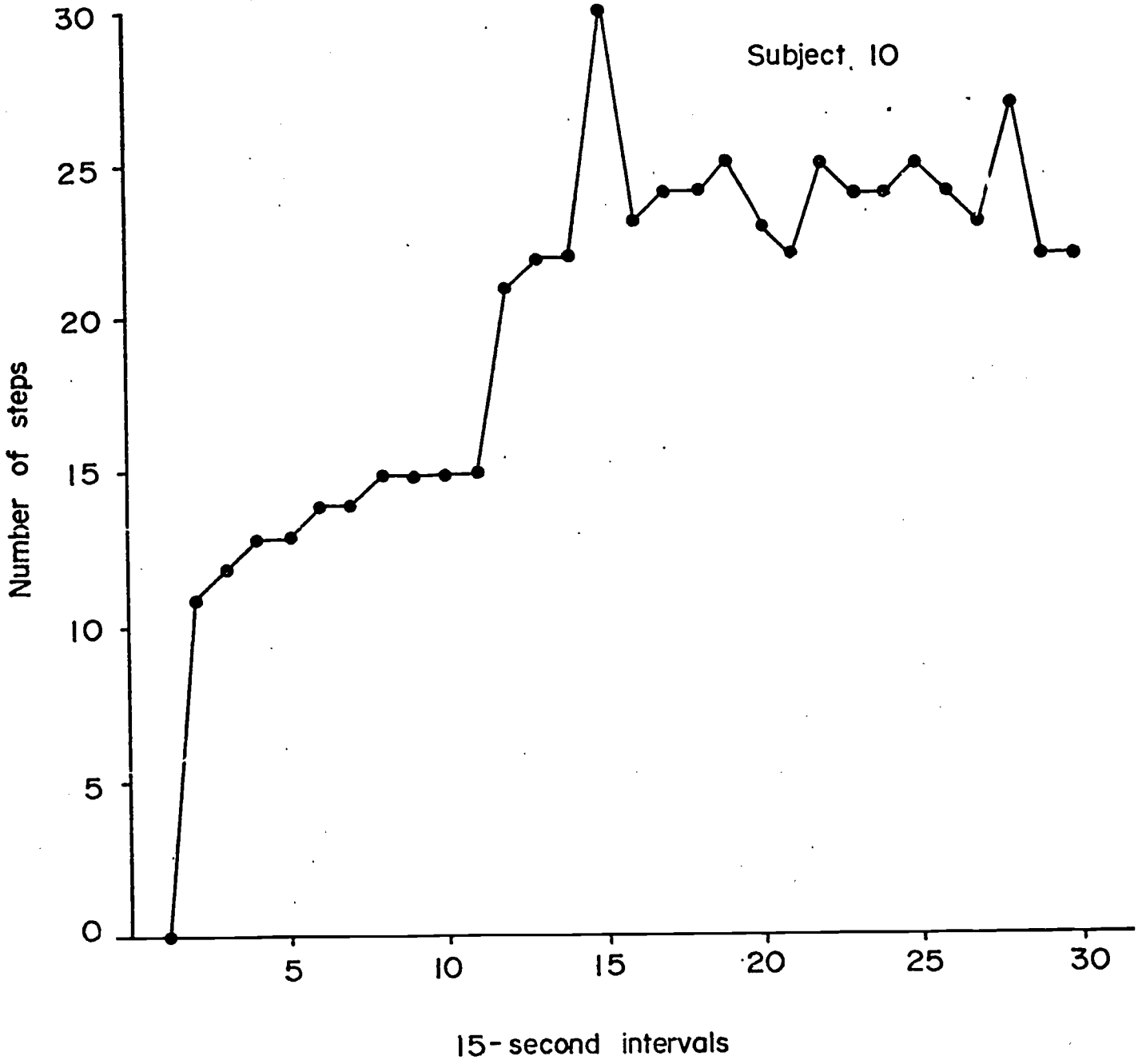

Fig. 4. Number of steps taken by a delayed child across 15-second intervals during support walk training with dowel stick.

one basic skill is involved in learning to verbally produce a label appropriate to the stimuli. However, it is useful to develop an implementation procedure for teaching this skill. The most appropriate form in which to represent this type of training is referred to as a flow diagram (for a detailed description see Cantrell & Cantrell, 1972).

The training flow diagram presented in Figure 5 is a detailed description of simple expressive vocabulary training. Once the child has demonstrated verbal imitation skills and receptive knowledge of words, he is ready for the training program in expressive labeling of the items which he knows receptively. Generally, four or five words are trained at once. The trainer selects pictures or objects to represent these words and presents them in a random sequence. Holding up one item in front of the child, the trainer asks, "What is this?" If the child responds correctly, he is reinforced; if not, he is presented with a verbal model to imitate, and reinforced for an appropriate imitation. The echoic model is faded out across trials. Training proceeds in this manner until the child has met a criterion for correct responses to that set of stimulus items (e.g. eight consecutive correct responses). At that point, either a new set of stimuli are selected and trained in a similar manner or the child proceeds to the syntax training program depending on the size of his expressive repertoire. Data on an expressive vocabulary training program conducted with one of the delayed toddlers is presented in Figure 6.

The Toddler Project has attempted to evolve a new approach to young developmentally delayed children. Although the Project has been operating for only two years, the findings are extremely encouraging. Young delayed and non-delayed children can adjust and make developmental progress when

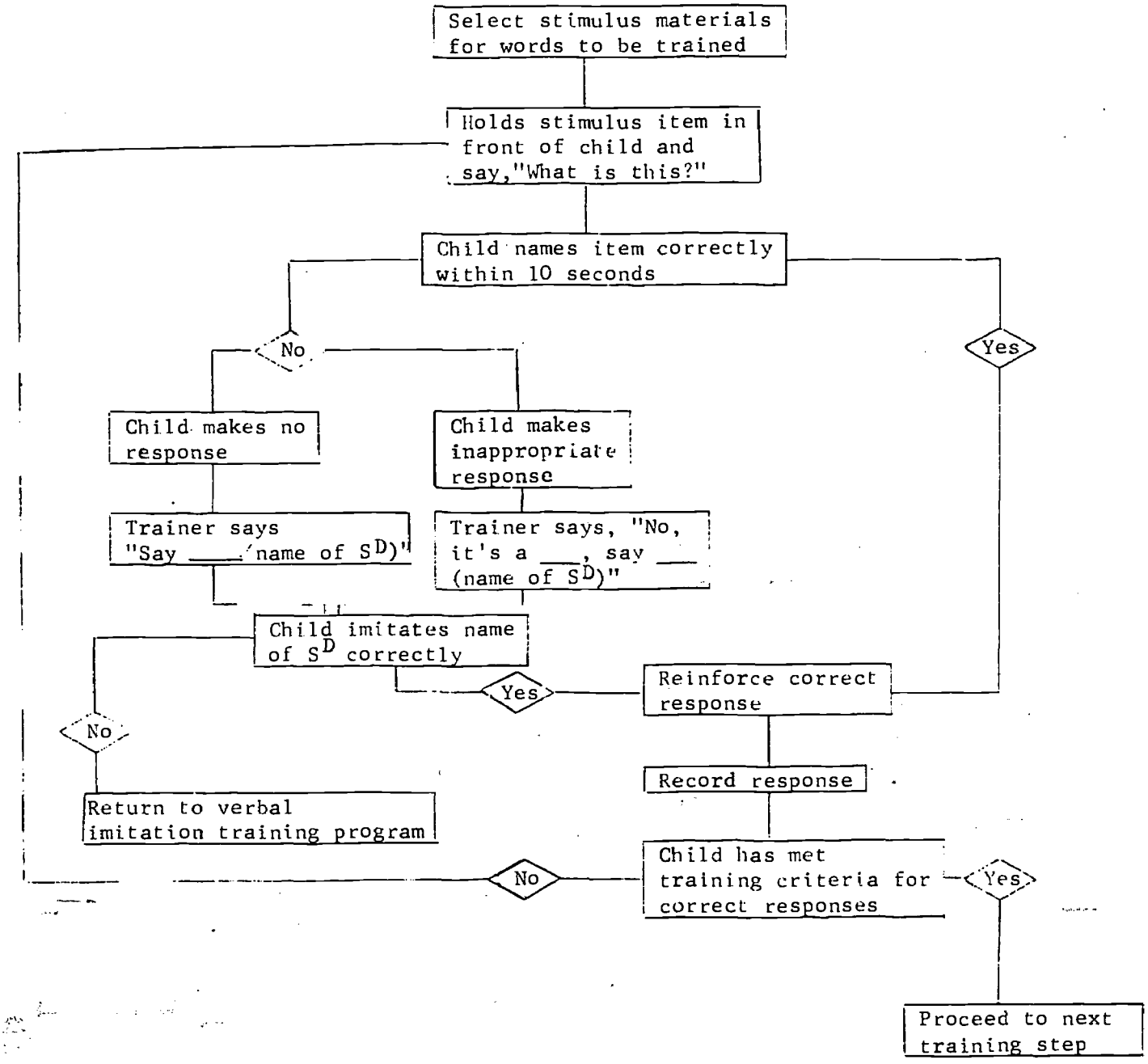

Fig. 5. Implementation of expressive vocabulary training.

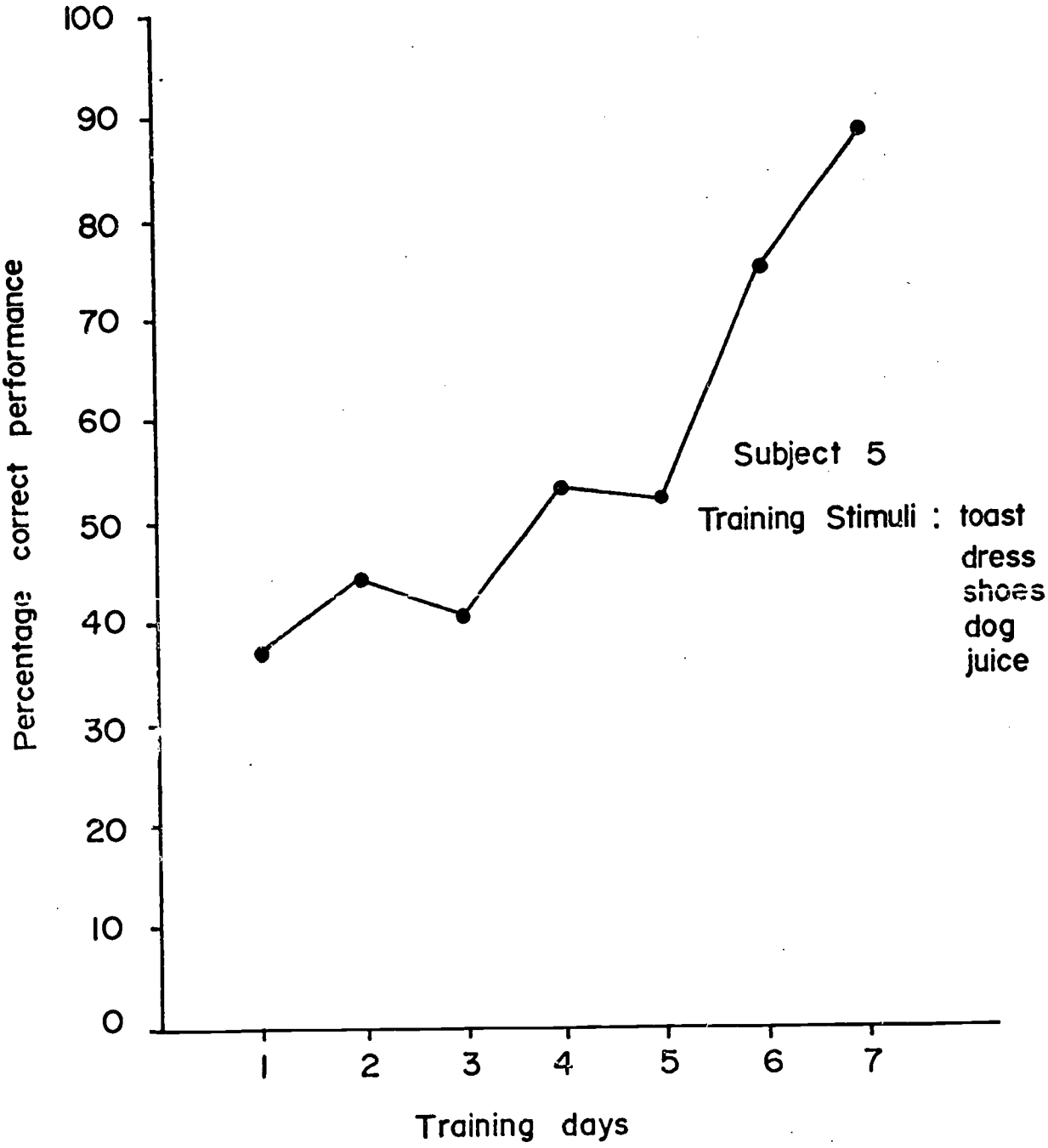

Fig. 6. Percentage correct performance across training days for a delayed child on expressive vocabulary training.

participating together in a structured classroom program. Parents can be trained as effective teachers of their children, as well as become important disseminators of information. It is possible to operationalize and specify a curriculum so that it can be empirically validated and so that it becomes useful for others. The child with a moderate to severe developmental problem has many difficulties to face as he matures; and programs such as the one described in this paper can provide a valuable resource for these children, their parents, and the community. Since it is now apparent that more and more retarded children will not be institutionalized but remain within the home environment, professionals from many disciplines will have to face the responsibility of providing the necessary support systems for the successful maintenance of these children within the community. The Toddler Project and others like it should serve as an important resource for the future development of educational programs for young handicapped children.

Research

This section of the report is devoted to a brief description of the research projects that have been initiated during the past two years. These reports are not intended to be comprehensive, but merely to indicate the type of research being conducted in the Toddler Project. For more information on a particular project write to the first author.

Operant Audiometry

Diane Bricker and Lisbeth Vincent-Smith[1]

A chronic problem confronting professionals dealing with young language-delayed children is the assessment of their hearing. The child who does not hear is approached in an educational manner different from the youngster whose hearing is normal. Often young retarded or language deficient children have no way of indicating whether or not they hear or what type of auditory deficit or distortion they are experiencing. A review of the literature suggests many investigators and clinicians have attempted to solve this problem through various approaches and procedures (Frisina, 1963). Within the last ten years the most promising new approach, particularly with difficult-to-test children, has been the use of operant audiometry (Bricker & Bricker, 1969; Lloyd, Spradlin & Reid, 1968). Operant audiometry is based on the principle that the frequency of a reinforced response will increase while a non-reinforced response will be extinguished. Consequently, a stimulus such as a pure tone can be presented and the child reinforced for making a specific response (such as a button push) in the presence of the tone. Conversely, the child is not reinforced for pushing the button during the absence of the tone. When the child learns to discriminate the stimulus conditions of tone off and tone on, an assessment procedure can be initiated. The frequency and intensity of the tone can be shifted until the child's threshold is determined. Although operant audiometry has been successfully used with older retarded children, there are few indications of its use with toddler-age delayed or non-delayed children.

[1] For a more detailed report of this investigation write to the authors at Box 88, Peabody College, Nashville, Tennessee 37203

The purpose of the present investigation was to examine the usefulness of an operant approach for assessing the hearing accuity of toddler-age children. Subjects chosen for the first phase of the present investigation were normally developing toddlers. Phase II, which will be conducted in the fall of 1972, will include delayed toddlers.

Method

Subjects

Seven children enrolled in the Toddler Project were included in this investigation. Table 1 presents the CAs and MAs for these subjects. All but Subject 7 were considered to be developing normally. Subject 7's spontaneous speech was unintelligible and his receptive vocabulary was extremely limited.

Procedure

Each of the seven toddlers included in this investigation had undergone light discrimination training using the same button-push response employed in the present investigation (See Toddler Project Report Year I). The same experimental room and equipment were employed so the subjects were familiar with the situation. The major change introduced in this investigation involved the stimuli used to indicate the S^D and S^Δ conditions. A 1000 Hz 80 dB pure tone replaced the white panel light as the S^D and absence of tone rather than light indicated the S^Δ condition.

The children were brought individually to the lab room and seated in front of a large box which housed an M & M and a Universal dispenser. On the front of the box was one light panel, a plexiglass button and dispenser cup. The speaker was located on the wall directly behind the child's head and a set of earphones were available when needed. The

TABLE 1

CAs, IQs, Number of Sessions for Acquisition of Tone Control

And Number of Sessions to Complete Hearing Assessment For

Seven Subjects

Subjects	CA (Months)	IQ or DQ[a]	Number of sessions to establish tone control	Number of sessions for hearing assessment
1	34	143	4	3
2	35	109	10	2
3	35	121	12	3
4	35	118	7	2
5	27	104	6	5
6	32	131	10	-
7	38	87	10	3

[a] IQ taken from Binet and DQ taken from MDI portion of the Bayley Infant Scales

speaker and headset were wired to a Beltone Audiometer model 9c which was located in the adjoining control room. The audiometer generated the pure tone used as the S^D.

After the child was seated in his chair the programming equipment located in the adjoining control room was activated. This equipment automatically presented the S^D and S^Δ conditions, dispensed the reinforcers on a prearranged schedule, recorded the subject's responses, and reset the timer when the subject responded in the S^Δ condition. The tone-on condition was on a VI-15 schedule, while the tone-off condition began with a VI-5 and gradually shifted to a VI-15. The subjects were reinforced on a VR-3 schedule.

Once tone control had been established with a free field tone, earphones were introduced. After the child adjusted to the headset, a standardized audiometric test was administered by a speech therapist. The frequencies of 500, 1000, and 2000 were tested. Since the testing room was only sound treated rather than sound proof, no attempt was made to reduce the intensity below 30 dB for any of the tested frequencies.

Results

The number of sessions necessary to gain tone control with a free field signal for the seven subjects ranged from four to 12 sessions with a mean of 8.4 sessions for all subjects. The number of sessions necessary to complete the hearing assessment using earphones ranged from one to five sessions with a mean of 2.7 sessions for the seven subjects. Sessions lasted approximately 10 to 15 minutes. Table 1 presents the number of sessions for acquisition of tone control and number of sessions to complete the hearing assessment for each subject.

Subjects 1, 2, 3, and 4 indicated reliable responses at 30 dB for all Hz tested. The reliability of the responses were checked by a retest the following day and the responses of subjects 1, 2, 3, and 4 were found to be highly reliable at 30 dB. Subjects 5, 6, and 7 indicated mild to moderate hearing losses in at least one ear. Subject 6 who initially responded unreliably was found to be suffering from otis media and had fluid within the middle ear during the initial testing. Following this several attempts were made to reintroduce the headset which were unsuccessful, a subsequent evaluation of this subject two months later when she was willing to tolerate earphones, indicated the child had a mild loss in the left ear. When the headset was introduced to Subject 5, he refused to wear them because he said they hurt. A subsequent visit to the child's pediatrician revealed this child also had an ear infection. When the child was retested several weeks later, he was willing to wear the headset and responded at 30 dB except in the left ear at 2000 Hz which he responded at 35 dB. Subject 7 indicated a mild to moderate loss in both ears. His responses were consistent and the examiner felt the child has a mild hearing loss. The parents were informed of this and it was recommended that the child be retested during the next year.

The results of this investigation suggest that operant audiometry is a technique that holds much promise for the hearing assessment of young children. The next step in this line of investigation is to use the same type of procedure with young developmentally delayed children.

The Development of New Assessment Procedures in the Areas of Receptive and Expressive Vocabulary

Lisbeth Vincent-Smith and Diane Bricker[1]

The purpose of the present investigation was to evaluate new assessment instruments in the areas of expressive and receptive vocabulary. Rather than arbitrarily choosing and testing a child's knowledge of 20 words thought to be common in a toddler's environment, words were obtained by examining other assessment instruments. Tests such as the Binet, PPVT, Houston Test for Language Development, and Parsons Language Sample were examined and vocabulary items appearing in three age groups (12-24 months; 24-36 months; 36-48 months) were tabulated. Table 1 contains a list of all the tests examined. In order for a word to appear in the assessment instrument in the present study, it had to meet the following criteria: (1) was included in at least three of the tests listed in Table 1 and (2) could be represented by object and/or picture. Following this procedure 20 words were isolated as appropriate for testing in each of three age ranges, 12-24 month range (designated as Level I), 24-36 months (designated as Level II), 36-48 months (designated as Level III). Table 2 contains lists of the words for each age group. Although one would predict that some words might be known receptively between 12-24 months, but not expressively until after 24 months, separate expressive and receptive lists for the various age levels were not employed in the present study. Many of the tests examined did not distinguish between these two modes, hence, evolving separate receptive and expressive lists was not done for this investigation.

[1] For a more detailed report of this investigation write to the authors at Box 88, Peabody College, Nashville, Tennessee 37203

Table 1

List of Tests Used to Compile Words

For the Receptive and Expressive Assessments

1. Peabody Picture Vocabulary Test
2. Houston Test for Language Development
3. Basic Concept Inventory (Engelmann)
4. Parsons Language Sample (Spradlin)
5. The Full-Range Picture Vocabulary Test (Ammons & Holmes)
6. Merrill-Palmer Scale of Mental Tests
7. An Instrument for Assessing Infant Psychological Development (Uzgiris-Hunt)
8. B. yley Scales of Infant Development
9. Stanford-Binet Intelligence Scale (L-M)
10. California Test of Mental Maturity
11. Cattell Infant Intelligence Scale
12. Minnesota Preschool Scale
13. Developmental and Skill Check List-Team Evaluation Center, Inc. Chattanooga, Tennessee
14. Utah Test of Language Development
15. Assessment of Children's Language Comprehension (Foster, Giddan and Stark)
16. Experimental Test of Comprehension of Linguistic Structures (Carrow)
17. Northwestern Syntax Screening Test (Lee)
18. Manual For Testing the Language Ability of 1-to-3-year old Children (Janet Marmor)
19. Grammatical Comprehension Tests (Bellugi-Klima)
20. Gesell Developmental Schedules
21. Preschool Language Scale

Table 2

List of the 60 Test Stimuli

Level I	Level II	Level III
1. Baby	21. Bird	41. Washing
2. Ball	22. Book	42. Throwing
3. Bed	23. Box	43. Riding
4. Clock	24. Boy	44. Cooking
5. Cup	25. Bus	45. Swinging
6. Dog	26. Chair	46. Hitting
7. Car	27. Coat	47. Orange
8. Horse	28. Fish	48. Green
9. Pan	29. Girl	49. Yellow
10. Hat	30. Glass	50. Blue
11. Scissors	31. Nail	51. Red
12. Hammer	32. Plate	52. White
13. Watch	33. Shoe	53. Black
14. Apple	34. Sock	54. Key
15. Block	35. Brush	55. Two
16. Boat	36. Table	56. Knife
17. Cat	37. Spoon	57. Fork
18. Truck	38. Telephone	58. Shirt
19. Train	39. Leaf	59. Comb
20. Banana	40. Towel	60. One

Subjects for the present investigation were 21 children enrolled in the Toddler Project. Eight of these children were developmentally delayed (Bayley DQ or Cattell IQ below 55) while 13 were non-delayed (Bayley DQ or Binet, Form L-M, IQ above 100). Half of the delayed

children were in a group with a CA between 38-40 months and a mean CA of 39 months (older delayed), while the other half were in a group with a CA between 29-31 months and a mean CA of 30 months (younger delayed). Similarly, six of the non-delayed children were in a group with a CA between 26-29 months and a mean CA of 27.8 months (older non-delayed), while the other seven were in a group with a CA between 23-25 months and a mean CA of 23.7 months (younger non-delayed).

For Levels I and II, subjects were tested first on their receptive understanding of objects and pictures and then on their expressive naming ability with the same objects and pictures. For Level III, the same sequence was followed with pictures serving as the only stimulus materials. Each level was composed of 60 two-choice discrimination trials. On Levels I and II 120 trials used objects and 120 trials used pictures while for Level III pictures were used on 120 trials. On each trial two stimuli were presented along with an auditory cue to indicate correct choice. Each of the 20 stimuli were randomly paired with the other stimuli with the restriction that each object appeared three times as the S^D (object to be chosen) and three times as the S^Δ (distractor). Pairs so constructed were randomly sequenced into three equal segments with each object appearing as the S^D and S^Δ once in each segment. Segments were administered on successive days unless the child was absent. Thirty sessions were required for a subject to complete all three levels of the assessment in both receptive and expressive modes unless criterion was reached at a specific level.

The subject was brought into the experimental room and seated across from the experimenter at a small table. The experimenter picked up the two objects for a given trial, held them in front of her, said "Take the _____(object name), Take the _____ (object name)." She then placed them down on the table far enough

apart so that the subject could not reach both stimuli simultaneously. If the subject chose the appropriate object, social praise and an edible such as ice cream was given and then the next trial began. If the subject chose the inappropriate object, the objects were removed and the next trial began.

Since the number of subjects in the two groups of delayed children was very small (N = 4) and differed from the number in the groups of non-delayed children, no formal statistical analyses were performed on the data.

Table 3 contains the mean number correct (out of 60 possible) for each of the groups on each of levels of the receptive assessment. Criterion indicates that all subjects in that group correctly selected at least 18 out of 20 objects or pictures by their third presentation. Chance performance in this situation would be 30 out of 60 correct. The younger delayed group did not differ significantly from chance. The older delayed group, while not reaching criterion on any of the levels, was performing significantly better than chance on all levels ($p < .05$).

TABLE 3

Mean Number Correct (out of 60) for the Four Groups On the Receptive Vocabulary Assessment

Group	Level I objects	Level I pictures	Level II objects	Level II pictures	Level III pictures
Older delayed	40.25	45.85	44.10	53.92	48.25
Younger delayed	33.80	29.60	34.40	33.20	32.20
Older non-delayed	criterion	criterion	criterion	criterion	50.17
Younger non-delayed	criterion	criterion	criterion	criterion	48.56

Table 4 contains the mean number correct (out of 20) on the first presentation of each object or picture in the expressive assessment. Criterion indicates that all subjects in that group had correctly labeled at least 18 out of 20 pictures or objects on the first presentation. While no statistical analysis was performed, the difference in performance between Level I and II by the older delayed children is noteworthy. The younger delayed children were terminated after Level I due to their low correct rate there. However, after seeing the summarized data on the older delayed children, the Level II assessment should have been administered.

TABLE 4

Mean Number Correct (Out of 20) for the Four Groups
On the First Presentation of Each of the Words
On the Expressive Vocabulary Assessment

Groups	Level I objects	Level I pictures	Level II objects	Level II pictures	Level III pictures
Older delayed	9.75	10.00	14.25	13.25	4.67
Younger delayed	3.50	3.50	-	-	-
Older non-delayed	criterion	criterion	criterion	criterion	14.83
Younger non-delayed	criterion	criterion	criterion	criterion	10.00

On the basis of number of words which could be considered known by the delayed subjects either receptively or expressively on the various levels indicated that for this population some words which

were on Level II should have been on Level I, as well as the reverse situation. The non-delayed children were not included in this analysis as they were performing at the ceiling on these two levels. An accurate assessment of whether pictures or objects were easier could not be made as testing on pictures always followed testing on objects. Since the child was reinforced for correct choices during testing, better performance on pictures could be accounted for by learning.

A perplexing finding in relation to some of the delayed children's performance on the Level I receptive versus expressive assessment was that objects or pictures which were not indicated as known in the receptive assessment were labeled correctly in the expressive assessment. An analysis of the receptive data indicated that often these objects or pictures were either preference or avoidance objects. While the delayed child might "know" an object or picture, in the two-choice situation his choice might not be controlled by the auditory cue but rather by properties of the stimuli themselves. This finding has led the investigators to question the use of a two-choice situation as a way of accurately assessing receptive vocabulary in children below a certain developmental age. The next step is to gather more data to clarify this issue and subsequently develop more accurate forms of assessment in the area of receptively vocabulary.

A Comparison of Receptive Vocabulary Skills In the Delayed and Non-delayed Toddler

Lisbeth Vincent-Smith and Diane Bricker[1]

The purpose of the present investigation was to compare the performance of non-delayed and delayed toddlers on a test of receptive vocabulary skills. The subjects for the study were 20 children enrolled in the Toddler Project. Half (10) of the children were developmentally delayed (Bayley Developmental Quotients or Cattell IQ below 55), while the other half were developmentally normal (Bayley Developmental Quotient or Stanford-Binet, Form LM, IQ above 100). Within the group of delayed children, five were in a group with a CA of 17-20 months and a mean CA of 19.0 months (younger delayed), while the other five were in a group with a CA of 25-28 months with a mean CA of 26.8 months (older delayed). Similarly within the group of non-delayed children five had a CA of 18-19 months and a mean CA of 18.2 months (younger non-delayed), while the other five had a CA of 28-30 months and a mean CA of 28.8 months (older non-delayed).

A modified Wisconsin General Test Apparatus (WGTA) was used to present the receptive vocabulary objects to the subjects. The stimuli employed were 20, small, three-dimensional objects mounted on 10 X 10 centimeter gray wooden plaques. The objects were selected on the basis of their functional value for the majority of children

[1] For a more detailed report of this investigation write to the authors at Box 88, Peabody College, Nashville, Tennessee, 37203

and are listed in Table 1.

Table 1

20 Objects Used As Stimuli

1.	Guitar	11.	Boy
2.	Truck	12.	Drum
3.	Orange	13.	Plate
4.	Watch	14.	Boots
5.	Hammer	15.	Boat
6.	Saw	16.	Girl
7.	Banana	17.	Couch
8.	Train	18.	Chair
9.	Bug	19.	Frog
10.	Plane	20.	Pan

The receptive vocabulary test was composed of 60 two-choice discrimination trials. On each trial two stimuli were presented and an auditory cue given to indicate the correct object. Each of the 20 objects was randomly paired with the other objects with the restriction that each object appear three times as the S^D (object to be chosen) and three times as the S^Δ (distractor). Once the pairs were constructed they were randomly sequenced into three equal segments with each object appearing as the reinforced object once in each segment. Right-left placement of the S^D and S^Δ was randomly predetermined and remained the same across subjects.

While the door of the WGTA was lowered, the experimenter baited the reinforcement well and positioned the stimulus objects. When the door was opened, the child was told to "Take _____(object name), take _____(object name), " before the tray was pushed

forward for the child to make his selection. If the subject chose the appropriate object, social praise was given and he retrieved his edible. If the subject chose the inappropriate object, the tray was withdrawn and the WGTA door was closed.

An analysis of the assessment data (Lindquist, 1953, Type III and simple effects test) indicated that while the younger delayed, younger non-delayed, and older delayed children performed at chance or 50 percent correct, the older non-delayed children scored significantly better than these three groups with a mean number correct of 55 out of 60.

Since the mean number correct for the younger non-delayed, younger delayed and older delayed subjects were not significantly different from each other or chance, strategy analysis was performed on these data to determine whether responses of the different groups were controlled by the same or different stimulus properties of the objects or tasks. Each subject's data was examined separately and known avoidance and preference objects identified.

The mean number of known objects was 2.0, 1.0, 1.2 (out of 20) for the younger non-delayed, younger delayed, and older delayed children respectively. In contrast to the performance of these groups, the mean number of known objects for the older non-delayed children was 16.6 out of 20. The mean number of preference objects for the three groups, younger non-delayed, younger delayed, and older delayed, was 3.2, 2.6, and 2.6 respectively. Finally the mean number of avoidance objects was 3.0, 3.8, and 3.6 for the younger non-delayed, younger delayed and older delayed groups.

A Lindquist (1953) Type I analysis of variance performed on these data yielded a significant main effect for type of strategy employed by the subjects ($F = 11.42$, df 2/24, $p < .001$), but a nonsignificant

main effect for groups and a nonsignificant groups by strategy interaction. A Lindquist (1953) test of simple effects was performed in order to determine the source of the obtained main effect for type of strategy employed. This analysis indicated that the use of the known strategy occurred significantly less often than the use of a preference strategy, with the frequency of use of preference and avoidance strategies not being different.

The results of this investigation point to the need to develop a training procedure for facilitating the acquisition of word-object associations by delayed children. The strategy analysis performed on the data obtained in this investigation indicates that the delayed children were not simply responding randomly, but rather that their choice was often under the control of stimulus dimensions other than the auditory cue provided by the experimenter. Strategy analysis of initial assessment data may lead to the development of different training procedures depending on whether an object was a preference or avoidance object.

An Evaluation of a Modified Fading Procedure in the Discrimination Learning of Developmentally Delayed Toddler-Age Children: A Replication

John Filler and Roger Smith[1]

Although a review of the literature indicates that there have been few studies utilizing a two-choice discrete trial discrimination task with children younger than 36 months, experimental interest in the discrimination learning of toddlers extends back to the 1930's (Gellermann, 1933a, b; Ling, 1941). Recently, Weisberg and Simmons (1966), emphasizing the lack of research in this area, examined discrimination learning in infants 12 to 16 months of age. They employed a modified version of the Wisconsin General Test Apparatus (WGTA) and a standard Harlow training procedure to evaluate two-choice discrimination learning with simple geometric form problems. After extensive training, five infants reached criterion while three of the infants exhibited only chance performance. However, few investigations of the relative efficiency of training procedures other than the Harlow procedure with toddler-age children have been reported in the literature.

Smith and Filler (reported in Bricker & Bricker, 1971) compared the relative efficacy of a fading procedure and a standard Harlow non-correction procedure in the acquisition of two-choice discrimination learning with non-delayed children younger than 36 months. The results indicated that, although there was no difference between the Harlow and fading groups' performance during training, the Harlow group exhibited significantly higher percent correct performance in the posttest. The present study was an attempt to

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replicate Smith and Filler (1971) utilizing developmentally delayed toddler-age children.

The subjects were pretested on four geometric form discrimination problems and four "junk" item problems. Following the pretest, subjects were matched on the basis of percent correct performance on the simple geometric form problems and then randomly assigned to a fading group or a Harlow comparison group. Subjects in both the fading and Harlow comparison groups received training on four new geometric form problems which were not used in the pretest.

The training for the fading group involved a four-step fading procedure of a flashing lighted border surrounding the S^D for a particular problem. On the first trial for each problem the flashing border was at full intensity. Following two consecutive correct responses, the flashing border was adjusted down one step (intensity decreased). At any point in the fading procedure, one incorrect response resulted in a return to the previous step (intensity increased). After completion of the fading procedure, two consecutive correct responses following termination of the light cue, training continued until a criterion of five consecutive correct responses was reached. Training for the Harlow comparison group followed the standard non-correction Harlow procedure. That is, for each trial, only the consequence of the response signified the S^D or S^{Δ}. As each child completed training, the posttest (a repetition of the pretest) was administered.

The pretest and posttest scores, as shown in Figure 1, on the simple geometric form problem were 52% correct to 51% and 50% to 52% for the fading and Harlow groups respectively. Although both groups performed at chance level on the pre- and posttest phases, the mean percent correct responses on the four training problems was 73% for the fading group and 52% for the Harlow group. This difference in performance during the training

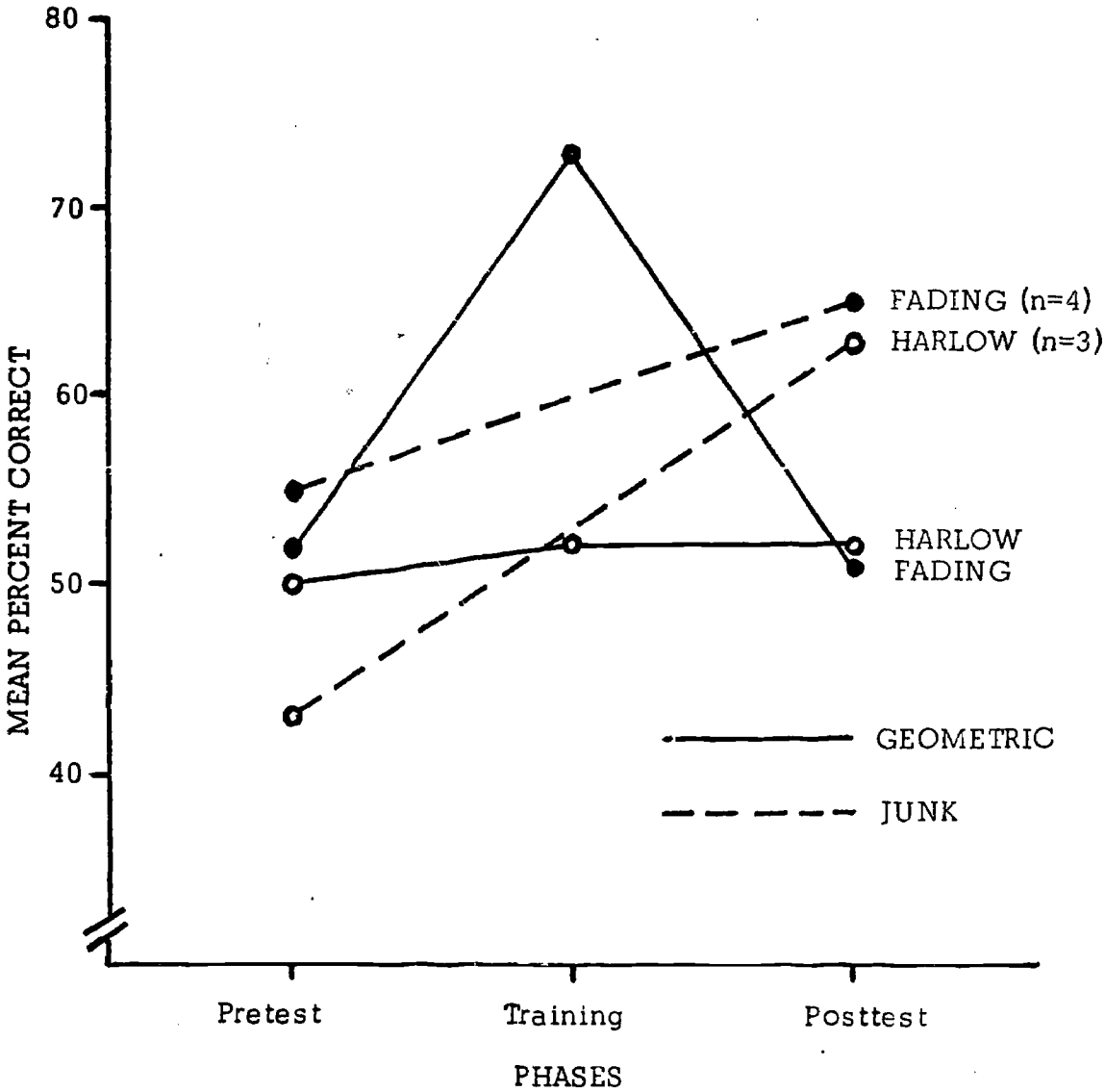

Fig. 1. Mean percent correct performances for the fading and Harlow groups on simple geometric form problems in pretest, training and posttest and on junk item problems in pretest and posttest.

phase can be accounted for by the establishment of light control of discriminative responding as a function of the fading procedure.

Figure 2 presents the performance of the two groups across the four training problems in terms of the mean number of trials to a criterion of five consecutive correct responses. While the Harlow group exhibited a generally increasing trend, 41 trials to criterion on problem four as compared to 26 trials on problem one, the fading group's performance was fairly consistent across the four training problems. Although there does not appear to be any basis for discriminating the groups in terms of pretest to posttest changes, the Harlow procedure did appear to lead to a progressive increase in the absolute number of trials necessary to reach criterion on individual training problems.

A second study is being conducted to provide an extension of the investigation comparing the fading and Harlow procedures. In the earlier study, the performance of the subjects in the fading group indicated that light control of discriminative responding was established during training. However, utilizing the fading procedure did not consistently result in transferring stimulus control from the flashing light cue to the relevant dimensions of the discriminative stimulus. Thus, the design of the extension study involves a procedure similar to that employed by Touchette (1971) for shifting stimulus control to the relevant dimensions of the S^D .

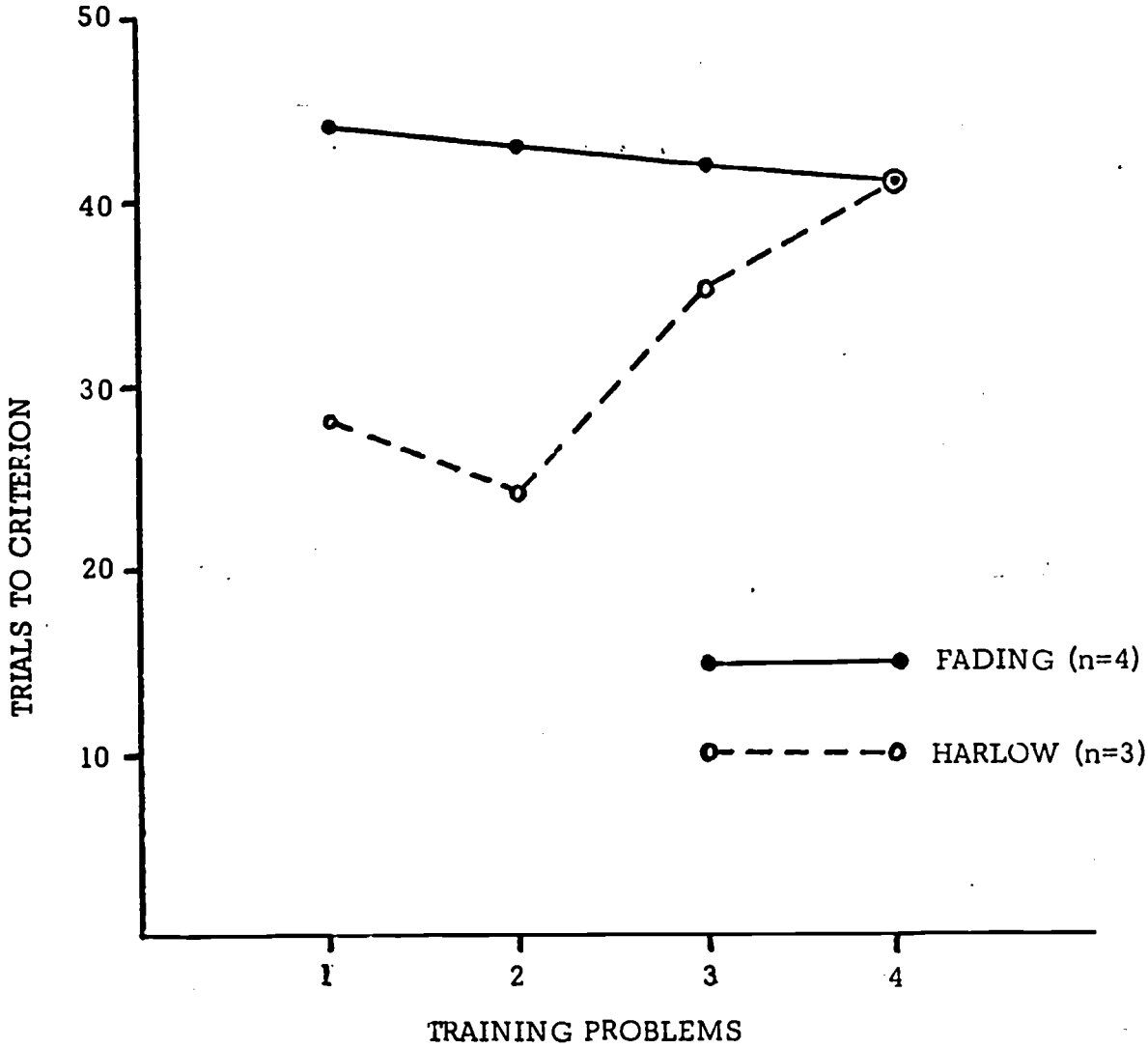

Fig. 2. Trials to criterion for the fading and Harlow groups on the four training problems.

Reliability and Validity of a Parental Teaching Style Assessment Scale

Roger Smith John Filler William Bricker
Cordelia Robinson and Lisbeth Vincent-Smith[1]

Attempts have been made to provide objective means for assessing the extent to which parents of developmentally delayed children utilize specific principles of behavior modification. The present investigators have designed a scale which provides both specific and simultaneous indices of parent and child behavior in structured teaching situations (Bricker & Bricker, 1971; Robinson & Filler, 1972). Although the interrater reliability and test-retest consistency in the initial evaluation of the scale could be considered adequate, the scale was revised in order to increase reliability. Revisions included adoption of a new task and modification of categories.

The training task was selected from the Leiter International Performance Scale, a nonverbal match-to-sample intelligence assessment instrument. The advantages of selecting a task from the Leiter are: (1) there are graded levels of difficulty, and thus, children can be pretested and assigned to tasks in which initial performance is 25 percent or less correct; and (2) the task is one where approximation and terminal responses can be defined with greater precision.

1 For a more detailed report of this investigation write to the authors at Box 88, Peabody College, Nashville, Tennessee 37203

Modification of rating categories of the scale include the deletion of child verbal behavior and the inclusion of a category for tangible reinforcement. A new antecedent event category called "Manipulation of Materials" was also introduced to replace the category of prompts. Since the new task is a four choice situation, the category of Manipulation of Materials permits specification of whether the trainer breaks the task down into components and teaches one response at a time or whether the child is presented with four choices continuously. Tables 1 and 2 contain revised scoring sheets which reflect these changes in the scale.

The present study was designed to provide information concerning the reliability and validity of the revised version of the scale. Since the scale was structured to assess the degree to which parental teaching styles reflect principles of behavior modification, one would expect that the scale profiles of a group of professionals trained in the experimental analysis of behavior should differ significantly from those of untrained mothers.

Eight adult female trainers were included in the investigation. Four of these were current or former George Peabody College students who hold a master's degree in psychology or special education and who had been trained in behavior modification procedures and had used their skills in applied settings. The people who were selected for inclusion in the study were currently working in Nashville Day Care centers, in public special education classes, or in projects other than the Toddler Project in the Kennedy Center Experimental School. The remaining four trainers were mothers of delayed children in the Toddler Project. Eight delayed and eight non-delayed children were selected from the Toddler Project group following the signing of a consent agreement by their respective parents. As with all investi-

Table 1

Mother and Child Behavior Rating Categories

	MOTHER						CHILD		
	Antecedent			Consequent					
	Verbal	Physical							
	Directions	Manipulation of Materials	Guidance	Verbal	Physical	Tangibles	+ or − Approx.	+ or − Terminal	Other
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

Table 2

Mother Antecedent Manipulation of Materials Rating Categories

MANIPULATION OF MATERIALS

	Block	Placement as Cue	Placement as Opportunity	No. of Choices	Comment
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					

	Block	Placement as Cue	Placement as Opportunity	No. of Choices	Comment
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					

gations in the Toddler Project, the parents were informed about all aspects of the investigation including a description of the procedures to be used. However, they were not told the specific outcomes of the research until after the investigation had been completed.

Prior to starting the instructional task, each child included in the investigation was brought to a training room and evaluated to determine the level of difficulty of the four choice match-to-sample task that was appropriate for him. If necessary, he was first taught the nature of the task requirement and reinforced for engaging in appropriate behavior. Then the task requirements were made more difficult until a level was reached where the child made correct responses between 10 and 35 percent of the time. This task and level was then used in the training analysis.

The design followed contrasted professional behavior modification personnel with relatively untrained mothers, teaching delayed versus non-delayed children, across three instructional periods. Both the professional trainers and the mothers worked with both delayed and non-delayed preschool age children. Order of training was counterbalanced across both professionals and non-professionals. No mother worked with her own child. Each trainer was asked to work with her assigned child for three periods of approximately 15 minutes each. Prior to going into each training session, the trainer was given instructions about the nature of the task and how it was to be presented to the child. This description covered the following points:

1. The training session was divided into three components each of which was regulated either by the experimenters or the trainer. One period of about ten seconds was set for the trainer to prepare for the presentation of the task to the child. When the experimenter considered the trainer to be ready to start the task, he signaled the trainer who then gave the child a "test" which consisted of setting the task so that

the child could engage in the required terminal behavior (i.e. make the required matches between the samples and the choice stimuli). This test period lasted until each of the four stimuli has been presented twice and was followed by a second signal which indicated to the trainer that teaching should begin.

2. Each trainer was told that during the teaching period she could use any method she wished that might be useful in getting the child to engage in the task in the correct manner. Juice and other edibles were available for use by each trainer if one wished to use tangible reinforcement. However, no other instructions were given to the trainers concerning possible teaching methods. They were told to continue teaching until signaled to stop teaching and again test the child. This procedure was repeated with each trainer on three successive school days.

3. Each session was video taped and the trainer was informed as to the use of the tape. The camera and video tape recorder were located in the training room and were operated by a trained technician who did not interact with the trainers during the training session.

4. If the child demonstrated emotional behavior because of the situation or the strangeness of the trainer, the trainer was told to play with the child without attempting to test or teach. Teaching sessions only began when the child was comfortable in the situation and apparently "ready for instruction" as judged by the experimenter. Only the six minutes of teaching (not including preparation or testing time) were rated in each session. The ratings were made by two observers who were not directly associated with the training sessions. The ratings of the tapes proceeded by ten second intervals and included information on the trainer's construction of events antecedent to specific movements of the child, the movements themselves, and the trainer's construction of events

immediately following each movement which provided the basic data in this investigation.

The two raters observed each six minute training session in two three-minute blocks. We have found that three minute rating sessions provide a substantial amount of data without exhausting the abilities of the rater. Each six minute tape was replayed five times. The first run provided the observers an opportunity to view the tape without having to rate specific aspects of the interaction so that they knew what to expect during the session. The second run was devoted to the child's movements which were rated according to the three categories. These movements were rated every ten seconds and we found that the type of task that we used produces an approximate or terminal response not more often than once each ten seconds, but generally more often than once in three ten second blocks. The combination of the relatively low rate of response and the focus of the observers on the child's movements should allow for excellent reliability among observers. The third run was used to rate the number of verbal directions emitted by the trainer each ten seconds. We found that this run for a single antecedent event is necessary because of the high rate of verbal directions given by the typical mother. The fourth run was used to record both manipulations of the materials and physical guidance of the response. The fifth run allowed sufficient time to record all three subsequent training events emitted by the trainer since their rate was controlled by the rate of relevant movements by the child. This rating procedure took about 40 minutes for every six minutes of taped instructional interaction.

To date not all of the 64 six-minute tapes have been rated. Upon completion of rating, the raters' observation sheets will be used to provide the data summaries of the instructional interactions. Reliabilities will be computed for each category of mother and child behavior, across all ses-

sions and pair combinations of six raters who viewed the tapes independently. Frequency of occurrence of behavior per thirty-second intervals for each category will be tallied and Spearman rank order correlations (rho) computed between raters. While the relationships between within session changes in child behavior and specific instructional styles will be analyzed, the formal statistical analysis will be made on a single summary score for each child for each session. This will be calculated by taking the overall session frequencies of correct approximate and terminal responses and then determining the proportion that is represented by these in relation to the total number of responses emitted by the child. These scores will then be analyzed by a three way analysis of variance procedure (Lindquist, 1953) with trainers (professionals versus mothers) by type of child (delayed versus non-delayed) across teaching sessions (three teaching days) as the major dimensions. Similar analyses will be performed separately on the trainer's verbal directions, use of physical guidance, use of potentially reinforcing consequences, and use of potentially punishing consequences.

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