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ABSTRACT

The report summarizes the first year of the Toddler Research and Intervention Project, a research program to devise and evaluate different aspects of educational intervention with children, ages 1-4 years, with moderate to severe development problems (primarily mental retardation). Described are the children who composed the intervention group, the physical classroom environment, classroom procedures, results of the first 8 months of intervention, initial investigations of language and cognitive training, and the parent training program. Also described are nine research projects carried out on the delayed and nondelayed young children involved, investigating such areas as effects of reinforcement schedules on acquisition of stimulus control, Piaget's object permanence concept, motor imitation, contingent social stimulation of vocalizations, discrimination learning, maternal teaching style assessment, classification skills, and receptive vocabulary skills and learning. (Author/KW)

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John F. Kennedy Center for Research on Education and Human Development

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REPORT - YEAR I

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If one can believe verbal feedback, the Toddler Project has served as a valuable resource and a functional operation for many individuals. Clearly the satisfying results of the first year must be attributed to those students, teachers, and assistants who participated with great enthusiasm and worked so hard to meet the project's goals. It has been an extraordinary staff and to each of them the writers wish to express their warmest thanks and appreciation.

Our greatest indebtness must go to the parents and children who have participated in the Toddler Project during this year. Their cooperation has been nothing short of stupendous and their esprit de corps the backbone of the Project. Consequently, we dedicate this report to them with much gratitude.

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FOREWORD

The Toddler Research and Intervention 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 development problems. This report covers the first year of that effort. The focus of this report is to describe the initial investigations of language and cognitive training which have occurred during the past year, and to describe the wider-ranging facets of the classroom and parent training intervention programs. This has been done in order to demonstrate that a successful service-oriented intervention program can coexist with a laboratory research program and, in fact, can stimulate new developments without the usual delay in applying research findings. In addition, the project has been developed with full knowledge that related activities are occurring in other research and day care centers. Consequently, a system is being evolved in which measurement instruments and educational intervention procedures can be used in several sites, notably with the University of Kansas and with Fort Custer State Home in Michigan. Such pooling of methods and procedures may operate to produce effective and efficient intervention programs more rapidly for handicapped children without slowing the rate of innovation that often develops from the healthy competition between researchers in different laboratories.

One of the specific goals of the Toddler Project is to develop an intervention model that combines the powerful techniques of the experimental analysis of behavior and behavior modification with linguistic and cognitive descriptions of child development into a single system of measurement and

training events. These supposedly antithetical approaches to child development are, in our experience at least, complementary and, when taken together, provide a powerful structure to use when intervening in the development of moderately and severely delayed children. The method by which the operant approach and cognitive and linguistic theory are combined is reported in several of the subsequent sections of this report dealing with sensory-motor development and language training.

INTRODUCTION

Intervention programs for culturally disadvantaged and handicapped children have become quite numerous in the past 10 years and have been a part of the psychological and educational literature for decades. Reports of intervention programs have been made for the mentally retarded (Lyle, 1960; Goldstein, Moss, and Jordan, 1965; Giles and Wolf, 1966; Kugel, 1970), the culturally disadvantaged (Bereiter and Engelmann, 1966; Klaus and Gray, 1968; Weikert, 1970), and the emotionally disturbed (Haring and Phillips, 1962; Lovaas, 1968; Hobbs, 1969). Using a predominantly operant paradigm, intervention programs with the retarded have taken place within the home (Risley and Wolf, 1966), the classroom (Harris, Wolf, and Baer, 1966), and the institution (Lent, 1968). Several intervention studies have been done with children who are under 3 years of age (Caldwell and Richmond, 1968; Schaeffer, 1969; Weikert and Lambie, 1970). These studies provide an important basis for the Toddler Project, but are different from it in several distinct ways. First, few of these studies involved intervention over time with a distinctly retarded population and none of them examined either the form or outcomes of intervention with retarded children who were under 3 years of age. Outside of the operant approaches, the research procedures involved only pre- and posttest measures with no direct causal linkage between intervention procedures and behavior change (Fowler, 1969). Finally, none of the studies attempted to mix the group so that handicapped children were in direct and continuous contact with normal children. Thus, the present project was an attempt to build on the previous history of intervention research with handicapped children in order to improve research methodology and develop better training programs for these children.

While intervention programs with retarded children will become the primary topic for discussion in this report, intervention research with the culturally disadvantaged child provides a rich source of information that can be used to build a rationale for intervening with children who are under 3 years of age and for using language as the primary behavior change target. Many of the studies with the culturally disadvantaged have indicated that socioeconomic effects which are associated with differences in intellectual functioning become apparent when children begin to use language expressively. Children under 15 months of age from different social class backgrounds are not statistically different in areas measured by standardized intelligence tests (Bayley, 1965). In summarizing the material available on the reliability of intelligence tests at various ages, it is apparent that infant tests are neither reliable nor predictive of subsequent development (Stott and Ball, 1965; Thomas, 1970). Standardized infant measures are not able to assess language-related skills which are the key to establishing predictions of subsequent developmental progress. Tests for children under 3 years of age are based on facets of sensory-motor development which have yet to be directly linked to language development. Consequently, children under 15 months of age who live in poverty (where one finds less appropriate language stimulation than in nonpoverty homes; Schoggen and Schoggen, 1971), are not reliably different from their advantaged peers on standardized assessments. Once children become old enough for assessment in language areas, socially and statistically significant differences between socioeconomic levels appear (Uzgiris, 1970). These data suggest that language is the pivot for measured intellectual functioning and that major developments in language occur sometime between 16 and 36 months of age.

Children who are moderately to severely delayed reflect deficiencies in motor development and even more substantial problems in language and language related areas. For low functioning children, linguistic deficits have frequently formed the basis of a recommendation for institutionalization. This recommendation has produced some remarkable self-fulfilling prophecies in that low-functioning children who are committed to institutions become even lower-functioning adults. Few people have challenged this sequence of events, and fewer still have attempted longitudinal intervention programs beginning before the age of three. To the present investigators' knowledge, no program has attempted to integrate an equal number of young delayed children with their normal age peers in the hopes that the non-delayed child can serve as an appropriate developmental model. Each of these factors discussed above has operated to stimulate the development of the Toddler Project to be discussed in this report.

In numerous community programs, one or two handicapped children have been integrated into a group of nonhandicapped preschoolers; however, there are no reports of previous intervention programs which have attempted to equalize the number of delayed and non-delayed children in a program. Since this is one of the important ways that the Toddler Project differs from previous intervention programs, the apparent advantages of this mixture should be noted.

First, the non-delayed child serves as an excellent model for the delayed child. The ways in which a non-delayed child plays with toys and other objects in the classroom and playground provide greater variation in the types of activity available than that provided by the more limited repertoires of the delayed youngsters. This modeling of object-relevant play may provide a better instructional medium than a teacher demonstrating

the same activity directly, since both approximations to relevant use and greater variations in the use of objects are evident in the play behavior of the non-delayed child. Second, the non-delayed youngsters provide both daily and longitudinal comparisons of development, which is particularly useful in training graduate and undergraduate students to work with delayed youngsters. Observing the non-delayed children gives definition to the forms of behavior these students will be attempting to teach the delayed youngsters and sets limits on how far they want to take them in a particular area of development. In addition, comparisons between the two groups of children allows for "insights" can then be built into the training activities for delayed children. For example, a substantial portion of our program for stimulating independent upright mobility (walking) was based on observing non-delayed children who were engaged in early forms of walking behavior. Finally, segregation of children on the basis of handicap is a socially destructive event for both delayed and non-delayed children. Most, if not all, of the behavior of delayed children is "normal" in terms of its topography, function, and significance. While a particular bit of behavior may resemble that in which a non-delayed child engaged at an earlier age, it is rarely "abnormal" or deviant. Indeed, unusual or atypical forms of behavior that are of concern to the parent and teacher are about as frequent in the non-delayed group as they are in the delayed group. In addition, early and continued exposure of personal variability among people may be a necessary aspect of learning tolerance for another's handicap. Schoggen (1964) has indicated that, if a handicapped person is a member of a social group composed primarily of nonhandicapped people, simple and subtle means will be found to compensate for the handicap and involve the handicapped youngster in the group's activities. Such interaction has mutually rewarding benefits.

The issues pertaining to integration of handicapped and nonhandicapped people into more heterogeneous clusters involve both experimental data and social justice. The children in the Toddler Project who are in the delayed group would typically be classified as mentally retarded and then further differentiated into moderately and severely retarded groups The term "mentally retarded" was an unfortunate choice as Bijou (1963) has indicated. This term implies a qualitatively different population who are detected and classified through the use of "mental measurement" instruments or intelligence tests. Such tests do not measure mentality but rather are used to evaluate the behavioral repertoire of a person in comparison with those who serve as the standardization group. The fact signified by performance on such a test is whether a person is at, above, or below the average performance of large groups of peers. A person who scores below average may have done so because he was unmotivated to emit the defined "correct response" or because he had not learned to emit that response. The typical intelligence test cannot be used to assess and differentiate these two possibilities. In addition, the fact that a person has not learned a particular response, even if motivated to emit it, should not lead to the conclusion that he is unable to do so. In the Toddler Project, the philosophy is taken from Bijou that children who do not emit important behavioral responses must be taught to do so. The approach to the problem that has the greatest promise for helping a delayed child is to view behavior as existing somewhere on a continuum of development. The next step is not to determine how delayed the child is in moving along this continuum, but to determine the next form of behavior he must learn to progress along that continuum. This philosophy provides the framework for the model used in the Toddler Project.

OPERATIONAL MODEL

The model used in the Toddler Project has three major components: (1) a basic educational system in the major areas of human development, (2) a system of programs and procedures within each of the major areas, and (3) a research and demonstration model that links the Toddler Project with detection and evaluation services in the Kennedy Center as well as with various service systems in Davidson County. Each of the components strengthens the other in defining a network that links diagnosis, intervention strategies, and service with a research, training, and demonstration system. The integration of these components is unusual in a project of this type.

The basic educational system is represented in Figure 1 and sets the stage for the other, more important, components. The factors represented in this figure include the hierarchy of development in the major areas of human performance and the approximate periods when such developments occur. Within each developmental area there are three aspects relevant to that area: (1) a program lattice that contains the hierarchy of program steps and the successive competencies of a person as he moves through the program, (2) a procedure network that describes methods and materials necessary to move a person through the specific program area, and (3) an implementation system that assigns the succession of training duties to parents, teachers, and others on a daily and weekly basis. The basic support system, shown on the left side of Figure 1, is divided into administration and behavior support systems. The administration segment is of least concern since its inclusion indicates that program development and an educational structure demand a coodinated administrative network for budgeting, liaison,

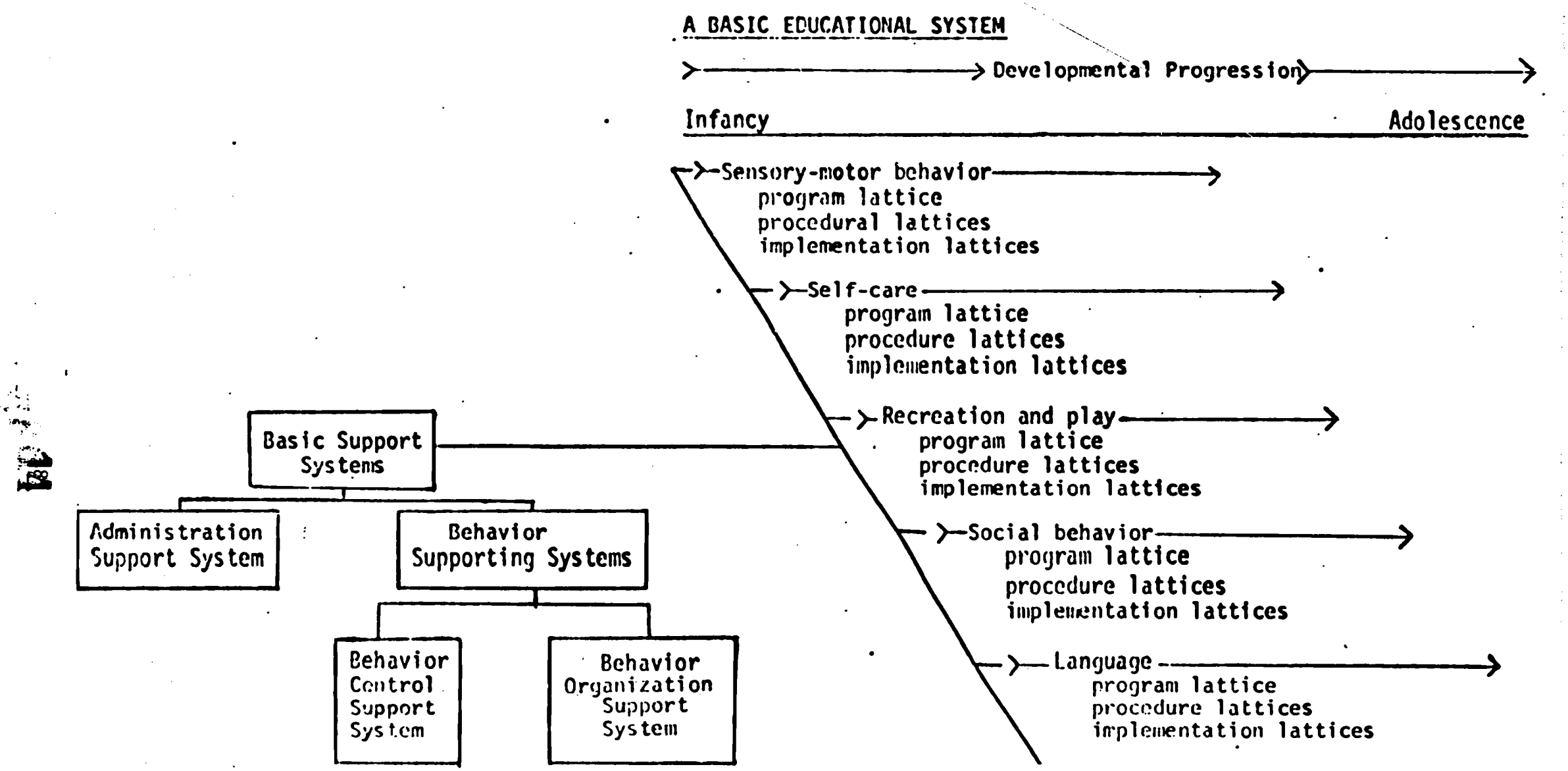

Figure 1. Basic Educational System for Delayed Children from Infancy Through Adolescence.

and other important details that are generally outside the purview of discussions on education. The behavior support system is sectioned into the behavior control and behavior organization support systems, which are discussed below.

The behavior control segment is used to represent the knowledge acquired from the experimental analysis of behavior which is often termed behavior modification when applied to the amelioration of human problems. This segment refers to arrangement of contingencies of reinforcement that are necessary to produce discriminated and motivated behavior in a wide variety of settings. Arranging contingencies of reinforcement requires that the teacher has a relatively specific set of skills. These skills include shaping behavior through the systematic use of reinforcement for successive approximations to a terminal-response form, producing discriminated performances that are under the control of well defined stimulus conditions, and maintaining selected forms of behavior over long periods of time through the systematic adjustment in complex schedules of reinforcement. These skills are applicable to behavior development at all levels, from the initial control over infant reflexes in the sensory-motor period to vocational training.

The behavior organization segment refers to a different and more diversified knowledge of specific content areas such as motor development, language, and academic skills. For example, the theory of sensory-motor development described by Piaget includes the concept of object permanence. Object permanence refers to a child's recognition of the existence of an object even when the child can no longer see or touch that object. Object permanence is evidenced when a child continues to search for an object when it is no longer visible. Within Piaget's system, the object permanence

concept is considered to be an outgrowth of earlier forms of visual and auditory tracking of objects as they move in space while the more advanced forms of the object permanence concept include searching for an object in relatively unambiguous situations, such as looking for a block hidden under a blanket. A still more sophisticated form of object permanence is the systematic searching for a misplaced object (e.g., a wristwatch) in a relatively ambiguous situation (e.g., somewhere in the house). Thus the concept of object permanence seems to follow a linear developmental progression of specified structures (responses) that become more complex across time. The same type of developmental sequence of content can be outlined for other important areas of development such as language, as well as for specific vocational skills. To some extent, knowledge of behavior organization seems to influence the efficiency and utility of the outcomes of the behavior control segment by decreasing the "mindlessness" of the shaping process. The two segments are complementary in a system being used in the Toddler Project to stimulate and facilitate development of educational programming.

The second component of the model used in the Toddler Project involves the specification of the programs and procedures within each of the five major developmental areas found on the right side of Figure 1. Program development is in the preliminary stages for all of the areas except language. During the past six years, the writers have been building a program of language training. This language training lattice is presented in Figure 2, which shows each of the program steps and their interrelationships on a time and order basis. The lattice starts at the left with initial behavior control and then proceeds to the right. Boxes that are approximately equidistant from the left are assumed to be essentially independent and could be begun as simultaneous training activities. Boxes connected by a line are related, and

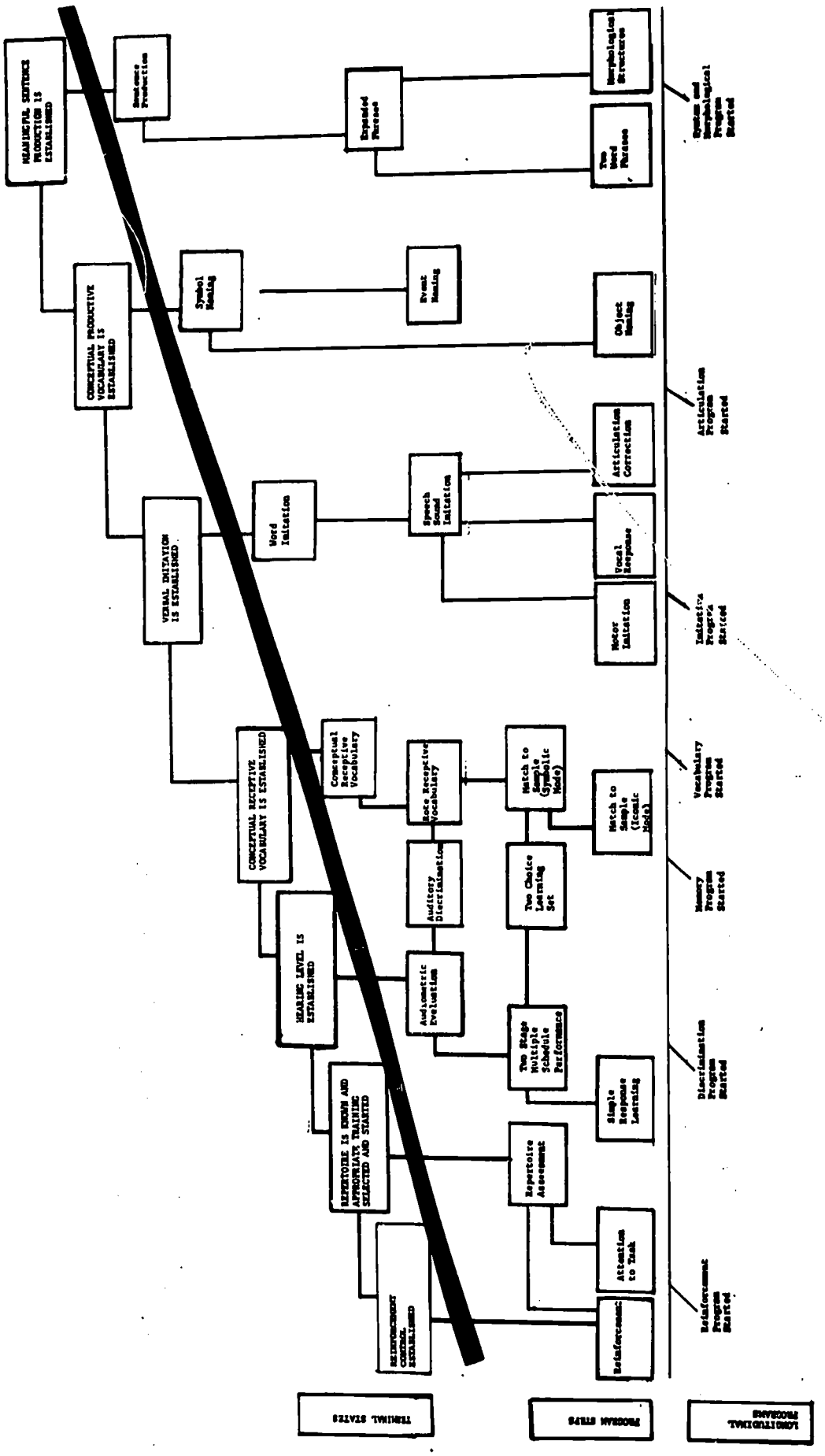

Figure 2. Language Training Lattice

the content in a box on the left of any other connected box represents training activities that should be completed before activities described in the next box to the right are begun. The boxes above the ascending diagonal represent the sequence of terminal behavior states that are established as a consequence of the training programs underlying them. Below the baseline are those programs that are continued in all subsequent aspects of training described in the lattice. For example, a reinforcement program may start with edible reinforcers but then move to social and intrinsic reinforcement in subsequent stages. The same type of expanding and changing structures operate in discrimination, imitation, and vocabulary. In conclusion, the sequence of training in a complex area such as language can be broken into specific program areas and arranged in terms of the relative starting point for each. But this is only a beginning, since each box serves as marker for a set of procedures which are much more detailed.

The procedure system being developed in the Toddler Project involves a set of flow diagrams in each program area. The diagram is used to outline the sequence of training steps and the way the situation is to be changed to react quickly and contingently to both correct and incorrect responses emitted by the child. We have found that there are generally six major steps in specifying a procedure diagram. The first is a method for evaluating the present repertoire of the child. This step usually involves presenting the terminal contingencies, including the discriminative and reinforcing properties of the behavior domain on a repeated basis, and observing how the child responds. If he emits the terminal behavior, then no further training is required in that area. However, if the child does not emit the terminal behavior, the procedure advances to the second step, the selection of the training materials. This selection is based on both the child's response to

the terminal contingencies and the structure of behavior being trained in that area. The procedural diagram is used to specify: (1) a method of presenting the stimuli, (2) when to prompt a correct or an approximate response, when to reinforce approximations, or when to fade prompts, and (3) how to bring the desired differentiated responses under the appropriate forms of stimulus control. Procedure diagrams of this nature are available in the areas of operant audiometry, discrimination learning set, and receptive vocabulary. Unvalidated procedures have also been diagrammed for object naming, and two word phrases. The goal of the Toddler Project staff is to have valid and efficient procedures diagrammed for each area specified in the language training lattice presented in Figure 2.

The third and final component of the model used in the Toddler Project represents the project's intersections with the demonstration and service network of the larger community. This component is contained in Figure 3. As seen in this figure, Steps one, two, and three, refer to the detection and evaluation routes that are used to bring the children into the project. The Toddler Project is in contact with several detection sources within Nashville such as well-baby clinics, pediatricians, local agencies including the Davidson County Association for Retarded Children and the city and county welfare agencies. When a child who is suspected of being developmentally delayed is detected by one of these sources, he can be referred to the Developmental Evaluation Clinic located in the Kennedy Center. There, under the direction of Dr. Nancie Schweikert, the Bayley Scales of Infant Development are used to evaluate each infant. Appropriate children are then referred to the Toddler Project, while children with other forms of behavioral and medical problems are referred to other more relevant agencies. However, this system of detection, evaluation, and referral is in the beginning

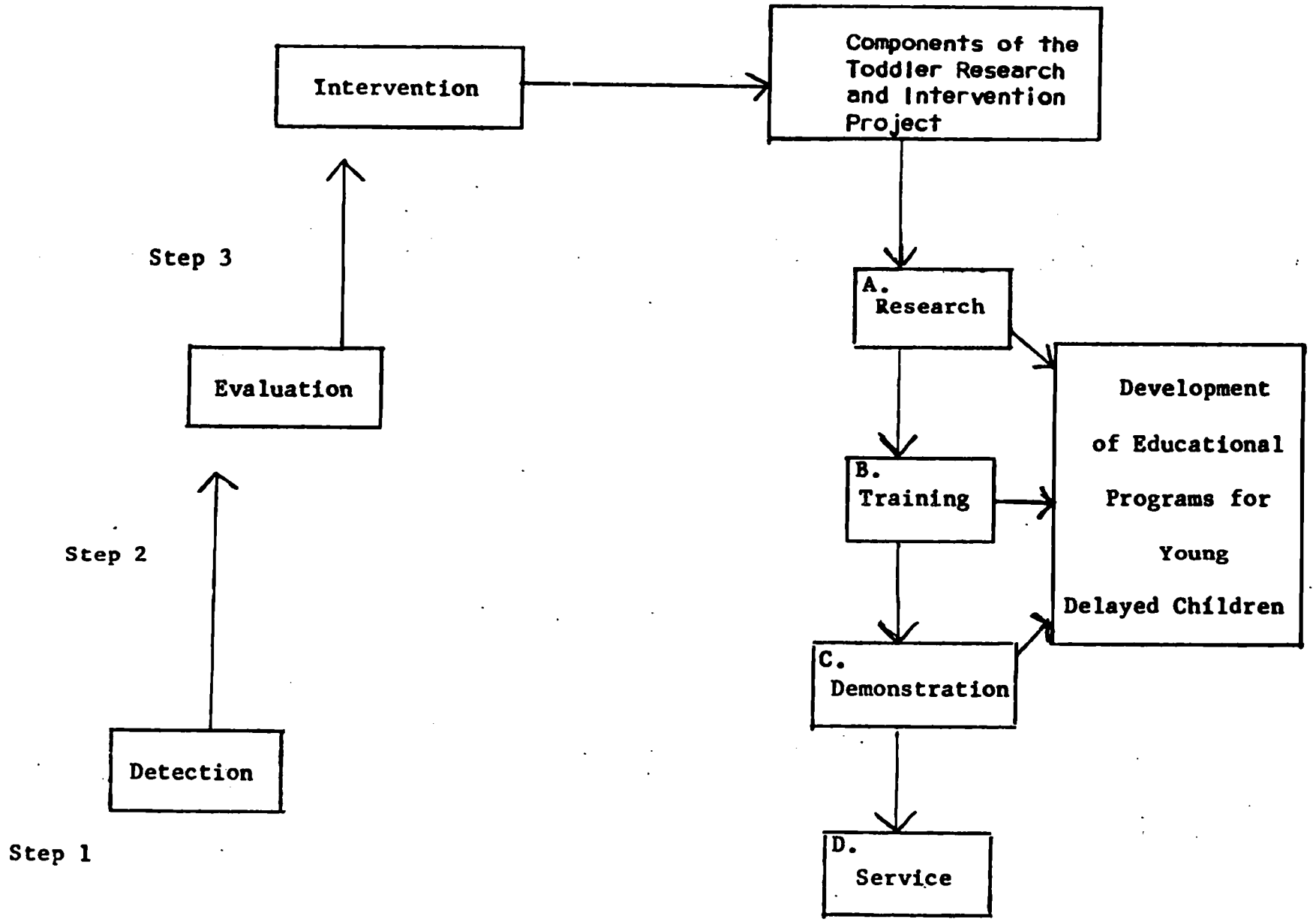

Figure 3. Operational Model of Toddler Research and Intervention Project

stages of development and many of the parents in this area must still go through the agonizing process of "shopping" for services and being frequently frustrated by the repeated evaluations that do not lead, even indirectly, into an intervention program. Fortunately, this situation is being corrected in Nashville and across the country.

If the parent and child are referred to and accepted in the Toddler Project, they become automatically involved in a four-pronged process of research, training, demonstration, and service. These components are represented as A, B, C, and D in Figure 3. Component A refers to the research arm of the project. The guiding system in this area emphasized the development of new and improved methods for facilitating the development of delayed youngsters. The research system is essentially a means for checking and improving the intervention methods contained in the procedural diagrams described earlier. Frequently this is done in a laboratory environment where important instructional variables can be isolated and explored under well-controlled conditions. As described in subsequent sections, however, some research projects have been undertaken in the classroom and in special training routines involving the mothers of the children.

Component B refers to the student-training function that is served by the Toddler Project. This is done at several different levels. For example, freshman students in the School of Nursing at Vanderbilt University use the Toddler Project for training in observational methods as well as for participating in the classroom activities. Undergraduate students in special education and human behavior use the project as a base for class and practicum requirements. Six graduate students in psychology have been closely associated with the project during the past year, and two of them have collected their dissertation data from the children in the project. In addition 12

mothers of the delayed children have been taught to use the special intervention techniques with their children.

The C component consists of the classroom and laboratory activities serving as demonstration projects. The Experimental School of the Kennedy Center has a number of programs dealing with handicapped children and unusually fine observational areas. Consequently, the Toddler Project and the other programs in the Experimental School are observed frequently by local, national, and international visitors. Jeanie Williams, Kennedy Center Liaison, estimates 15 out-of-town visitors per week have visited the Toddler Project since January 1971. While no records have been made of the local visitors, a substantial number have visited the program.

Component D refers to the service offered to the Toddler Project children and their parents. This service extends beyond the classroom and parent-training segments of the project since many of the staff are involved in consultation with parents of children who are not in the project. For example, the mother of a profoundly retarded daughter has been guided by the staff in providing stimulation and exercise for her daughter throughout the year. While the number of children being served is not large, the quality of the educational intervention is excellent, given the training and experience of the teachers and the other students who operate as support personnel in the service activities. The intervention methods used are described in greater detail in subsequent sections of this report.

POPULATION DESCRIPTION, EVALUATION DATA, AND CLASSROOM PROCEDURES

This chapter is devoted to a discussion of the children who composed the group, the physical environment, the general strategy used in the classroom, and the results of the first eight months of intervention. The Toddler Project occupies one of the double classrooms in the Kennedy Center Experimental School. Three-fourths of the area is used for the classroom activities while the remaining one-fourth is sectioned off by a series of specially constructed room dividers and used as a large observation area. Consequently, while watching an active two-year-old, an observer can move from end to end of the observation area or stop at any point in between in order to keep the child in view. Located directly off the classroom are two experimental rooms. A separate observation area is reserved for the children's parents. Two additional experimental rooms are located a short distance from the classroom. The classroom is divided into the typical preschool areas such as housekeeping, group time, quiet work, and so on. One corner of the room has been sectioned off for the teachers to use in the individual training sessions with the children. The outside play area is easily accessible and contains varied items of playground equipment. The physical environment is ideal for the children and for observation of their activities.

Children

When the program began, the children ranged in age from 14 to 26 months. During the year as new children were added the range shifted from 12 to 20 months. During the year, two children were dropped from the program because of transportation difficulties and another because of an inability of the

staff to communicate with the family whose understanding of English was limited. A fourth child left because the family moved to a different state. Three welfare cases were lost because the foster parents were unable to transport the youngsters to and from the Kennedy Center. All of these children were replaced, so that by March the enrollment was at 20 and remained there until May. During the summer months the class was resumed exclusively for the delayed children. In September, 1971, a new group of young non-delayed children was included. Table 1 contains a list of the children who were in the morning class from October until May and Table 2 a list of those in the afternoon class. These tables specify the CAs, length of time in the program, and whether the child is non-delayed or delayed. As seen in Tables 1 and 2, ten of the children began the program in October, one child entered in December, six in February, and the remaining three entered in March. Table 3 lists the 11 delayed children enrolled in the summer program (June to August, 1971). This table presents each child's diagnosis, CA and the date he entered the project. Two delayed children did not continue in the summer program.

Standardized Assessment

In general, the Bayley Scales of Infant Development were used as the standardized instrument defining developmental delay or non-delay. However, a few of the non-delayed children were performing above the ceiling of that test so that the Stanford-Binet (1960, Form L-M) had to be used. Each child was evaluated upon entrance to the program, again prior to the project's recess in June, 1971, and again in September, 1971, the beginning of the project's second year. This allowed the staff to make a tentative analysis of the progress of the children as reflected in the standardized test scores. The results of this standardized assessment for the delayed children are

TABLE 1

Composition of the Morning Class from October, 1970 to May, 1971

Children	Delayed or Non-Delayed	Age in Months as of Feb.,'71	Date Entered Program	Months in Program as of June 1, '71
1	D	29 mo.	Oct., 1970	8 mo.
2	N	23 mo.	Oct., 1970	8 mo.
3	N	30 mo.	Oct., 1970	8 mo.
4	D	25 mo.	Oct., 1970	8 mo.
5	N	29 mo.	Oct., 1970	8 mo.
6	D	20 mo.	Oct., 1970	8 mo.
7	D	28 mo.	Oct., 1970	8 mo.
8	N	28 mo.	Dec., 1970	6 mo.
9	D	17 mo.	Feb., 1971	4 mo.
10	D	32 mo.	Feb., 1971	4 mo.

TABLE 2

Composition of the Afternoon Class from October, 1970 to May, 1971

Children	Delayed or Non-Delayed	Age in Months as of Feb.,'71	Date Entered Program	Months in Program as of June 1, '71
1	N	24 mo.	Oct., 1970	8 mo.
2	D	19 mo.	Oct., 1970	8 mo.
3	D	26 mo.	Oct., 1970	8 mo.
4	N	19 mo.	Feb., 1971	4 mo.
5*	D	21 mo.	Feb., 1971	4 mo.
6	N	30 mo.	Feb., 1971	4 mo.
7	D	17 mo.	Feb., 1971	4 mo.
8	N	27 mo.	Mar., 1971	3 mo.
9**	D	15 mo.	Mar., 1971	3 mo.
10	N	12 mo.	Mar., 1971	3 mo.

*Child not included in summer project because of hospitalization
**Child not included in summer project because of mother's inability to transport child

TABLE 3

List of the Delayed Children Enrolled in the

Summer Program from June to August, 1971

Children	Diagnosis	Age in Months as of September, 1971	Date Entered Program
1	D S*	36 mo.	Oct., 1970
2	D S	32 mo.	Oct., 1970
3	B D**	35 mo.	Oct., 1970
4	D S	27 mo.	Oct., 1970
5	D S	26 mo.	Oct., 1970
6	D S	33 mo.	Oct., 1970
7	D S	24 mo.	Feb., 1971
8	L D***	39 mo.	Feb., 1971
9	B D	24 mo.	Feb., 1971
10	D S	21 mo.	June, 1971
11	B D	23 mo.	June, 1971

*Down's syndrome
**Brain damage
***Language disorder

TABLE 4

CAs, Developmental Quotients (DQ), Time Between Test

Administrations and Months Gained for the Delayed Children

Children	CA (months)[a]	Initial Mental Develop. Quotients	Initial Motor Develop. Quotients	Months Between 1st and 2nd Administration	Months Gained		Months Between 2nd and 3rd Administration	Months Gained	
					Mental	Motor		Mental	Motor
1	36	55	<50	8 months	5.0	6.5	4 months	1.0	1.5
2	32	<50	<50	7½ months	5.5	4.0	4 months	4.0	4.5
3	35	52	56	6½ months	4.0	0.5	4 months	4.5	1.5
4	27	59	<50	9½ months	7.5	2.5	4 months	2.0	1.5
5	26	54	80	7 months	3.5	6.5	4 months	3.0	3.5
6	33	<50	<50	8 months	5.0	8.0	4 months	4.0	2.0
7	24	<50	65	3½ months	1.0	0.0	4 months	6.0	5.0
8	24	<50	58	2 months	3.5	1.0	4 months	0.0	3.5
9[b]	28	<50	52	6 months	1.5	5.0	---	---	---
10[c]	39	ceiling	<74	2 months	IQ-87	---	---	---	---
11[d]	23	62	<50	6 months	6	7	2 months	0	0.5
12[d]	21	63	58	4 months	3	3	---	---	---

[a] As of Sept., 1971

[b] Child did not participate in summer program.

[c] Child given the Bayley as a pretest and the Binet as posttest.

[d] Child entered the program in June.

presented in Table 4. Included in the table are the CAs developmental quotients (DQs), time between the administrations, and months gained from first to second testing and from second to third testing. The data for the non-delayed children are presented in Table 5. The consistent upward trend

TABLE 5

CAs, Tests Used for Evaluation, Time Between Test Administrations, and Months Gained for the Non-Delayed Children

Children	CA (months)	Test	Months Between Administrations	Months Gained Mental	Motor
1	23	Bayley	7½ months	10	Ceiling
2	24	Bayley	7 months	10	6
3	19	Bayley	4 months	8	9
4	30	Binet	7 months	14	--
5	28	Binet	4 months	7	--
6	29	Binet	4 months	3	--
7	30	Bayley-Binet	3 months	IQ 105	

while not of great significance given the absence of an appropriate control group at least supports the contention that the program was not disruptive in the development of these children.

Teaching Staff

The primary responsibility for the classroom activities and contact with parents is maintained by the teachers. The teacher has a Master's degree in Special Education and the assistant teacher is working towards her Bachelor's degree. Both teachers have formal and informal training in programming and contingency management. In general, the teachers structure

the classroom program so that certain stimulus conditions are met and so that the occurrence of desired behavior is reinforced under those stimulus conditions. The regular teaching staff is supplemented by students doing practicum work. The teacher-to-child ratio is generally one to three.

Classroom Procedure

From October through May 1970 the Toddler Project conducted two classes daily, one from 9:00 A.M. to 11:00 A.M. and another from 2:00 P.M. to 4:00 P.M. Each class was eventually composed of five or six delayed and four or five non-delayed children for a total of 20 toddlers. Each mother was responsible for bringing and picking up her child. During this time the following schedule of classroom activities was used:

ACTIVITY	TIME
Arrival	10-15 minutes
Indoor Activity	30 minutes
Snack	15-20 mintues
Group Activity	15-20 minutes
Outdoor Activity	30 minutes
Departure	15 minutes

When the summer program began in June some shifts were made to remedy some errors in the original procedure. The original classroom staff adopted a somewhat traditional preschool education approach. Although much of the children's behavior was responded to contingently, the contingencies were loose and not consistently applied. Small behavioral approximations to a terminal goal were repeatedly overlooked which slowed the progress of the children who emitted these responses. With the beginning of the summer program, a new teacher with an operant background was put in charge of the classroom. Activities and procedures in the classroom now emphasize principles of reinforcement, contingency management and shaping. The current classroom schedule is presented below:

ACTIVITY	TIME
Parent-Child Training Sessions	9:00 A.M. to 9:30 A.M.
Opening Group	9:30 A.M. to 9:40 A.M.
Activity Time	9:40 A.M. to 10:00 A.M.
Outdoor Play or Music	10:00 A.M. to 11:00 A.M.
Juice	11:00 A.M. to 11:10 A.M.
Art	11:10 A.M. to 11:20 A.M.
Closing Group	11:20 A.M. to 11:30 A.M.

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 prompt the response physically 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. During this time children complete puzzles or drop objects in appropriate holes, such as a circle in a round hole. Since the children vary in competency level, the puzzle difficulty and shape box given to a child is slightly above his competency. For example, if the child has learned to insert a circle appropriately, the next step is to program square insertion. If the task is too difficult, all the holes except the square hole can be taped shut. Gradually as the child develops competency in inserting the square, the tape is removed to make the task more complex. After the child has learned to insert the square consistently, the circle and square are presented simultaneously, making the task more difficult. This procedure is repeated if necessary with each new shape that is introduced. Often the teachers use backward chaining to help 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 filling 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 other activities themselves. The teachers also use this time for specific skill training. To teach these specific skills a program is developed for each child. Figure 4 presents a week's sample program and recording form for one of the non-delayed children while Figure 5 presents a week's program for one of the delayed children. Programmatic changes from week to week were dependent on the child's performance on the movement cycles. As can be seen in these figures there were six categories set up in a programmatic manner. A brief description of each category follows. Program Event refers to the terminal behavior to be learned. Frequency 1 refers to the number of times the teacher presented the program event. Movement Cycle refers to the specific response to be emitted by the child and Frequency 2 refers to the number of times the child appropriately emitted the response. Once the movement cycle has occurred, Contingency refers to the consequence that is to follow the child's appropriate response. Frequency 3 refers to how often the specified consequence occurred.

Table 6 presents a summary of the program events used in the classroom and representative movement cycles for each program event. Programs and movement cycles were selected for each child commensurate with his level of development. Figures 6, 7, and 8 present the results of selected classroom programs on three different children carried out by parents and teachers during the summer. The data are presented in terms of mean percentage correct which is calculated by dividing the number of appropriate responses by the number of opportunities for each training item, and then computing

Child _____ Observer _____ Date _____

Program Event	Frequency 1	Movement Cycle	Frequency 2	Contingency	Frequency 3
Teacher says, "Do this" and models:					
Pat table		Imitates movement		Praise	
Ring bell		Imitates movement		Praise	
Touch nose		Imitates movement		Praise	
Clap hands		Imitates movement		Praise	
Beats drum		Imitates movement		Praise	
Drink cup		Imitates movement		Praise	
Teacher says, "Say ____ _____" and models two word utterance, i.e., more cracker		Imitates both words together		Praise	
Teacher says, "pick a _____ object" and supplies a color each time.		Picks object of correct color: Red		Praise	
		Blue			
		Green			
		Yellow			
Elimination of aggressive behavior		Biting		Teacher holds child and says: "Don't bite	
		Hitting		Don't hit	
		Pinching		Don't pinch	
		Taking a toy from another child		Don't take toys	

Figure 4. Week's Program for one of the Non-delayed Children

Child _____ Observer _____ Date _____

Program Event	Frequency1	Movement Cycle	Frequency 2	Contingency	Frequency 3
Do this: Pat table		Pats table		Praise	
Touch nose		Touches nose		Praise	
Claps hands		Claps hands		Praise	
Squeak toy		Squeaks toy		Praise	
		Any emitted non-distress vocalization		Teacher imitation	
Consonant sounds b=boy		Approximate sound imitation		Teacher imitation	
d=dog					
m=man					
Label "juice"		Approximate sound imitation		Teacher imitation	
"cookie", "more"					
Support walk		Walks 10 steps		Praise	
Support while she stands for 1 min.		Stands with support for 30 sec.		Praise	
Hold and release in a standing position until she falls		Stands without support		Praise	

Figure 5. Week's Program for one of the Delayed Children

TABLE 6

Summary of the Program Events Used in Classroom Training

and Representative Movement Cycles

PROGRAM EVENTS	REPRESENTATIVE MOVEMENT CYCLES
1. Motor imitation	(a) rings bell (b) pats table
2. Verbal imitation	(a) imitates syllables (b) imitates single words
3. Color discrimination	(a) takes object of correct color i.e., (red, blue) (b) matches colors
4. Balance development	(a) steps on wide balance beam with supports (b) steps alone on narrow balance beam
5. Stair climbing	(a) climbs up stairs with support (b) climbs down stairs alone
6. Shape discrimination	(a) places correct shape in hole of shape box (b) matches shapes
7. Receptive vocabulary	(a) takes correct item when named (i.e., ball, cup)
8. Expressive vocabulary	(a) labels item correctly (i.e., ball, dog)
9. Walking	(a) support steps (b) free steps
10. Cooperative play	(a) shares toys with other children
11. Eye contact	(a) looks at teacher's face (b) maintains eye contact 5 sec.
12. Eye-hand coordination	(a) places pegs in peg board (b) puts beads in bottle
13. Identification of body parts	(a) points to hand (b) points to nose
14. Midline skills	(a) claps blocks together (b) claps hands
15. Self-help	(a) drinks juice from cup (b) puts on hat
16. Block play	(a) Stacks 2 blocks (b) stacks 4 blocks
17. Following instructions	(a) responds to "come here" (b) responds to "sit down"

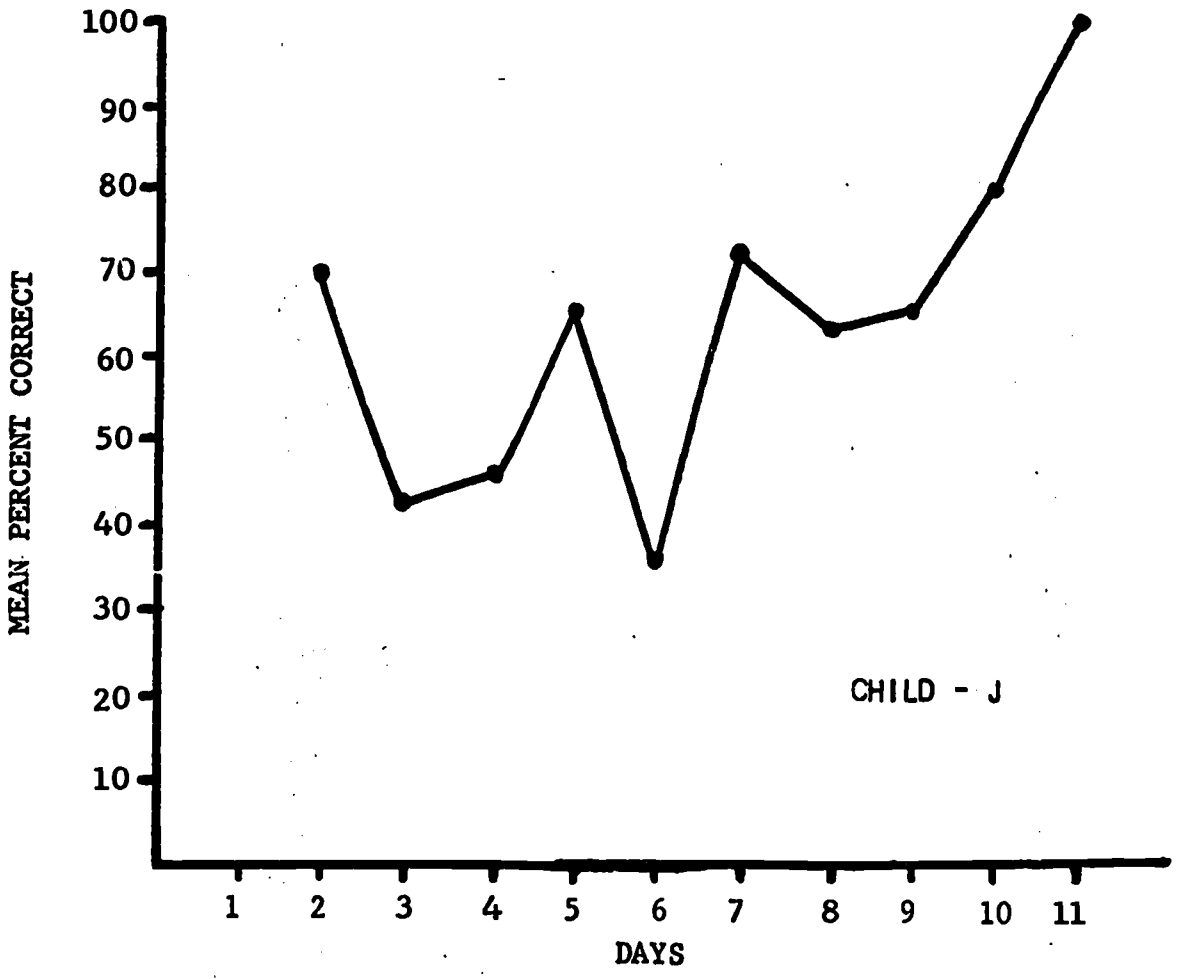

Figure 6. Mean percent of correct responses to receptive vocabulary items across training days.

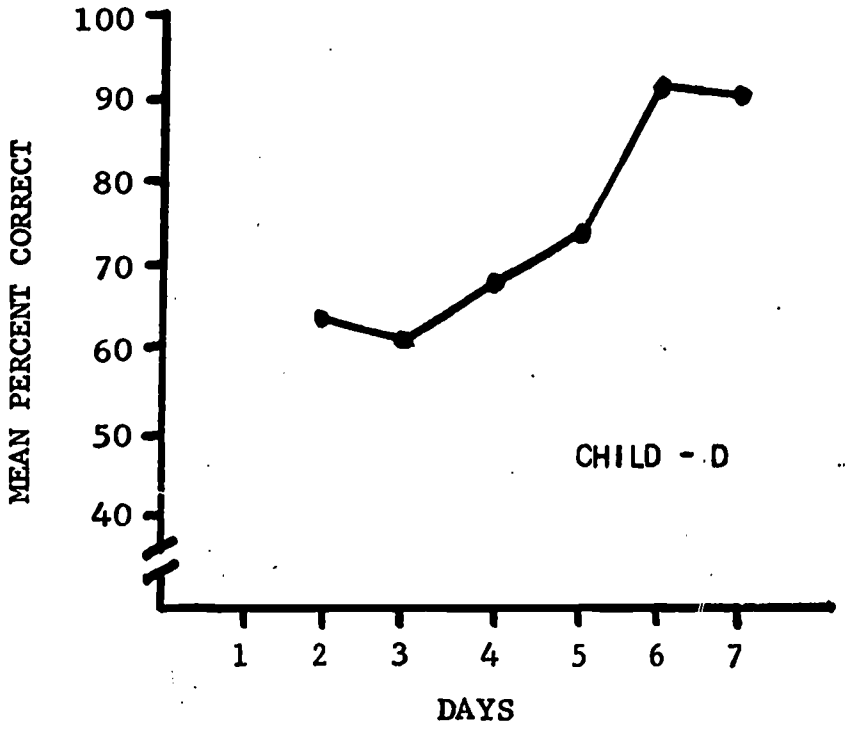

Figure 7. Mean percent of correct motor imitation responses across training days.

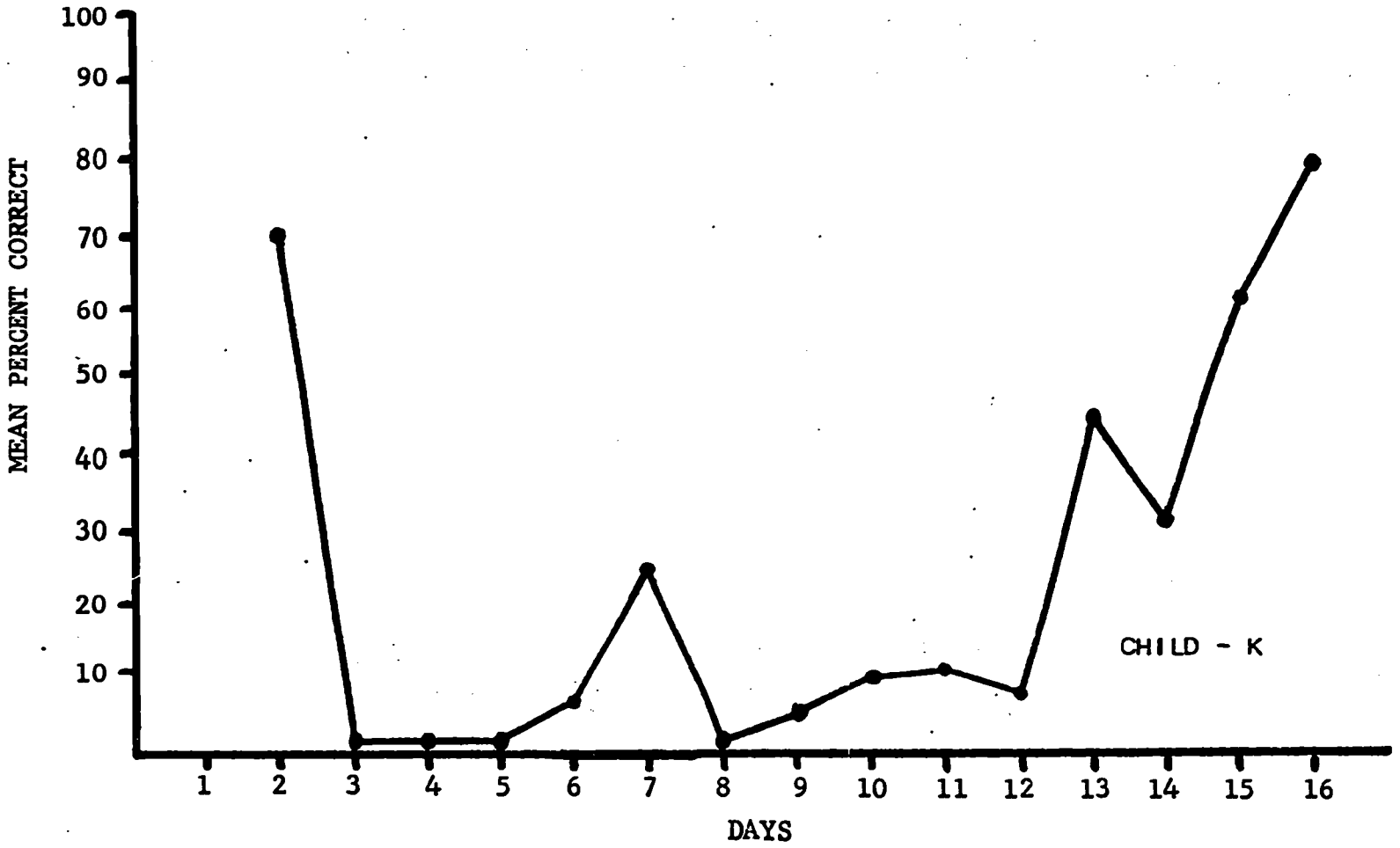

Figure 8. Mean percent of correct labeling responses to expressive vocabulary items across training days.

the mean for all items. The mean percent correct for each session was then plotted across sessions. New training items were included as the child reached criterion on the initial training items.

A technique that has been employed in the individual training sessions since June 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 to 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. Another procedure initiated this summer was to help six of the delayed children develop their pincer grasp. These children either did not have the pincer grasp or did not use it frequently. Many fine motor activities become clumsy if one does not employ the use of the pincer; for example, retrieving a pencil or crayon with the palmar grasp. The six children given pincer training were assigned to three dyads for training. The two children in a dyad were seated across from each other at a table with the teacher sitting between them. Small beads were placed between the children and they alternated in picking up a bead using the pincer grasp and dropping it in a can. Mothers keep records of the children's correct, incorrect, or attempted responses. Pincer grasp data for two of the children are presented in Figures 9 and 10.

Following the individual training sessions was outdoor play, music or physical activities which were rotated depending on the weather. This period was used to encourage following directions and large muscle activities

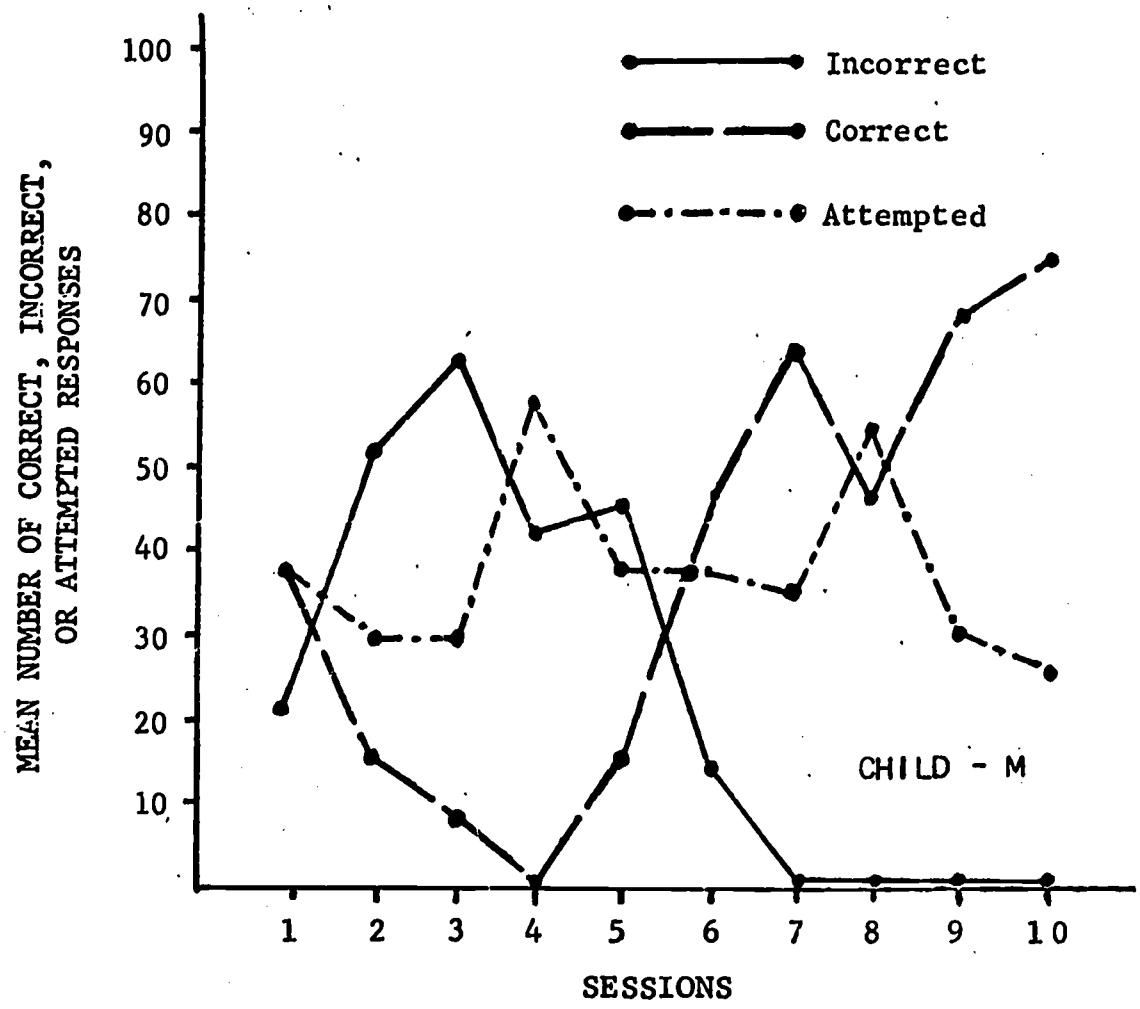

Figure 9. Mean number of correct, incorrect, and attempted pincer grasp responses across training days.

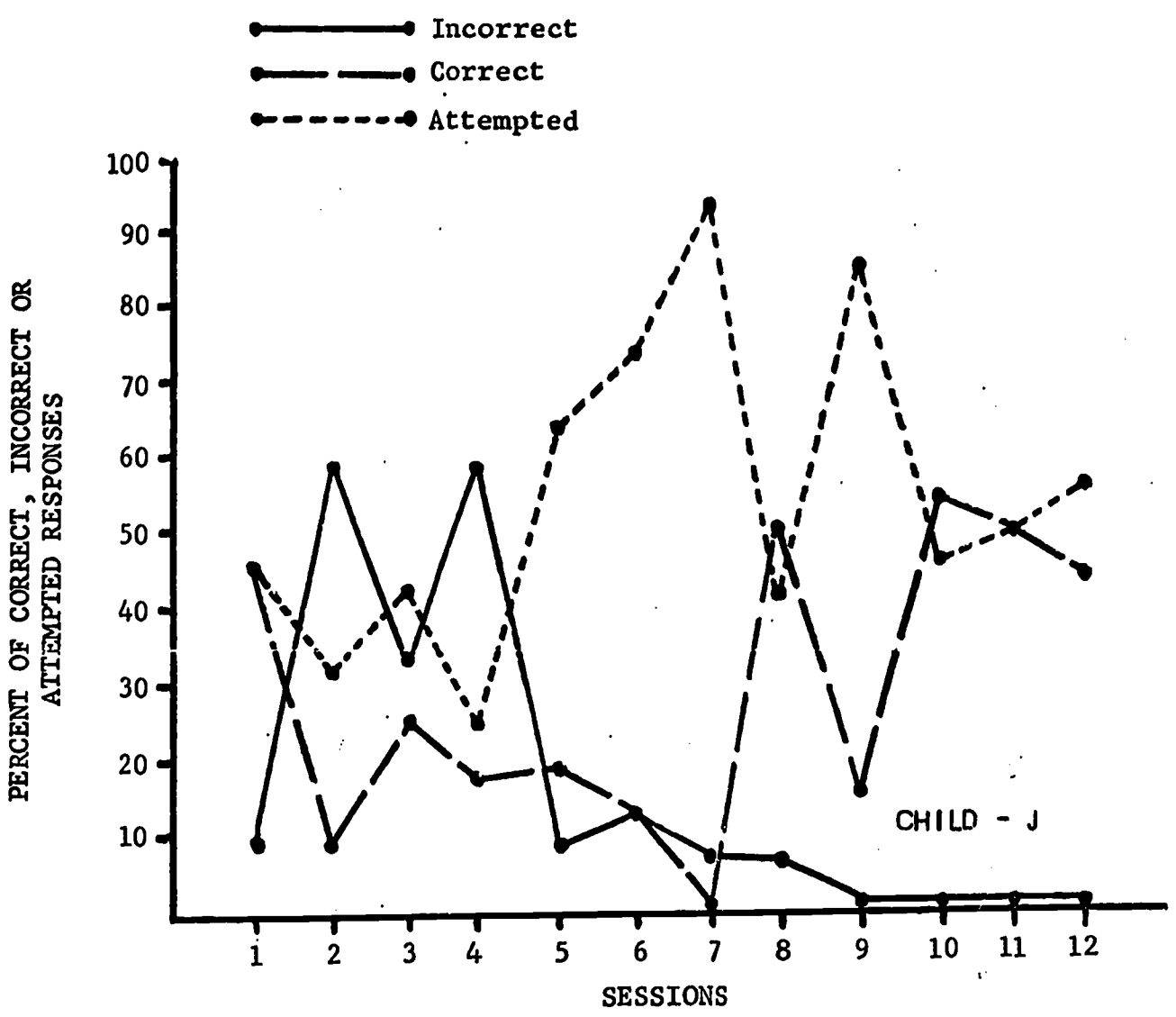

Figure 10. Mean number of correct, incorrect, and attempted pincer grasp responses across training days.

which are particularly helpful in developing the poor muscle tonus of the Down's syndrome children. Outside play consisted of swinging, playing in the sand box, and swimming pool activities.

Juice time was used to elicit speech from each child. All children were required to emit some vocalization before getting a sip of their juice. Since the children varied in their verbal ability some were required to say "juice" or "more juice," while others were required to say /ju/ or /mo/, and others were simply asked to imitate a simple verbal sequence such as /wa,wa/. As their speech developed the children were requested to produce a more complex verbal utterance to get their juice. After juice time, there was an art period during which the children were seated at small tables. Activities during this period center around using crayons, play dough and other similar mediums. The final activity was closing group time which was conducted like opening group time.

Most of the data collected in the classroom and reported in this chapter are for use by the teachers or parents. The information gathered from the individual programs is primarily to help the teachers develop and implement effective procedures and content within the classroom. Because of the many procedural shifts made during the first year, it was difficult to collect adequate data on many of the classsoom activities. With the beginning of the second year, attempts will be made to institute more reliable data-collection procedures. However, the primary recipients of the classroom data will continue to be the teachers and parents. Without objective feedback the teacher and parent cannot make valid decisions about a child's progress from day to day. A goal of this present project is to develop data-collection procedures that will enable on-the-line teachers to acquire information on a child's progress in more efficient and effective ways.

PARENT 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.

Initially it was decided to have weekly parent meetings. Parents of the delayed children were encouraged to attend while the parents of non-delayed children were allowed the option of attending. These meetings were established for three specific purposes. First, the meetings were to provide a source of information for parents on child development and problems of retardation. Parents were encouraged to ask both general and specific questions. Second, the meetings were used to establish a carry-over of classroom behavior into the home. The parents were requested to select a response and attempt to teach this response at home. Further, parents were encouraged to chart the child's progress in acquiring this response across days. Third, a weekly meeting was to provide an opportunity for the mothers to meet and discuss problems pertinent to the project. A student in clinical psychology conducted the afternoon meeting while the classroom teacher conducted the morning parent meeting.

In May an evaluation by teachers, parents, and an objective parent-child interaction scale (see the research section for a description of this scale) revealed a general dissatisfaction with the format of the weekly meetings. A parental questionnaire concerning: (1) the child's participation in the program, (2) the combining of non-delayed and delayed children, and (3) the parental meetings was given to each parent. According to the parental responses, the majority desired more direct contact with the classroom and specific training in techniques for working with their children. An evaluation of the parent-child interaction scale revealed that although the parents were able to verbalize many of the principles of reinforcement and behavior shaping, they were unable to translate these principles into their repertoires. Consequently, in June a new approach was begun with the parents.

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 begun 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. Initial feedback on these parent-child sessions has been positive from both the parents and the staff. Posttest analysis for the child's responses and the maternal-child interaction scale are yet to be done. These results will be reported later.

As mentioned before the parents were given questionnaires to assess their opinions about the project. The results of part of this questionnaire are presented in Table 7 and 8. Of the 20 children in the program 19 questionnaires were returned. An analysis of the parental responses indicated that these parents were overwhelmingly positive about their reaction to mixing delayed children with normal children. One parent indicated that he would not be willing to enroll his child in a mixed program and one parent did not respond to this question. None of the parents of non-delayed children indicated that they observed any negative effect on their children from interacting with less capable children. The parents of the delayed children agreed that their children benefited from interacting with non-delayed children. The project staff will re-administer this questionnaire following the completion of each year's program. If the response by the parents of both non-delayed and delayed children continues to be as positive and if the parents continue to report that mixing children produces no observable negative effect, it would seem safe to conclude that this approach will have demonstrated that young handicapped children can be carefully integrated with non-delayed children without harm to either group of children. Further, if this project can continue to produce data that indicate both the non-delayed and delayed child is making expected or better than expected developmental progress as measured by objective criterion, then two of the major obstacles for combining young non-delayed and delayed children will have been overcome.

Table 7

Responses of Non-delayed Children's Parents to Project's Parents Questionnaire After 8 Months of Operation*

1. Do you think your non-delayed child suffered any negative effects from interacting with less capable children?

   Yes 0 No 8

2. Do you think your child received any positive effect from interacting with less capable children?

   Yes 4 No 2 No answer 2

3. Would you place your child in the program again?

   Yes 8** No 0

4. If you could choose a program of all non-delayed, all delayed, or a mixed group of non-delayed and delayed children, in which program would you place your child?

   Mixed 6 All non-delayed 1 All delayed 0

   No answer 1

*Eight out of nine forms returned
**The one family who did not return the questionnaire have requested that their child be placed in the program this fall.

TABLE 8

Responses of Delayed Children's Parents to Project's Parents Questionnaire After 8 Months of Operation*

1. Do you think your child received any positive effects from interacting with more capable children?

   Yes 11 No 0

2. Do you think your child received any negative effects from interacting with more capable children?

   Yes 1 No 8 No answer 2

3. Would you place your child in the program again?

   Yes 11 No 0

4. If you could choose a program of all non-delayed, all delayed, or a mixed group of non-delayed and delayed children, in which program would you place your child?

   Mixed 11 Non-delayed 0 Delayed 0

* Eleven out of 11 forms returned.

RESEARCH

This section of the report is devoted to a brief description of the research projects that have been initiated and for the most part completed during the first year of the project. The authors and addresses are noted on each report so the reader can request a more complete copy of a particular study.

The toddler presents a challenge to the laboratory researcher who attempts to control experimental conditions. The sparseness of literature on the toddler probably can be partially accounted for by the often individualized techniques that are needed while working with children barely out of infancy. Our research population was not only young but was drawn from homes where the children were loved, toyed, and fed in abundance. Our children never presented a picture of either physical or attentional deprivation. Consequently, maintaining reasonable motivational levels in the laboratory was a consistent and important problem. However, through persistent effort, parental help, varying procedures, and contingencies, the project has managed to begin building a pool of reliable data on the delayed and also on the non-delayed toddler.

Effects of Two Schedules on Stimulus Control in the Non-delayed and Delayed Toddler

Diane Bricker, Lisbeth Smith, and William Bricker[1]

This study examined the effects of two schedules of reinforcement on the acquisition of stimulus control in the delayed and non-delayed toddler as an initial step in the use of operant audiometry with young children. The procedure consisted of teaching the child to press a small button when he saw a light and to refrain from pressing the button when there was no light. This was done by reinforcing the child when he pressed in the presence of the light and not reinforcing him when he pressed in its absence. An automated programming device was used to control the onset of the light and the delivery of the reinforcers. In the beginning of the procedure the child was given long periods during which the light was on and he could produce reinforcers followed by very short periods (starting at about five seconds) when the light and reinforcement device were off. If the child pressed the button when the light was off he simultaneously reset the clock so that he had to wait an additional five seconds before the light turned on. Such resetting continued until the child refrained from responding for the required five seconds. When he learned to inhibit responses in the absence of the light, the time that the light was off was increased slowly until the child could wait as long as 45 seconds without pressing the button.

The question investigated with the toddlers was whether the schedule of reinforcement used influenced the training time necessary to bring the child under light control. If a child is reinforced each time he presses the button in the presence of the light, then both non-reinforcement and the

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

light-off condition are potentially discriminative for an extinction period. If, on the other hand, the child is reinforced only after he makes several responses (the number is varied around a specified average such as five responses per reinforcement) only the light-off signal indicates extinction. The intermittent schedule of reinforcement, however, produces a higher and more stable rate of responding which is a more reliable behavioral index than the slow response rate that occurs if the child is reinforced each time he makes the correct response. In this study we divided the children into four groups, two of which were non-delayed children and two delayed. One non-delayed and one delayed group were trained under the condition of reinforcement for every correct response and the other two groups were trained in the intermittent reinforcement condition. The results indicated that the non-delayed children took about 40 minutes less training time than the delayed youngsters on the average although one two-year old Down's syndrome child reached criterion faster than all but one of the non-delayed children. The variable ratio schedule was associated with faster acquisition for both the non-delayed and the delayed children but the savings in time was only a matter of about five minutes for both groups.

The second phase of this investigation was to shift from light to tone control in order to establish an operant audiometry procedure for hearing assessment. The shift from light to tone control has been done with six non-delayed and one delayed child to date. The data indicate reliable hearing assessments on all but one non-delayed child. This operant audiometry procedure will be an area of primary focus with the delayed children in the future.

Analysis of Stage Four and Stage Five Object Permanence Concept as a Discriminated Operant

Cordelia Robinson[1]

Piaget describes six stages in the development of the object permanence concept and the stages of interest in this investigation were four and five. Stage four behavior is characterized by the child's searching for completely covered objects with the restriction that the child searches for the object only where it was found on the previous trial. Children in the fifth stage of object permanence search for objects where they were seen placed. The purpose of this research was to examine the development of stage four and five as discriminated operant responses. To demonstrate such search behavior, a functional analysis of the stimulus response relationships was necessary. Rather than viewing the "restricted" search behavior of stage four as an indication that objects are tied to particular locations it is possible to view the response as predictable on the basis of the child's past history of being reinforced for searching for objects in a specific location. Stage five object permanence behavior can be viewed as under the control of the discriminated stimulus "look for the object where last seen." Terminal performance in this investigation was characterized by the ability of the children to search for two objects, one of which was a stage four object (look for the object where last found) and one which was a stage five object (look for the object where last seen) when the two objects were presented in a random sequence.

Six children ranging in chronological age from 21 to 32 months of age were selected from the delayed children in the Toddler Research and Intervention

[1]This investigation is the author's doctoral dissertation. For a more detailed report write the author at Box 163, Peabody College, Nashville, Tennessee 37203

Project. All six passed the pretraining criterion which consisted of picking up each token and exchanging it for food or social reinforcement.

A modified Wisconsin General Testing Apparatus was used in all phases of the study. The tray of the apparatus had three wells covered by solid sliding doors with handles. The objects hidden throughout the study were felt tokens (one a green triangle, the other an orange circle) which the children were permitted to exchange for some type of edible.

There were six principle stages to the study. Following selection of subjects on the basis of pretraining performance all subjects went into the baseline phase. Here tokens were hidden in stage five manner and subjects were requested to search for them. The next phase was determined on the basis of baseline performance. Subjects who demonstrated stage five search behavior proceeded to the discriminated operant (DO) phase. Subjects who did not demonstrate stage five behavior were trained to do so. Following training to criterion subjects went into the DO Phase. In the DO phase the two tokens were hidden in two different ways requiring use of both level four and level five search strategies in order to maximize reinforcement. Correct search behavior in this phase consisted of looking for one object in the location where the experimenter placed it (level five) and looking for the other token in the same well on each trial even though the experimenter could be observed to have placed the token in a different well (level four).

The next phase of the experiment involved a reversal of the token properties so that the level four token became the level five token and the level five became the level four token. This was followed by another reversal back to the original DO phase. The final stage was a return to the baseline condition in which both tokens were hidden in a level five manner. The criteria for each phase of the study were: (1) the subject was required to

search correctly on at least 85% of the trials per session for three consecutive sessions and (2) search correctly for each token-well combination on a minimum of five consecutive trials.

All six children participated in the study throughout its five month duration. Results will be described for each phase of the investigation.

Baseline: Two of the children demonstrated level five performance during the baseline and consequently went directly to the discriminated operant phase.

Training: Training for the subjects who required it varied from 12 to 34 sessions. The training procedure was varied in order to adjust for specific problems such as development of position bias or failure to respond to prompting.

Discriminated operant: None of the children demonstrated DO performance when the random sequence was initially introduced; consequently all subjects went through a phase of successive presentations of each token. First, the level four token was presented on every trial until the child reached the criterion of five consecutive correct searches for each token-well combination. The level five token was then presented until the same criterion was reached. This procedure continued until the child switched strategies with no more than two errors per presentation. Initially the switch to level four behavior was more difficult for five of the six subjects but as the total number of trials to criterion decreased, the difficulty of switching appeared more comparable. Three of the children have completed this phase. The other three, after from 30 to 50 sessions, were not switching with two or fewer errors. For these three children a cue was introduced to help facilitate development of the discrimination. A green card is placed on each well during all level four trials for these children. This cue appears to be facilitating switching

behavior for the three children. Two other children who required initial training are presently in the reversal phase. Unlike the child who has completed all phases these children did not reach criterion during the random sequence reversal situation and consequently went into the reversal successive presentation phase, with a two trial criterion. One of the children has completed this phase and is now demonstrating the discrimination in the random sequence reversal phase. The other child is still in the successive presentation phase.

Motor Imitation in the Normal and Delayed Toddler

Lisbeth Smith, Diane Bricker, and William Bricker

The purpose of this series of three investigations was to assess two levels of motor imitation skills in non-delayed and delayed children and to examine the effects of classroom training on the motor imitation ability of the delayed toddler. These studies are described in three phases.

Phase 1. Comparison of delayed and non-delayed toddlers on motor imitation test, level one

The level one motor imitation test was administered to seven non-delayed and seven delayed toddlers. The individual CAs and test scores of these subjects as well as the group means are presented in Table 9. The reliability coefficients ranging from .92 to 100 percent with a mean of .98 also appear in Table 9.

The level one motor imitation test consisted of ten different items (such as squeak toy, ring bell, roll ball) each presented four times for a total of 40 trials. This series of 40 trials followed a predetermined random presentation which was standard across subjects.

Before the test was administered, each child was pretrained with two responses (clap blocks together and drop blocks into a cup) to a criterion performance of five consecutive responses for each item. Once this criterion was reached the level one test was administered in two 20-trial sessions. The child was seated in front of the experimenter who obtained the child's attention by saying, "Look at me," before presenting the response to be modeled. When the child's attention was on the model, he said, "Do this." and performed the response to be imitated. Two observers sat beside the

Table 9

Comparison of Non-delayed and Delayed Toddlers' Performance on Motor Imitation Test, Level One. Rater's Reliability Coefficients for Each Test are Also Listed

SUBJECTS	CA(months)	TEST SCORES	RELIABILITY
NON-DELAYED			
1	26	39	100
2	26	33	100
3	21	17	.98
4	17	24	.92
5	27	36	100
6	20	35	100
7	28	39	100
Mean	23.57	31.85	98.57
DELAYED			
1	25	29	100
2	16	23	.96
3	23	16	100
4	26	27	100
5	21	29	100
6	17	26	.98
7	18	30	100
	25.12	25.22	99.20

child and independently recorded the child's response to each modeled presentation. Responses were recorded as appropriate or inappropriate. Each appropriate response was rewarded with a tangible reward. Rewards consisted of bits of cereal or candy. To maximize motivation it was necessary that each child received some reinforcement during the presentation of the test. Consequently, five presentations of each training item (clap blocks and dropping a block) were interspersed among the 40 test trials so that each child should receive a minimum of ten reinforcers during the test presentation. These ten trials were not counted in the total test scores.

The results of this phase of the investigation are summarized in Table 9. The CA range and mean for the delayed and non-delayed group are almost identical. Although there is a six point difference in the mean test scores in favor of the non-delayed group, a Mann-Whitney U Test revealed that this (U = 1.73) was not a reliable difference.

These results indicated that with the group of 14 children used in this investigation the non-delayed and delayed toddler cannot be differentiated on a motor imitation test composed of simple items. A subsequent study which used more complex responses to be imitated is presented in Phase III.

Phase II. Effects of classroom training on motor imitation test, level one performance of the delayed toddlers

Following the assessment of the delayed children's motor imitation skills on level one test (pretest), a classroom intervention program was begun with six of the delayed children. The classroom teacher selected the non-imitated responses from the pretest for each of the children. An individual program to teach the non-imitated responses was developed and implemented within the classroom for six weeks during December and January.

Children were trained individually by the teachers. The teacher and child worked in a secluded section of the classroom for an average of five to ten minutes three times a week. Usually four responses were trained during a session. Responses were trained to a criterion of five consecutive correct before a new response was introduced. The teachers employed techniques of prompting, fading, and reinforcing approximations to the terminal behavior as well as appropriate responses.

During the last week in January motor imitation test, level one (posttest) was readministered to the six children who had received the classroom instruction. Table 10 presents the individual pretest, posttest and gain scores.

Table 10

Pretest Posttest Comparisons of Delayed Children's Performance on Motor Imitation Test, Level One Following Training

SUBJECTS	PRETEST SCORES	POSTTEST SCORES	GAIN
1	29	40	11
2	23	28	5
3	16	30	14
4	27	34	7
5	29	34	5
6	26	35	9
Mean	25.0	33.5	8.5

Figure11 presents a comparison of the motor imitation test, level one (pretest) performance of the delayed and normal youngsters. Figure 11 also shows the gains made by the delayed children on the second administration of the level one test (posttest).

Although the lack of a control group makes it impossible to attribute the gains made by the delayed children to the classroom intervention, the systematic gains made by each child in the training program suggest the intervention had an effect. The Wilcoxon Sign test run on the mean number correct on the pretest and posttest for the delayed children indicated a reliable difference between the two tests ($p < .05$).

Phase III. Comparison of delayed and non-delayed toddlers on motor imitation test, level two

This phase of the investigation is presently underway. In this phase a more complex motor imitation test was used. The level two test was

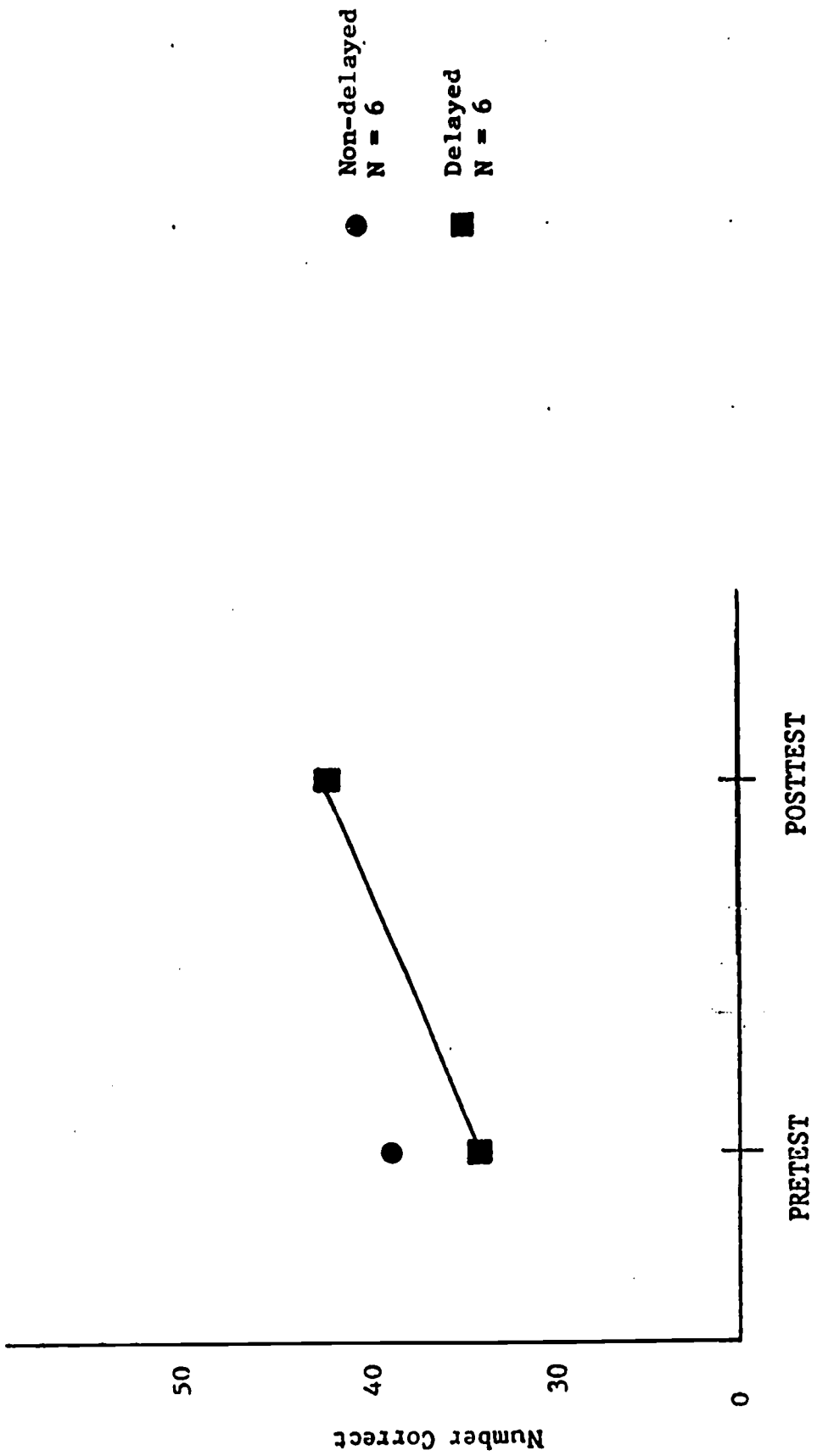

Figure 11. A Comparison of the performance on the Motor Imitation Test, Level I
One of the Non-Delayed and Delayed Children. A Pretest Posttest
Comparison for the Delayed Children Following Training

composed of 20 different items (such as hands on head, pat box, swing feet) presented four times for a total of 80 trials. The test was administered and the responses recorded precisely as in the level one test. The initial data are presented in Table 11.

TABLE 11

Comparison of Non-delayed and Delayed Children's Performance on Motor Imitation Test, Level Two

	SUBJECTS	CA (months)	TEST SCORES	RELIABILITY
Non-Delayed				
	1	26	74	100
	2	27	75	100
	3	21	66	.97
	4	21	66	.98
	5	26	61	100
	6	28	78	100
Mean		24.83	70.00	99.16
Delayed				
	1	24	50	100
	2	25	38	.98
	3	31	70	---
	4	30	37	.97
Mean		27.50	48.75	98.33

Contingent Social Stimulation of Infant Vocalizations: Developmental Deficit and Mother-Infant Interaction

Rune J. Simeonsson[1]

This study was designed to determine specific and generalized effects of contingent social stimulation of prelinguistic vocalizations in non-delayed and developmentally delayed infants. Research on early language development has typically been dichotomized with the focus being either on extended, global enrichment and intervention programs with deprived and/or delayed toddlers and preschoolers or short term, experimental laboratory studies designed to demonstrate conditioning phenomena with young infants.

This study evolved from research findings on conditioning of infant behavior with an interest in intervention strategies for developmentally high-risk infants. Conditioning paradigms found effective with young non-delayed infants were applied to modify vocal production in older non-delayed and delayed infants. Measures of mental development and mother-infant interaction were obtained before and after experimental treatment to determine generalized effects.

Ten non-delayed infants (CA < 12 months) and 10 delayed infants (CA 11-29 months), all limited to non-verbal vocalizations, were randomly assigned to contingent social stimulation (CSS) or non-contingent social stimulation (NSS) groups and observed in baseline, stimulation, extinction, and contingent stimulation periods. Social stimulation consisted of a smile, a touch, and a verbal phrase administered by the author either contingent

[1]This report is the abstract from the author's doctoral dissertation, George Peabody College, Nashville, Tennessee, 1971.

upon vocalizations (CSS group) or unsystematically (NSS groups). Frequency and intervals of vocalization per 10-minute trial were recorded in two daily trials for 11 days.

Results indicated great variability within subjects and no significant experimental effects were found for vocalization frequency. Significant effects were found for intervals of vocalization showing that all groups vocalized a greater ($p < .05$) percentage of time in all periods compared to baseline. Separate analysis of trials in the stimulation periods showed that CSS groups vocalized in more ($p < .05$) intervals ghan NSS groups. Measures of mother-infant interaction demonstrated that intervals of maternal vocalization increased significantly ($p < .05$) from pre- to post-treatment with non-delayed infant groups ($p < .05$) and CSS groups ($p < .01$) accounting for specific changes. Generalized developmental changes were reflected in a greater ($p < .05$) number of infants in CSS groups making gains on the Mental Developmental Index (MDI) following experimental participation than infants in NSS groups. These findings indicate that contingent social stimulation of prelinguistic vocalizations is a model applicable to older non-delayed and delayed infants and that such stimulation is more effective than increased stimulation in facilitating changes in mother-infant interaction and in measures of general development.

An Investigation of the Efficacy of a Fading Procedure in Establishing Learning Set in Toddlers

Roger Smith and John Filler

The value of fading procedures in discrimination training has been demonstrated in investigations employing both infrahuman subjects (Terrace, 1963) and older non-delayed and delayed children (Moore & Goldiamond, 1964; Touchette, 1968; Bricker, Heal, Bricker, Hayes & Larsen, 1969). Typically, these procedures have involved fading in the intensity of the S-delta until it is equal with the intensity of the S^D. In general, these fading procedures have been found to facilitate the development of discrimination learning but not to be effective in establishing discrimination learning set.

The purpose of the study was to evaluate the efficacy of a fading procedure in the acquisition of discrimination learning and discrimination learning set with children younger than 30 months. Unlike the procedures employed in the previously cited investigations, a flashing lighted border of adjustable intensity surrounding S^D was utilized in an attempt to maximize S^D responding and minimize S-delta responding. 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 for training. Subjects in both groups then received training on four new simple geometric form problems (not used in pretest). As each child completed training, the posttest, a repetition of the pretest, was administered.

[1]For a more detailed report of this investigation write to the authors at Box 163, Peabody College, Nashville, Tennessee 37203

An analysis of variance, with training procedure groups (fading and Harlow) as the between factor and type of problem (geometric and junk) and testing (pre- and post-) as the within factors, indicated a significant main effect for testing and a significant triple interaction. Tests of simple effects showed the source of the triple interaction to be the fading group's performance on simple geometric form problems in posttest. As depicted in Figure 12, the fading group's performance on the posttest on simple geometric form problems was significantly lower than their performance on the junk item problems and lower than the performance of the Harlow group on both types of problems in posttest.

The writers interpreted these results as indicating that the fading procedure interfered with performance on posttest gecmetric form problems where fading was not employed. This interpretation is reinforced by the finding that the fading group's posttest performance on junk item problems did not significantly differ from the posttest performance of the Harlow group on both junk and geometric form problems.

This investigation is currently being replicated with a group of developmentally delayed children with CA's below 36 months.

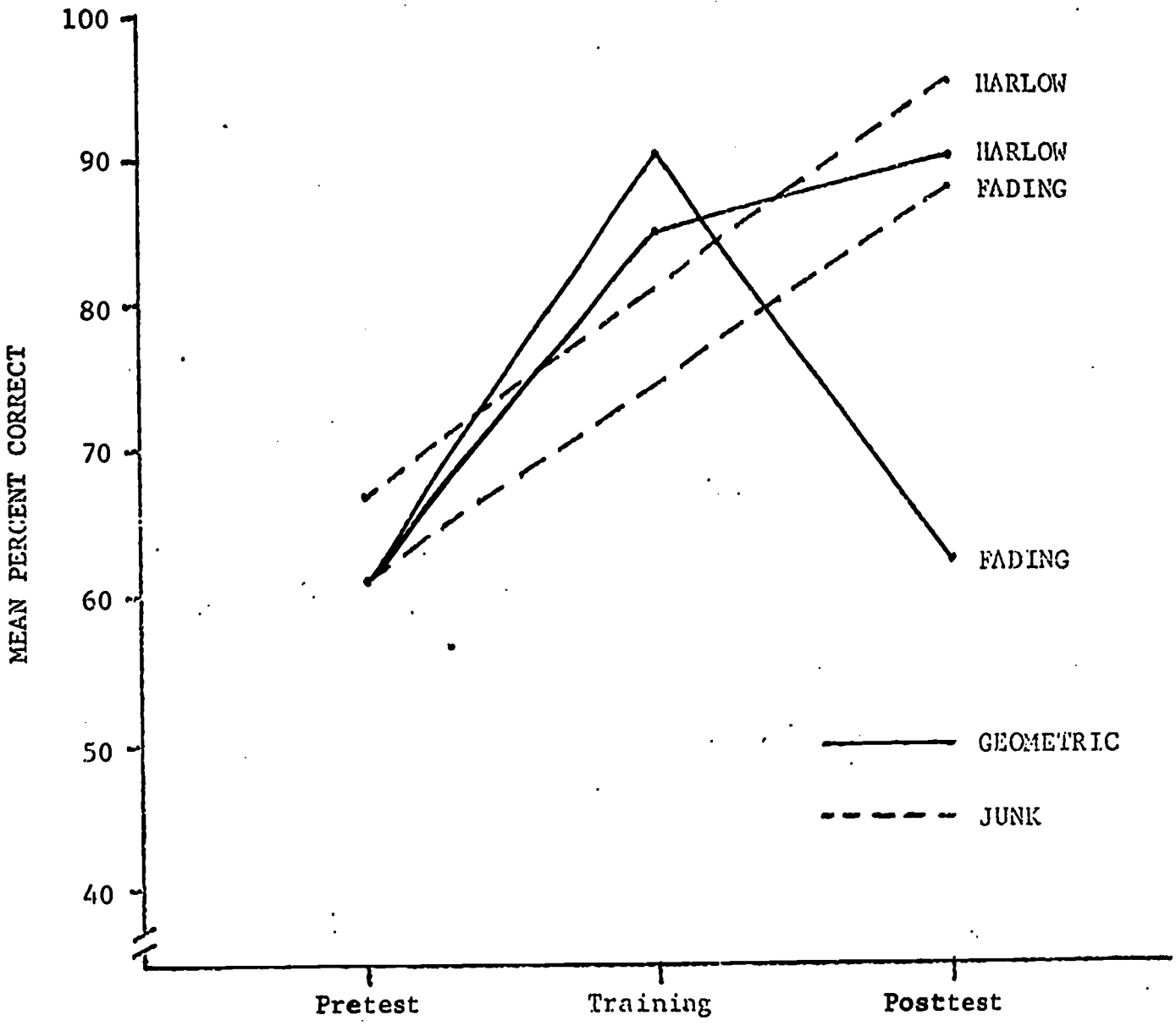

Figure 12. Mean percent correct performance for the fading and Harlow groups on simple geometric form problems in pretest, training and posttest and on junk item problems in pretest and posttest.

Maternal Teaching Style Assessment Scale

Cordelia Robinson and John Filler[1]

The maternal teaching style assessment scale was developed to assess the extent to which mothers of the children in the Toddler Research and Intervention Project used strategies such as physical shaping, verbal directions and positive feedback when they worked with their children. It was decided that to influence the behavior of the children effectively it would be necessary to influence the training procedures their parents use, since the greater portion of the child's time is spent with the parents.

The scale consists of 12 categories of maternal and five categories of child behaviors. Maternal behaviors can generally be classified as either verbal or physical antecedent or consequent events. Antecedent events include directions, demonstrations, and prompts of approximations and terminal behaviors. Consequent events include both verbal and physical positive and negative feedback. Table 12 presents the definitions used for the maternal responses. Child behavior can generally be classified as verbally or physically task relevant or task irrelevant. Table 13 presents a list of the definitions of child responses.

Nine mother-child pairs were individually video taped for two 3-minute periods. Each mother was given two tasks to teach her child. One task, a relatively simple toy, was a series of cups to be nested inside one another. A set of dolls with different fasteners such as zippers and buttons was the second more difficult task. Each mother was given the toys and asked to teach her child how to manipulate the object appropriately. An observer in

[1]For a more detailed report of this investigation write the authors at Box 163, Peabody College, Nashville, Tennessee 37203

Table 12

List of Definitions of Maternal Teaching Responses

VERBAL	PHYSICAL
<u>Directions and/or Instructions</u> Mother verbally requests the child to emit some behavior which may be task relevant (denoted by +) or task irrelevant (denoted by -) or mother provided information which may be relevant (denoted by +) or irrelevant (denoted by -). <u>Feedback</u> May be positive (denoted by +) or negative (denoted by -). May occur to an approximation of the terminal behavior or to other behavior.	<u>Task Oriented</u> Prompt. The mother makes contact with objects involved in the task to encourage the child. Demonstration. The mother demonstrates the response. Can be divided into approximation in which mother demonstrates a component of the task or terminal in which mother demonstrates the terminal behavior Guidance. The mother physically assists the child in the response. Can be divided into approximation in which mother assists the child in a component or the task or terminal in which the mother assists the child in completing the response. <u>Feedback</u> May be positive (denoted by +) or negative (denoted by -).

Table 13

List of Definitions of Child's Responses

VERBAL	PHYSICAL
Task relevant For example, child imitates mother's directions (denoted by +).	Toward object Child manipulates object Approximation. Child emits a component of the terminal behavior. Terminal. Child emits terminal behavior. Task relevant-terminal or component behavior is correct (denoted by +). Task irrelevant-terminal behavior is incorrect (denoted by -). Other. Child emits behavior irrelevant to task.
Task irrelevant For example, babbling or crying or requesting to leave (denoted by -).	Toward mother Child makes physical contact with mother Task relevant. Child elicits mother's assistance (denoted by +). Task irrelevant. Child tried to get mother to leave (denoted by -).

the room kept time for the mother. A signal was superimposed on the video tape in order to signal ten second intervals that were used during the tape analysis. Each of the two segments was viewed jointly by two observers three times in order to rate three general classifications of behavior separately: (1) mother's verbal behavior, (2) mother's physical behavior and (3) child's behavior. Scores were computed by summing the columns for each of the two scoring sheets (one for the easy task and one for the difficult task). Mean percent agreement between the two observers for all categories, dyads and each task was .74. Further revisions of the scale are planned to simplify scoring and to increase the reliability of the scale. This scale will be used in the future to assess the effect of the project's parent training program.

Early Classification Skills of Developmentally Delayed Toddlers

Gesila Chatelanat, Candy Henderson, Cordelia Robinson and William Bricker

Early classification skills of ten developmentally delayed toddlers were measured using Series III of the Uzgiris-Hunt Provisional Instrument (1966). This series is based on Piaget's description of schemas in relation to objects which forms the motor basis for object classification and, perhaps, the beginning of concept development. Essentially, the series consists of presenting various toys to the child and then recording the ways in which he uses them in exploration and play. The way a child uses a particular object might include mouthing, hitting, throwing, or crumpling or the child's behavior might be object relevant such as drinking from a cup, moving a car along on its wheels, or putting a necklace around one's neck. The number of different operations that a child uses in manipulating the objects are relatively finite and a child will use a particular operation with several different objects. These object-operations interactions define the schemas that the child has for organizing and classifying the world around him. In one sense, the schemas are the primitive concepts that become the basis for naming object classes. The purpose of the present investigation was to improve existing methods for assessing the schemas that a child has so that particular classification deficiencies evidenced in the repertoires of developmentally delayed toddlers could be isolated and ameliorated.

The procedure followed in this investigation used 15 objects each of which was presented to each of ten delayed children on 2 separate occasions. Encouragement to pick up and play with the objects was given to each child by the examiner who then recorded the type of action that the child performed with the object. A second person also observed and recorded the

child's action. A preliminary analysis of the results to date indicate that the preponderance of responses emitted by the children involved relatively simple motor schemas such as mouthing, holding, and throwing the objects. However, several instances of object-relevant activities were also observed. The next step in this investigation is to evaluate the performance of a group of non-delayed children on the same objects to assess the differences between the two groups of children. This evaluation will probably lead to the expansion of the measurement instrument in preparation for an intervention phase that will be used to instruct the delayed children in more sophisticated uses of objects.

Receptive Vocabulary Skills in the Toddler

During the past year a series of investigations has been conducted in the area of receptive vocabulary using the Toddler Project population. In these investigations receptive vocabulary refers to specific word-object association. For example, a child must learn that the auditory signal "chair" refers to four-legged objects with flat seats and a perpendicular back generally used to sit on. There have been four studies completed in receptive vocabulary.

Phase I. A Comparison of non-delayed and delayed toddlers on a measure of receptive vocabulary

Diane Bricker, Lisbeth Smith and Bill 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 present study were 18 children enrolled in the Toddler Project. These children ranged in age from 14 to 30 months and had been assessed with the Bayley Infant Development Scale or the Stanford Binet. Half of these subjects had developmental delays (DQs below 55) while the other half were developmentally non-delayed (DQs or IQs above 100).

The 20 stimulus objects were small three dimensional objects mounted on two by two inch wooden plaques and are listed in Table 14. These objects were presented as two-choice discrimination problems on the Wisconsin General Test Apparatus (WGTA).

The 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 were randomly paired with the other

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

Table 14

List of the 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

objects with the restriction that each object appeared three times as the SD and three times as the S-delta. Once the pairs were constructed they were randomly sequenced into three equal segments in which each object appeared as the SD and the S-delta once in each segment.

While the door on the WGTA was closed, the experimenter placed a small edible or token in the reinforcement well and then 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 so the child could make his selection.

An analysis of the results indicated two significant effects. First, there was a reliable difference between the performance of the non-delayed and the delayed children. The non-delayed toddlers made more correct responses on each of the three test blocks. Second, there was a reliable blocks effect indicating that both groups' performance was improving across the successive presentations of the three test blocks. These results are presented graphically in Figure 13. These data suggest the need for developing a training procedure for facilitating the acquisition of word-object association in delayed toddlers who have indicated a deficiency in this important area of language behavior.

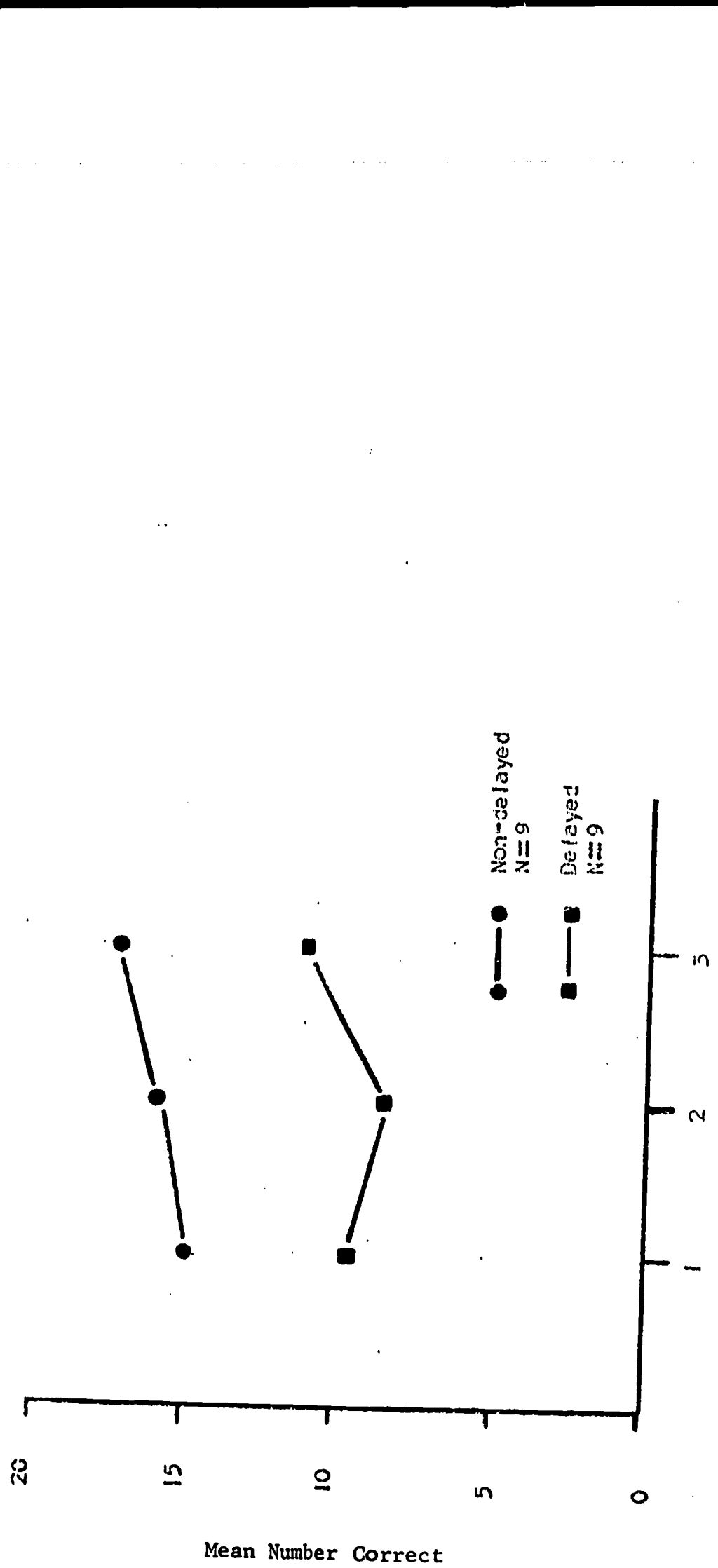

Figure 13. Performance of the Delayed and Non-delayed Toddlers Across Three Segments of the Receptive Vocabulary Test

Phase II. Two training procedures for facilitating the acquisition of receptive vocabulary in developmentally delayed toddlers

Lisbeth Smith, Diane Bricker, Tom Freck and Linda Ritchie

The purpose of the present investigation was to examine the effect of two training procedures on the development of word-object associations (receptive vocabulary). Subjects for the present investigation were nine developmentally delayed children between the ages of 16-32 months who were enrolled in the Toddler Research and Intervention Project at the Kennedy Center, George Peabody College, Nashville, Tennessee. Bayley Scales of Infant Development indicated mental developmental quotients around fifty for all children. Table 15 contains the demographic information on the subjects.

Table 15

Demographic Information and Pretest Scores on the Subjects in Groups A, B, and C

Subjects	CA (months)	Bayley Developmental Quotients	Pretest Scores
Group A (motor)			
1	28	50	29
2	28	55	29
3	25	50	35
Group B (verbal)			
1	18	50	29
2	20	50	29
3	32	--	22
Group C (control)			
1	20	50	25
2	18	54	32
3	17	50	30

A modified Wisconsin General Test Apparatus (WGTA) was employed to present the receptive vocabulary objects to the subjects. The stimuli employed were 20 small three dimensional objects mounted on two by two inch wooden plaques. The objects were selected on the basis of their functional value for the majority of the subjects, and were the same objects as used in the first investigation (see Table 14).

The study was conducted in three separate phases: pretest, training and posttest. In each phase the child was brought individually to the experimental room and seated in front of the WGTA. One experimenter sat in front of the box with the child and recorded trial by trial data, while a second experimenter sat behind the WGTA and positioned the stimuli and reinforcers. Reinforcers were predetermined for each child and consisted of small edibles such as candy and juice. Sessions lasted approximately 15 minutes and were conducted on consecutive weekdays unless the subject was absent.

Pretesting: The pretest was composed of 60 two-choice discrimination trials. On each trial two stimuli were presented along with an auditory cue as to which object was correct. Each of the objects was randomly paired with the other objects with the restriction that each object appeared three times as the S^D (object to be chosen) and three times as the S-delta (distractor). Once the pairs were constructed they were randomly sequenced into three equal blocks with each object appearing as the reinforced object once in each segment. The three blocks were administered on three consecutive weekdays. Right-left placement of the S^D and S-delta was randomly predetermined and remained the same across subjects.

While the door of the WGTA was closed the experimenter baited the well and positioned the stimulus objects. If the object to be chosen was chair,

for example, when the door opened the experimenter said "Take chair," "Take chair," and then pushed the tray forward so the subject could make his response. Subjects were matched on pretest scores and then assigned to one of three groups for training: Experimental group A (motor movement training), Experimental group B (verbal labeling training), and a control group C. There were three subjects per group.

Training: Experimental group A (motor) followed a four step training sequence. The steps were:

Step one- The experimenter opened the door of the WGTA; the first training object appeared alone on the tray; the tray was pushed forward and the subject told to find the reward; placement of the object followed a random left-right sequence; criterion to go on to step two was three consecutive correct responses each made within twenty seconds after the tray was pushed forward.

Step two- The WGTA door was opened; the training object appeared alone; the experimenter sitting in front of the box with the subject modeled a motor movement saying "do this;" the subject imitated or was physically prompted to imitate; the tray containing the object was pushed forward; criterion to go on step three was three consecutive imitations (without physical prompts) and object choices each within twenty seconds after the tray was pushed forward.

Step three- The WGTA door was opened after the well was baited and the stimuli positioned; the experimenter behind the box said the training object's name; the subject made an appropriate motor response (this was prompted until he did so spontaneously); the experimenter said "Take _____(object name)" as the tray was pushed forward; criterion to go on to step four was three consecutive motor responses to the object name and correct choices each within twenty seconds after the tray was pushed forward.

Step four- The WGTA door was opened; the experimenter behind the box said "Take _____;" the subject made the appropriate motor response and the tray was pushed forward; on the tray were located two stimuli, an S^D and S-delta; the distractor or S-delta was changed on each trial and could be any item from the pretest except training items; criterion was three correct motor responses and object choices each made within twenty seconds after the tray was pushed forward.

Experimental group B (verbal) also followed a four step training procedure.

The steps were as follows:

Step one- The WGTA door was opened and the training object appeared alone on the tray; the tray was pushed forward and the subject was told to find the reward; the object followed a random left-right placement; criterion to go on to step two was three consecutive choices each made within twenty seconds after the tray was pushed forward.

Step two- The WGTA door was opened; the experimenter pointed to and named the training object which appeared alone on the tray; the tray was pushed forward as the experimenter said "Take _____ (object name);" criterion was the same as step one.

Step three- The WGTA door was opened; two objects appeared on the tray; the experimenter pointed to and named both objects (training and distractor); the tray was pushed forward and the experimenter said "Take _____ (training object's name);" the distractor changed for each trial and could be any nontraining item from the pretest; criterion was three consecutive correct responses each made within twenty seconds after the tray was pushed forward.

Step four- The WGTA door was opened; two objects were on the tray, a training object and a distractor, which varied on each trial; the experimenter said "Take _____ (Training object's name);" the tray was pushed forward as the experimenter said "Take _____" again. Criterion was the same as step three.

The subjects in the two experimental groups received training on six objects which they had missed two or three times out of three presentations on the pretest. Training on an object was terminated when the subject either reached criterion on step four or had completed 50 trials. After training on the first object was terminated, training on the second object was begun and so on until all six objects had been trained. At this point the posttest was administered. The control subjects received no systematic training on receptive vocabulary other than what might normally occur in the classroom. After one subject from each experimental group had finished training the first control subject was posttested and so on until all three control and six experimental subjects had been posttested.

An analysis of the pretest data was made on the basis of number correct during each of the three sessions in order to assess whether learning across pretest occurred. The mean number correct (out of 20 possible) across all subjects was 10.00, 8.89, and 10.33 for sessions one, two and three of the pretest respectively. An analysis of variance procedure using sessions by subjects was performed and the main effect of sessions was not significant. The mean number correct for the entire pretest collapsed across all subjects was 29.42 (49%), which indicated that the subjects' performance did not differ from what one would expect by chance.

Table 16 presents the mean number correct for each of the groups on pretest and posttest. In order to assess whether training facilitated the development of word-object associations an analysis of variance was performed on the number correct on pretest and posttest by the motor, verbal and control groups. This analysis indicated no statistically reliable differences between the groups and no reliable difference between pretest and posttest scores.

Table 16

Mean Number Correct on Pretest and Posttest for the Motor Verbal and Control Groups

Group	Pretest	Posttest
A (Motor training)	31.00	28.67
B (Verbal training)	26.67	30.00
C (Control)	30.33	31.00

If training had resulted in the development of the word-object associations for the six objects employed during training, these objects would always be chosen when they were the S^Ds, but never chosen when they were the S-deltas. An analysis of the posttest data indicated that out of eighteen possible times, subjects in the motor training group chose the trained objects an average of twelve times when they were S^Ds and thirteen times when they were S-deltas. For the verbal training groups the means were twelve choices when training objects were S^Ds and twelve choices when they were S-deltas. Thus, training did not result in the acquisition of word-object associations. On the posttest when the training objects appeared together as S^D and S-delta subjects performed at chance (54%).

The results of this investigation indicated that neither the motor mediation training nor the verbal labeling training facilitated the acquisition of word-object associations. Rather, these two procedures taught the subject to discriminate trained from nontrained objects and to choose the trained object regardless of the verbal label provided by the experimenter as indicative of the correct object.

The failure of the motor mediation training to facilitate word-object associations is contrary to the results of Bricker's (unpublished manuscript) study on imitative sign training. However, this failure may be due to a lack of distinctiveness of the individual motor movements chosen as mediators rather than to the procedure in general. The subjects in this study had received no previous training in fine motor imitation, the object-imitation-word paradigm may have been inappropriate without such training. It was observed that the motor movements performed by the subjects were

nearly identical for several objects, e.g., drum and hammer. In addition, the sequencing on steps to criterion in order to go on to training on another object did not demand that the subject attend to the verbal label, but only that he visually discriminate the object being trained from the various distractors. At no time during training were two trained objects presented together, one as the S^D and one as the S-delta. This simultaneous presentation of two trained objects would force attention to the verbal cue and was the procedure employed in the second experiment.

Phase III. A further comparison of training procedures to facilitate the acquisition of receptive vocabulary in delayed toddlers

Diane Bricker, Lisbeth Smith, Linda Ritchie, and Tom Freck

Since the experimental procedures used in the previous investigation failed to help the delayed toddlers acquire word-object associations, the present study was designed to examine another training technique. Subjects for the present investigation were ten developmentally delayed children (nine of whom were in the previous investigation) between the ages of 16-32 months. The apparatus and stimuli employed were the same as those in the previous study. (See Table 14 for a list of the stimuli.)

The study was conducted in three phases: pretest, training, and post-test. The procedure for the pretest was the same as the previous study also. In fact, the previous posttest served as the pretest for this investigation. Subjects were matched on the basis of their pretest scores and assigned to either an experimental or control group. There were five subjects in each group. The experimental group followed a five-step procedure outlined below:

Step one - The WGTA door was opened; the first training object appeared alone; the experimenter labeled the object for the subject; the subject pointed to the object

(this was physically prompted until the subject did so spontaneously); the tray was pushed forward as the experimenter said, "Take ____." Criterion was three consecutive nonprompted pointing responses and object choices.

Step two - The WGTA door was opened; the training object appeared on tray with a distractor; the distractor varied on every trial and was any nontraining item from the pretest; the experimenter labeled the training object and the subject pointed to the labeled object (if he pointed incorrectly he was corrected); the tray was pushed forward as the experimenter said, "Take ____ (training object's name)." Criterion was the same as step one.

Step three-A second object was trained in the same manner as the first object.

Step four- The WGTA door was opened; training objects one and two appeared together on the tray; the S^D shifted from one to the other across trials in a random sequence and object placement followed a random left-right sequence; the experimenter labeled the correct object for the subject and the subject pointed to the correct one (if he pointed incorrectly he was corrected); as the tray was pushed forward the experimenter said, "Take ____." Criterion was three consecutive correct choices of each training object.

Step five- The WGTA door was opened. Training objects one and two either appeared together or with other nontraining items from the pretest; the experimenter labeled the correct object (always a trained object) and the subject pointed to the correct one; as the tray was pushed forward the experimenter said, "Take ____." Criterion was the same as step four.

The subjects in the experimental group received training on five objects which they had missed on two or three out of three presentations on the pretest, with the restriction that no objects which a subject had received training on the previous study could be on his training list for this investigation. Training on an object was terminated when criterion was reached on step four. After training on the first two objects was completed, training on the third object began and so on until all five objects had been trained. At this point the posttest was administered. The control subjects received

no systematic training on receptive vocabulary other than what might normally occur in the classroom. After one subject in the experimental group had completed training, his matched control subject was posttested and so on until all subjects had been posttested.

The mean number correct for the entire pretest collapsed across experimental and control subjects was 30.20 (out of 60 possible). Table 17 presents the mean number correct for the two groups on pretest and posttest.

TABLE 17

Mean Number Correct on Pretest and Posttest for the Experimental and Control Groups

Group	Pretest	Posttest
Experimental (training)	30.60	38.60
Control	29.80	32.60

In order to assess whether training facilitated the development of word-object associations, an analysis of variance was performed on this data. This analysis indicated no statistically reliable differences between the control and experimental groups, or between pretest and posttest, and no significant interaction. Since the subjects were matched on the basis of pretest performance, training efficiency would have been indicated by a significant interaction.

The results of this investigation indicated that the training procedure did not facilitate word-object associations. However, the study was terminated before four of the five experimental subjects completed the training procedure because the school session was about to end. The subject who finished the procedure went from 30 correct on pretest to 58 correct on

posttest. Another subject completed training on four out of five objects. His posttest score was 47 as compared to a pretest score of 32. The other three subjects had not completed training on more than two objects despite the fact that they had had over 150 trials. Thus it seems that if a subject completes the training procedure, the development of word-object associations is facilitated. However, for some subjects the training procedure is inappropriate and probably needs to be broken down into more functional and smaller steps.

Language Development in the Non-delayed Toddler: Receptive Vocabulary

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The purpose of the present investigation was to explore some of the parameters of receptive vocabulary learning in non-delayed children between 20 and 31 months of age, employing a two-choice discrimination paradigm similar to the one used by Bricker and Bricker (1970). Two types of objects were used as stimuli and were classified as familiar objects and unfamiliar objects for the present investigation. The familiar objects were common articles which the children had demonstrated prior receptive understanding in a two-choice discrimination task (Bricker and Smith, in preparation). Articles of which a young child probably would not know the appropriate names served as the unfamiliar objects. Pairings of familiar and unfamiliar objects were presented together and the child was given an auditory cue as to which one to choose; his performance would be at chance and then rapidly improve to criterion performance over trials. However, if an unfamiliar object was paired with a familiar object and the child was given an auditory cue to choose the unfamiliar object, his performance would be above chance from the initial trial.

Subjects for the present investigation were seven children between the ages of 20 and 31 months who were enrolled in the Toddler Project. All subjects achieved Development Quotients or IQs of 105 or better on either the Bayley Scales of Infant Development or the Stanford-Binet, Form LM. In addition, only children who scored at least 80 percent correct on a preliminary receptive vocabulary test of common objects were included.

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A WGTA was used to present the receptive vocabulary objects to the subjects. The stimuli employed were 40 small three-dimensional objects mounted on 10 x 10 centimeters gray wooden plaques. Ten of the objects served as the familiar object group and were selected because all subjects had chosen them correctly at least 80 percent of the time on the preliminary receptive vocabulary test. The other 30 objects served as unfamiliar objects and were selected on the basis that a young child would have had limited previous experience of associating the object with its name. These 30 unfamiliar objects were randomly placed in three groups with ten objects in each group. Table 18 contains a list of the four object groups, one familiar and three unfamiliar. The study was conducted in two phases: (1) testing, and (2) learning assessment.

TABLE 18

Four Object Groups, Three, Unfamiliar and one Familiar,

Used in Testing and Learning Assessment

Group A Unfamiliar	Group B Unfamiliar	Group C Unfamiliar	Group D Familiar
megaphone	golf club	ten	drum
ax	rhinoceros	binoculars	girl
wrench	screw	switch	pan
elk	tractor	trailer	boat
paddle	gas pump	camel	train
steel wool	door knob	ruler	banana
vise	kangaroo	rolling pin	truck
extinguisher	eraser	sea horse	orange
saxophone	pliers	strainer	plate
seven	plug	spatula	toy

Testing. The initial receptive vocabulary assessment was composed of 100 two-choice discrimination trials. On each trial two stimuli were presented with an auditory cue to indicate the correct object. These two trials were composed of two types of problems. As seen in Table 19 the objects in Group A, unfamiliar S^Ds, were always paired with objects from

TABLE 19

The Sequence of Object Group Pairings Which Resulted In Unfamiliar and Familiar Problems. The X's Indicate Sequence of Problem Presentation in Ten-trial Blocks

		Groups			
Sessions	Trials	A Unfamiliar SDs	B Unfamiliar S-deltas	C Unfamiliar SDs	D Familiar S-deltas
1	1-10	X	X		
	11-20			X	X
2	21-30			X	X
	31-40	X	X		
3	41-50	X	X		
	51-60			X	X
4	61-70			X	X
	71-80	X	X		
5	81-90	X	X		
	91-100			X	X

Group B, unfamiliar distractors, so that the child was confronted with two unfamiliar objects in these pairings. These pairings were termed unfamiliar problems. The objects from Group C unfamiliar S^Ds, were always paired with objects from Group D, familiar distractors, so that on these trials the child

was confronted with one familiar and one unfamiliar object. These pairings were termed familiar problems. Fifty of the trials were unfamiliar and 50 were familiar problems. Twenty trials were administered per session, ten unfamiliar and ten familiar. Which of the ten problem sequences, unfamiliar or familiar, appeared first was alternated from day to day. On each presentation the SD and the distractor changed. The same SD was paired with a different distractor for each session so that each of the 20 SDs appeared five times across sessions with a different distractor on each of those five trials. Right-left placement of the SDs and the distractors was randomly predetermined and remained the same across subjects with the restriction that an SD would not appear on the same side more than two consecutive times.

Learning assessment. This phase of the investigation was conducted to see if the subjects had learned to associate a previously unfamiliar name with the appropriate object in the familiar problems or whether the children had simply learned to choose away from the familiar object in each pair. This phase of the investigation consisted of 30 two-choice discrimination trials administered in ten-trial segments across three successive days. The SDs for these trials were the objects from Group C while the distractors were the objects from Group A. Thus as a result of these pairings previously unfamiliar SDs (Group C) remained as SDs while previously unfamiliar SDs (Group A) became distractors. Chance performance on phase II would suggest no object-name association learning had occurred during phase I familiar problems while above chance performance would suggest the subjects had actually learned to associate the object with its name rather than simply choosing away from the unreinforced, familiar object.

The results of this investigation are graphically presented in Figure 14 and clearly demonstrated that young non-delayed children learned to associate

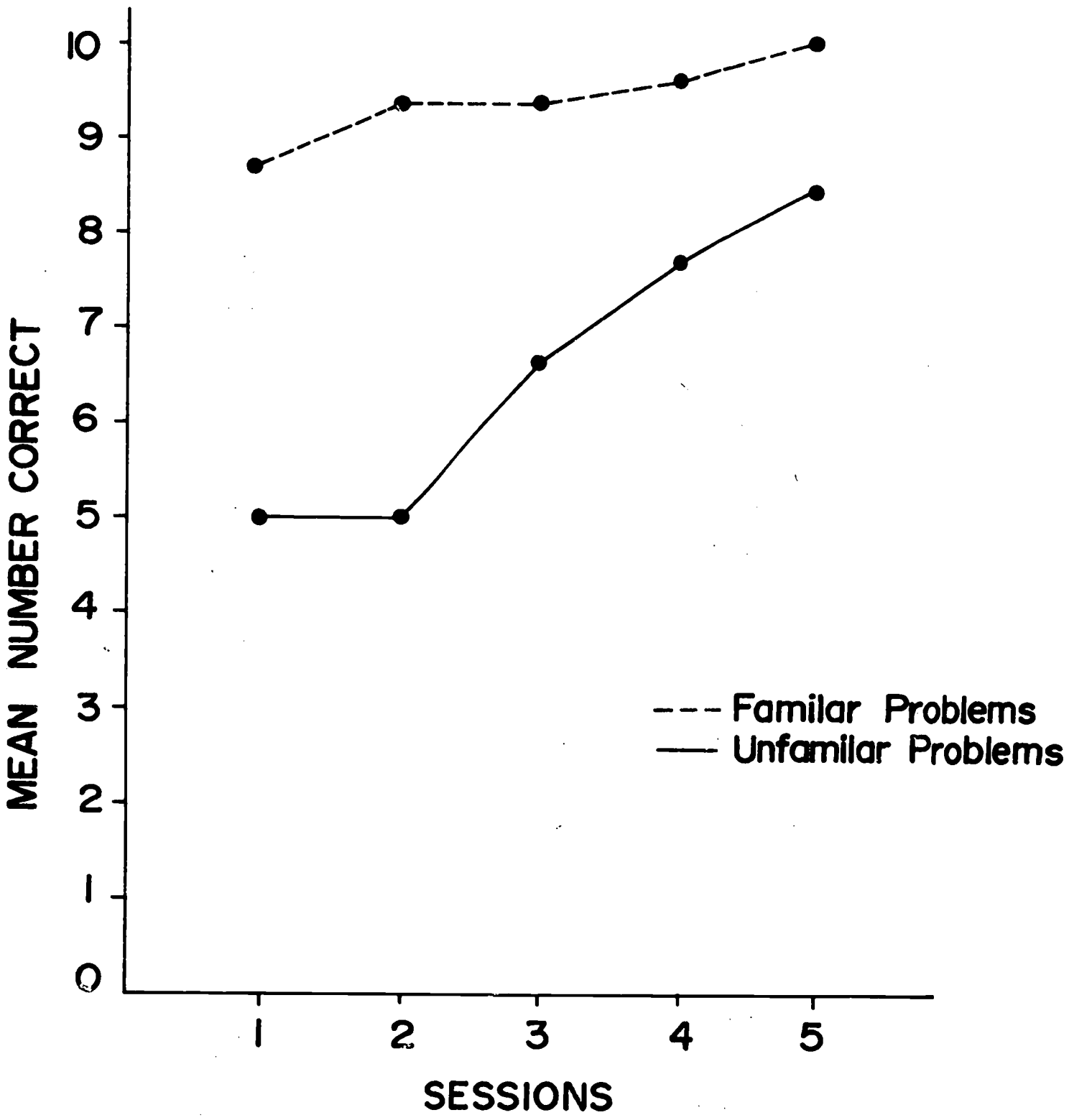

Figure 14. The mean number of correct response on familiar and unfamiliar problem pairs across five sessions.

20 previously unfamiliar names with their appropriate referent within five presentations. The results also indicated that when a young non-delayed child was confronted with a two-choice situation and one of the choices was familiar or known to him, the child was able to use that information to respond correctly even if asked to choose the unfamiliar item. In other words if the child was asked to choose a 'strainer' and his alternatives were 'strainer' and 'doll,' he was able to make the appropriate selection if the word-object association for doll had been established previously. In addition, the findings from the present investigation suggest that in the familiar problems these young children learned not only to choose away from the familiar object but, in fact, learned a new word-object association within five presentations.

SUMMARY

The purpose of this report has been to inform interested people about the progress and findings of the Toddler Project during its first year of operation. The project has had numerous requests for written material describing its philosophy, classroom activities, research projects and results to date.

In general the staff members feel extremely positive about the first year's effort. Although the project has experienced difficulties, particularly in terms of data collection procedures, initial support has been gathered for the following positions. First, evidence from this project suggests that non-delayed and delayed toddlers can be successfully integrated into a classroom setting. Second, children between the ages of 14 to 30 months can adjust to a structured classroom environment. Third, this project was able to collect laboratory data while providing a service for the children and their parents. Fourth, the toddler, although more difficult to work with than the college sophomore, is a suitable subject for classroom and laboratory research. Fifth, parents, given the opportunity, can learn to become skillful teachers of their children.

In subsequent years this project plans to collect more data in the areas mentioned as well as to demonstrate the necessity of early intervention with handicapped children if these children are to develop maximally and remain, as they should, within the community setting.

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