

PROGRESS REPORT
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A Behavior Evaluation Program for Retarded Children

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The past two years have been largely devoted to 1) developing an arena for testing the validity and applicability of laboratory strategies and tactics and 2) focusing our laboratory procedures on the most severely retarded ambulatory children.

The first of these has involved increased contact with and more realistic appraisal of the policies and operations at Fernald School as they affect our investigative and service efforts. From our initial evaluation, it appeared that development of a daily-operating behavior research laboratory would be our most difficult task because its relevance to institutional operations had not been demonstrated. Our subsequent experiences have shown that regular "testing" of residential children within a relatively self-contained laboratory is far easier to carry out than programs outside the laboratory that directly involve institutional personnel and policies.

In adding some of the most severely retarded children to our laboratory sample we have had to face new problems. We are making progress, but our pace has been grossly attenuated not only by the nature of the children we are studying and the need for methodologic revisions, but also by a variety of administrative problems.

In this report of our recent endeavors, we attempt to outline our encounters, progressions, regressions, and hopeful plans.

1.0 Administration

- 1.1 New projects affiliated with laboratory. Our program stimulated the development of three related institutional programs, which are described more fully in sections on behavior evaluation and training. These programs are extending laboratory-developed training procedures into the classroom and ward.

Financial support for these new projects is coming from funds allocated by the U. S. Office of Education under Title I of P. L. 89-313 to the Massachusetts Department of Education. Our initial excitement when the application submitted by our staff nurse and teacher was approved has given way to frustration and despair over the insecurity of this form of support. Since funds are allocated only for six-month periods, continuity in programming is difficult to achieve. Several competent people have had to seek more secure employment elsewhere, and some promising attempts at developing habilitation programs have been irrevocably disrupted.

- 1.2 Training facilities include two basement areas, one inadequately lighted and often flooded, and the other imperiled by escaping steam from an antiquated heating system. Nonetheless, these areas house part of our programmed instruction project and constitute our only ward training area. The latter was partially furnished with donations, and was painted by teenage volunteers from Waltham, Mass.

A large room adjacent to the laboratory was recently set aside as a specialized training area. Alteration of this space, funded by Title I, is scheduled to begin this spring. Six cubicles for individual instruction, an area for group activities, and a control area for observation and electronic recording will be included.

- 1.3 Ward facilities -- which should be training facilities -- are reflective of custodial use rather than habilitation. Analogous conditions are well illustrated in Blatt & Kaplan's pictorial essay, Christmas in Purgatory.
- 1.4 Office facilities have been strained by the increase in personnel. A room previously designated for a classroom within the laboratory has been equipped as an office for our editorial and resource assistant. It houses journals, reprints, and duplicating equipment.

Furnishings have been added to our Data Room and Secretarial Office to accommodate our research and training coordinator and the secretary of our affiliated project.

- 1.5 Laboratory facilities now include equipment for bidirectional social reinforcement. The televised sight and/or sound of another person may be independently controlled by each of two people. There are still many "bugs" in this system, but we hope to develop it for analysis of "modeling" or imitative behavior.

Six conditioning enclosures are now equipped with standard consoles and manipulanda. The Lindsley plunger manipulanda were redesigned to be operable by pushing as well as pulling. One of our single-operant enclosures was modified for analysis of successive discrimination with a single available response. Vocal "cues" or "commands" are automatically programmed in two of the enclosures. Our commercial TV enclosure now allows simultaneous but independent conjugate control of the audio and video portions of televised programs. More sensitive transducers of stereotyped rocking were developed and are now available in two enclosures.

- 1.6 Administrative problems. In becoming more directly involved in ward and classroom programs, we have had to spend considerable time on administrative problems. Efforts at innovation have been limited not only by the inadequacy of many of the institution's facilities and services, but also by the hesitancy of many institution staff members to give us the support and cooperation we so urgently and hopefully seek.

- 1.61 Maintenance problems. Our potential effectiveness has been severely limited by the absence of preventive maintenance procedures and the prevalence of custodial versus training-oriented space allocation, supplies, equipment, and personnel.

For example:

- 1.611 Flooding and raw sewage backups have occurred with incredible frequency in the laboratory, and in the basement area of the Wheatley Hall Dormitory our staff and children sometimes coexist with frogs. We have had more than 12 raw sewage backups through the laboratory toilet (10 of which occurred during a 7½-month period in 1967). These have left us with up to 8 inches of floating toilet sewage. Sewage backups have constituted a severe health hazard, and they have necessitated days of cleanup performed primarily by those of us on the laboratory staff. We estimate that we lost 1,788 man-hours of work in 1967 because of this problem in the laboratory alone.

1.611 (continued)

A backwater valve was installed in the laboratory last August through the generosity of the Superintendent. This will presumably prevent direct "hits", but it will not prevent general flooding in the main corridor from entering the laboratory.

Flooding in the Wheatley Hall basement renders our makeshift training area useless for long periods. The problem is caused partly by cluttered window-well drains which permit rain and melting snow to enter under the poorly fitted windows.

- 1.612 Antiquated facilities. Improperly repaired swelling doors, inappropriate and thus usually broken screening, boarded up or malfitting windows, lack of thermostatic heat control, inadequate lighting, bathing facilities designed to be used on rather than by children, toilet facilities not directly accessible to the children, overcrowding to the point of forcing nearly fullgrown children to sleep in cribs, lack of space for individual lockers — these are but a few of the problems we face daily.
- 1.62 Inadequate laundry facilities force ward personnel to spend their valuable time washing and sorting clothes. Clothing sent to the Fernald laundry is likely to be damaged or lost. Not even diapers are sent to the institution laundry — only sheets.
- 1.63 Lack of janitorial service forces ward personnel to spend time cleaning floors and walls — time that could be spent trying to generate new behaviors in the children.
- 1.64 Inappropriate clothing for children. The rudiments of self-care for severely and profoundly retarded children do not have to include such complex operations as shoe-tying or buttoning. Clothing appropriate for self-dressing by handicapped children has been reported in the literature and we are still attempting to persuade institution personnel that it is worth trying.
- 1.7 Health problems have caused severe interruptions in our experiments with individual children. A three-month hepatitis epidemic interrupted most of our laboratory work. The seriousness of this interruption became clear when we saw how long it took most of our severely retarded children to regain their formerly acquired behavior. In some cases it took as long as six months following their return to the laboratory. More recently, because of a flu epidemic eight children could not come to the laboratory for another three-month period, then we were told they could not go out in the snow. Despite the advent of spring, we have yet to resume experiments with these children.
- 1.8 Promising signs of change have been the subject of wide-spread speculation in recent months. Mounting pressure for change began with newspaper and television exposés, a visit to Fernald by almost the entire state legislature, and gubernatorial-instigated investigation. It has been reinforced by the combined efforts of a new Commissioner of

1.8 (continued)

Mental Health (Milton Greenblatt, M.D.), a new Assistant Commissioner for Mental Retardation (Burton Blatt, Ed.D.), and new university-affiliated professional personnel who have complained openly of the near impossibility of instituting and maintaining either behavioral research or effective training programs at Fernald.

Coupled with the recommendations of the Mental Retardation Planning Project—which the program director helped formulate—demands for updated personnel and operating policies and for development of training versus custodial functions are beginning to gain administrative attention. A promising young Assistant Director of Nursing was recently appointed, additional positions for ward personnel were obtained for Wheatley Hall, and the new Director of In-Service Nursing Education is sponsoring frequent presentations and discussions of the many programs gradually being developed at Fernald.

The Superintendent has promised that the census of Wheatley Hall will be reduced to 40 as rapidly as possible. The Research and Training Committee recently devoted two meetings to consideration of our plans for and problems on the ward. The Director of Medical Research asked us to submit a list of basic design and equipment changes we feel necessary for a training program for Wheatley Hall. The Superintendent had a plumbing contractor review the plumbing needs and possibilities at Wheatley Hall.

The physician recently assigned to Wheatley Hall (the 5th since we became involved with the children in that building) has expressed interest in and support of our efforts. Dr. Audrey Bill has been helpful in assisting with staff problems and in suggesting practical solutions for many administrative problems.

A new Assistant Superintendent, the current Director of Medical Research, will assume office this spring. As a basic researcher, he has the experience to appreciate what constitutes a good research climate. He has promised to make Fernald a more favorable environment for both the children and the people who attempt to study and to train them. With these developments forthcoming, we look for a brighter future.

2.0 Behavior Evaluation

2.1 Strategies which continue to guide our design and application of evaluation procedures are: 1) delineation of individual behavior patterns within subgroups of the retarded population otherwise considered behaviorally homogeneous; 2) functional calibration of evaluation procedures, i.e., development of behavioral measures based on empirically demonstrated behavior patterns of the children who are being evaluated (rather than, say, a non-retarded group); 3) universal applicability of behavioral measures throughout the range of retardation to permit direct comparison of children irrespective of degree of retardation; 4) prescriptive utility which should emerge if we can show that functional description of environmental variables which affect a child's laboratory behavior is predictive of similar effects on the child's behavior in other environments.

2.1 (continued)

These strategies which evolved in the laboratory are being extended to guide the development of ward and classroom evaluation and training procedures.

- 2.2 Severely and profoundly retarded children have been our recent focus. The psychometric scores and ages of our total laboratory group, including 31 children added since our last progress report, are presented in Table 1. It should be noted that absence of an IQ score in a child's record means that the clinical staff considered the child "untestable" or "not worth testing." This category includes 36% (34) of our children. Twenty-five children from the new group were selected from one dormitory, where our habilitative efforts have been centered. Six of the new children are blind residents of the building that houses our laboratory. It should be emphasized that only a portion of these children have full laboratory histories. Attrition of our subjects has become more severe as new programs emerge at the institution, each with its "own" children in a particular building.
- 2.21 Prevalence of low rate and non-responding children. Table 1 indicates the number of children at each level of retardation who never operate laboratory equipment at median rates above 100 responses per hour for any of the consequences currently programmed. At the lower levels, there is a sharp increase in the percentage of children for whom our standard procedures are not effective. Although all the children have not yet been exposed to all our procedures, enough of them have been to make it clear that assessment of many of the most severely retarded children will require methodological modifications.
- 2.22 Prevalence of severely disruptive behavior that competes with or overrides adjustive behavior. Table 1 also shows the prevalence of persistent "problem" behaviors at the various levels of retardation. In our first group of severely and profoundly retarded children, the behaviors which interfered with laboratory participation soon decelerated under differential reinforcement. The second group has proved to be a much greater problem (see section 2.23). We do not have laboratory procedures for automatic recording of defecation, urination, feces throwing, clothes shredding, etc. However, we are exploring several techniques that may enable us to control these behaviors which are as disruptive on the ward as in the laboratory.
- 2.23 Possible relationship of dormitory environment and laboratory behavior. Tables 2 and 3 indicate that differences in automatically-recorded adjustive behavior and in disruptive behavior may be associated with the dormitory to which the children are assigned--and in which they spend most of their time. Institution officials consider that Dormitory "A" and Dormitory "B" house children of the same general level of retardation. However, children from Dormitory "A" as compared with those from Dormitory "B" and other dormitories behave very differently in the standardized laboratory environment. Dormitory "A" children needed no demonstration of how to operate the various pieces of apparatus. So many Dormitory "B" children have required at least one or more demonstrations that we now include demonstrations as a routine procedure.

TABLE 1

PSYCHOMETRIC CLASSIFICATION, AGE RANGES, PREVALENCE OF LOW OPERANT RATE, AND PREVALENCE OF PERSISTENT DISRUPTIVE BEHAVIOR IN TOTAL LABORATORY GROUP

LEVEL OF MEASURED INTELLIGENCE OR ADAPTIVE BEHAVIOR*	N	BASED ON:		AGE RANGES	MEDIAN RATE < 100 R/HR		PERSISTENT DISRUPTIVE BEHAVIOR	
		IQ	SQ		N	%	N	%
V BORDERLINE	5	5	0	8-14	0	0	0	0
IV MILD	17	16	0	7-19	1	5	0	0
III MODERATE	15	12	4	3-16	2	11	4	15
II SEVERE	23	16	7	4-14	3	16	8	30
I PROFOUND	35	12	23	6-16	19	68	15	55
TOTALS	95	61	34	3-19	19	100	27	100

*HEBER, A.M.D., 1959.

TABLE 2

PREVALENCE OF LOW RATE AND ADEQUATE RATE CHILDREN FROM DIFFERENT DORMITORIES

DORMITORY	MEDIAN RATE < 100 R/HR		MEDIAN RATE > 100 R/HR		N
	N	%	N	%	
"A"	1	5	22	29	23
"B"	11	58	24	32	35
OTHERS	7	37	30	39	37
TOTALS	19	100	76	100	95

TABLE 3

PREVALENCE OF CHILDREN WITH AND WITHOUT PERSISTENT DISRUPTIVE LABORATORY BEHAVIOR FROM DIFFERENT DORMITORIES

DORMITORY	CHILDREN WITH PERSISTENT DISRUPTIVE BEHAVIOR		CHILDREN WITHOUT PERSISTENT DISRUPTIVE BEHAVIOR		N
	N	%	N	%	
"A"	3	11	20	29	23
"B"	20	74	15	22	35
OTHERS	4	15	33	49	37
TOTALS	27	100	68	100	95

2.23 (continued)

Although some Dormitory "A" children initially exhibited disruptive behaviors such as tantrums, destructiveness, frequent urination and defecation, feces throwing and smearing, and vociferous refusal to participate in experiments, these behaviors disappeared in all these children after their first few weeks in the laboratory. Children from Dormitory "B", in contrast, not only showed greater initial prevalence of disruptive behaviors, but also persistence of these behaviors under conditions in which the same types of behavior disappeared in Dormitory "A" children.

Dormitory "B" was built and staffed as a nursery building many years ago. Prior to the current "freeze" on admissions, when children reached a certain age they were transferred out of that building. Many former "B" children are now in "A", which has never functioned as a nursery, but children caught in the "freeze" remain in "B". They are cared for by the same core staff who cared for them as infants. Many have been sleeping in cribs all of their lives despite their advanced ages and sizes. There is a locked door between the day room and the toilets so that access to the toilets is at the discretion of an attendant. "Accidents" and other disturbing behaviors usually receive immediate personal attention.

In contrast none of the "A" children sleep in cribs. They are managed by a non-nursery staff. Their toilet facilities are accessible, and their "accidents" and other disruptive behaviors do not gain them immediate attention. Many of them receive daily training in self-help skills.

Although the ages and retardation levels of "A" children are comparable to those of "B" children, their care is quite different. The "A" staff has required more behavior from their children. They do not coddle children but expect each child to fend for himself as much as possible — and the staff does not minimize the possibilities for self-care. "B" children have been treated as though they were still infants. In late 1965 28% of the "B" children were considered unable to feed themselves; the opportunity for self-feeding had never been provided. The emphasis in "B" is on cleanliness rather than behavior development; the "A" staff emphasizes the opposite.

Although the sizes of our samples from the two buildings are not equal, they are large enough to be representative of the children in each dormitory. That similarly retarded groups of children from two different buildings behave differently in terms of rate of response and persistence of disruptive behaviors over many months of continued study suggests that environmental conditions and ward management procedures may override severity of retardation as a powerful determinant of behavior.

- 2.3 Comparison of differentiation and discrimination acquisition across levels of retardation. The extremely low rates at which many Dormitory "B" children respond has limited the applicability of our response differentiation-stimulus discrimination enclosure. Children who make less than 100 responses per hour for the best general

2.3 (continued)

reinforcer (candy) do not emit enough behavior to be analyzed reliably by the current design. With most "B" children, lowered reinforcement ratios have generally been ineffective in generating and sustaining enough behavior to justify assigning them time in the more complex differentiation-discrimination enclosure.

However, enough severely and profoundly retarded children have qualified for the screening phase of this analysis to permit comparisons in terms of level of retardation. Table 4 presents an up-to-date summary of the unremediated final states of acquisition shown by 50 children. It compares children in borderline through moderate retardation subgroups with children classified as profoundly and severely retarded.

Screening has been completed on more than twice as many severely and profoundly retarded children as were last reported. A need for more refined categories of final acquisition has become evident. Final acquisition in the more severely retarded children is less likely to show clear-cut specific deficits than in the higher level of children. Among the severely and profoundly retarded children there are several whose terminal performance is neither randomly non-differential nor clearly within a normal range of efficiency. They show acquisition but it is not always complete. Therefore, with our present design, description of their performances may often depend on predominance rather than specificity of deficit. It is apparent that differentiation deficits and discrimination deficits of severely and profoundly retarded children require more extensive subcategorization than the deficits of the moderate to borderline children (see final states 3 and 4 in Table 4).

With respect to non-differential behavior (absence of either partial or complete acquisition of differentiation or discrimination), there is little difference between the two broadly categorized groups of retarded children. Roughly the same percentages of each group show complete absence of acquisition.

Efficiency equal to that of normal adults was shown by 31% of the borderline to moderate children and 25% of the severely and profoundly retarded children. That this difference is so small is, to us, exciting. Of the less retarded children whom we have been able to follow, 80% of those who reached normal efficiency without remediation were either discharged or assigned to special training. Of the severely and profoundly retarded children, 71% of those who reached normal efficiency without remediation have been progressing well in training programs.

Not all children who learn to respond efficiently to the screening program continue to perform efficiently on reversal problems. Successive reversals continue to reveal deficits not shown by the screening procedures. Similarly, children who show particular deficits on the screening program, may respond well when remedial variables are applied. Therefore, the efficiency of a child under the standard screening program is not a sufficient predictor of his potential behavioral efficiency; the child's response to remediation must also be directly measured.

AGE AND PSYCHOMETRIC CATEGORIZATION DESCRIBING THE UNREMEDIATED DIFFERENTIATION AND DISCRIMINATION ACQUISITION OF 50 RETARDED CHILDREN

FINAL STATE OF UNREMEDIATED PERFORMANCE EFFICIENCY	BORDERLINE TO MODERATE						SEVERE TO PROFOUND						COMBINED BORDERLINE TO PROFOUND									
	RANGES			RANGES			RANGES			RANGES			RANGES			RANGES						
	N	%	IQ ¹	MA	SQ	SA	AGE	N	%	IQ ²	MA	SQ ³	SA	AGE	N	%	IQ	MA	SQ	SA	AGE	
1. NORMAL DIFFERENTIATION & DISCRIMINATION	8	31	50-72	2-3 TO 9-0			3-15	6	25	22-38	4-0	27-57	0-8 TO 3-2	6-15	14	28	22-72	2-3 TO 9-0	27-57	0-8 TO 3-2	9-15	
2. SPECIFIC OVERGENERALIZATION DEFICIT	5	19	59-81	7-10 TO 10-6			13-20	1	4	21	2-4	19	2-4	16	6	12	21-81	2-4 TO 10-6	19	2-4	13-20	
3. DISC. DEFICIT																						
A. SPECIFIC PARTIAL (VARIABLE)	3	11	44-60	3-0 TO 6-4			7-11	1	4	<30	2-5	29	3-8	12	4	8	<30-60	2-5 TO 6-4	29	3-8	7-12	
B. COMPLETE	0	0						5	21	17-24	1-11 TO 2-11	17-28	1-1 TO 2-10	8-14	5	10	17-24	1-11 TO 2-11	17-28	1-1 TO 2-10	8-14	
B. PREDOMINANT DISC. DEF.*	1	4	41	2-11			9	0	0						1	2	41	2-11			9	
4. DIFF. DEFICIT																						
A. SPECIFIC & COMPLETE	1	4	50	4-11			10	1	4			34	1-11	8	2	4	50	4-11	34	1-11	8-10	
B. PREDOMINANT DIFF. DEF.**	0	0						3	13	25-30	1-10 TO 2-8			10-12	3	6	25-30	1-10 TO 2-8			10-12	
5. NONDIFFERENTIAL RESPONDING	7	27	38-67	3-3 TO 5-6			7-17	7	29	13-20	4-7	17-54	0-11 TO 3-4	5-14	14	28	13-20	4-7	17-54	0-11 TO 3-4	5-14	
6. CESSATION OF PLUNGER OPERATION	1	4	34	4-9			15	0	0						1	2	34	4-9			15	
TOTALS	26	100	34-81	2-3 TO 10-6			3-20	24	100	13-38	4-7	17-57	0-8 TO 3-8	5-16	50	100	13-81	1-10 TO 10-6	17-57	0-8 TO 3-8	3-20	

1. IQ SCORES ARE AVAILABLE FOR ALL CHILDREN IN BORDERLINE TO MODERATE GROUP.
 2. IQ SCORES ARE AVAILABLE FOR ONLY 15 IN SEVERE TO PROFOUND GROUP.
 3. SQ SCORES ARE AVAILABLE FOR 23 CHILDREN IN SEVERE TO PROFOUND GROUP.

*PREDOMINANT DISCRIMINATION DEFICIT = DISCRIMINATION DEFICIT PREDOMINATES IN PRESENCE OF PARTIALLY ACQUIRED DIFFERENTIATION & CONTROL OF OVERGENERALIZATION.
 **PREDOMINANT DIFFERENTIATION DEFICIT = DIFFERENTIATION DEFICIT PREDOMINATES IN PRESENCE OF PARTIALLY ACQUIRED DISCRIMINATION & CONTROL OF OVERGENERALIZATION.

2.4 Remediation of differentiation and discrimination deficits. Most of the rather subtle forms of environmental variation that produce improved performance in many higher level children do not work with the more severely retarded. However, there are exceptions in both groups. Some of our moderately and mildly retarded children need repeated exposure to remedial variables, and even then, the effects may be short-lived. On the other hand, some of our severely and profoundly retarded children can reach, sustain, and readily adapt a high level of performance efficiency with only minimal assistance. One of our star examples of this is a profoundly retarded mongoloid boy who needed only a few successive sessions with simple instructions and a simple change in the light conditions to surmount an acquisition "hump". Since this remediation, he has shown some of the most efficient behavior we have seen in any child in this laboratory.

In an attempt to reach the most retarded children we recently added automatically programmed verbal discriminative stimuli, "Pull now", "Don't pull." The addition of tones to lights or the substitution of tones for lights sometimes boosts or destroys the successive discriminations of some children, but our repeated instructions, which alternate either alone or in addition to lights and tones, do not seem to have definitive effects. Some children's performance is temporarily disrupted by the repeated commands. Although we will try the procedure with other children, we do not anticipate that verbal commands will be effective with many of them.

We discovered recently that one of the children who repeatedly failed to respond appropriately to the taped commands also does not respond to her teacher's commands in the classroom. She is one of our most puzzling children for many reasons. None of our currently available discriminative stimuli are functional for her, but she does discriminate one reinforcer from another. On the ward she responds at least 60% of the time when her name is called. We do not know to what extent that is due to the visual presence of the attendant or teacher, though presumably the child is not deaf. Since we have a number of children who resemble this girl, we plan to use our bi-directional closed-circuit television system to investigate the effects of the visual presence of the experimenter or other people.

Quickly formed, non-adaptive behavior "chains" or sequences that may become adventitiously reinforced are more prevalent among the severely and profoundly retarded children than among the less severely retarded. In our differentiation-discrimination experiment, such chains develop, for example, when the child emits the "wrong" response just before the "right" response, which is immediately reinforced. In some children this sequence may persist in stereotyped form and is clearly a type of differentiation deficit. A different chain may develop if the child makes the wrong response just before the stimuli alternate, so that it appears to have produced the light or sound associated with reinforcement. This type of chain shows up as a discrimination deficit. In many cases, if other procedures fail, we program the apparatus so that if the child makes the wrong response at the right time, or the right response at the wrong time, he automatically keeps himself on extinction. Until the child produces the right response at the right time — and nothing else — he will not get reinforced. However, without a very powerful reinforcer, there is the risk of losing all measurable behavior. Since many severely retarded children engage in destructive

or severely disruptive behaviors during periods of extinction, prolonged time-out periods — despite their proven effectiveness with starved pigeons — must be used with discretion.

2.5 Problems of generality

2.51 Differentiation and discrimination deficits.

In the laboratory we recently added the standardized consoles and manipulanda necessary to explore the generality of response differentiation deficits under two different programs. We have already found that some children who are unable to differentiate a candy-producing plunger from an ineffective plunger, are also unable to differentiate a plunger that maintains the video portion of television from one that produces nothing. In several children the same behavioral deficits have emerged in two or more experimental enclosures with a variety of consequences, while the topography of the responses has remained constant. We have also begun some response reversals in the television enclosure to determine the generality of reversal-produced differentiation deficits.

In the classroom some simple diagnostic training sequences are being developed to pick up deficits in response differentiation, stimulus discrimination, or both. Successive and simultaneous discriminations and differentiations will both be studied. Since these mock-up programs will eventually be adapted for automated presentation and recording, a child's performance with and without the presence of the teacher can be evaluated.

The diagnostic training sequences have begun to reveal some of the response differentiation deficits that we find in the laboratory. Procedures are being developed to teach children simple form and quantity discriminations that would be useful to them in the ward environment. The procedures should therefore be useful in describing a broader spectrum of generalized deficit and ability than can be shown in the more highly controlled environment of the laboratory.

In the ward we are beginning to document the numerous indications of whether a child differentiates responses of either the same or different topographies. Some children who appear to have reasonably good differentiation and discrimination skills in their daily repertoires were recently added to our laboratory group to see if our procedures are sensitive to some of the rudimentary discriminations and differentiations involved in dressing, self-feeding, and responding appropriately to various other stimuli in the ward environment.

2.52 Consequence-specificity. For some of our more severely retarded children, the range of consequences which control their behavior is extremely limited. Some children who respond at high rates and show contingency sensitivity will work only for one consequence. Some of our children work only for candy and not for music, pictures, tokens, or television. One of our children responds primarily for

2.52 (continued)

a series of colored slides. We have not yet determined if the behavior is also specific to certain environments, e.g., particular experimental enclosures, the laboratory in general.

We have one child who rejects M & M's in the laboratory but who works for tokens. In an individual training situation, the same child works for M & M's. The responses involved are quite different — operating a plunger versus naming letters, numbers, and her written name. There is, of course, another difference — the presence of the teacher in the latter situation. We hope to be able to identify the variables that account for this discrepancy.

- 2.53 Apparent specificity of adjustive behavior. In recent months, we have begun to study two groups of children, considered generally responsive or unresponsive on the ward and classified by their teacher as either good or poor habilitation candidates. All of the children who have been progressing in small classes are categorized on the ward as responsive children, but all except one have shown low rates or absence of responding in the laboratory. As yet not all of them have had the opportunity to work for all available consequences in the laboratory. However, it seems quite likely that these children may be very dependent on adult human stimuli — both as elicitors and as reinforcers of their more adjustive behavior. All of these children have grown up in the old nursery building previously described (section 2.23).

To investigate this further, we recently initiated procedures in the laboratory to determine the effectiveness of apparatus demonstrations, of experimenter-presence, and of experimenter-requests. So far, introduction of human stimulation has catalyzed responding in all children who actively participate in a class as well as in others not in classes. Some of the children require repeated doses of adult presence and/or requests to sustain their behavior, i.e., the effects of adult presence and/or requests appear to be very temporary (prosthetic) for some children. When no one asks them to do something, they sit, rock, play with clothing, etc. The effect may also be consequence-specific, i.e., adult presence and/or requests may be effective in eliciting responding for one consequence but not for another. It remains to be seen how many of these children will eventually acquire and sustain laboratory measured behavior equal in amount and efficiency to that of the supposedly equally retarded children from Dormitory "A".

We still have a considerable number of Dormitory "B" children whose rates of responding we have been unable to increase. If we are to include these children in a single behavioral measurement system, we must modify our methods until we find what will generate and sustain their behavior.

- 2.6 Effects of extended absence from laboratory and interruptions in training. We are assessing the effects on individual children of prolonged absence from the laboratory and from training. Most of our less retarded children showed dramatic rate increases following two- to three-month interruptions, whether they were interrupted during a period of reinforcement or during a period of extinction. Some showed improvement in discrimination and/or differentiation following these interruptions. The few who showed losses of differentiation or discrimination readily regained their previous levels of efficiency in one or two sessions.

The severely and profoundly retarded children differ markedly from less retarded children in the extent and duration of their behavioral losses following planned or unplanned absences. Once again differences between equally retarded children from Dormitory "A" and Dormitory "B" emerged. While those from "A" showed losses, they fairly quickly recovered without remedial procedures. "B" children showed prolonged and severe losses, often requiring a variety of procedures to re-instate their previously acquired behavior. "A" children are currently absent, and we await their return to check the reliability of our findings following their previous prolonged absence.

In both the classroom and in individual training, we are checking the effects of interruption. All children thus far have shown substantial losses in previously acquired skills as a result of interruptions in training. Some of the more disturbed children have also shown a return of disruptive behaviors that had been decelerated under training.

- 2.7 The increasing importance of a prosthetic analysis of retarded behavior. As our arena for evaluating retarded behavior expands from the laboratory to the classroom to the ward, we accumulate more varieties of data which demonstrate the validity of prosthesis as a major habilitative and analytic strategy in the assessment and modification of retarded behavior. While many less retarded children may acquire behavioral skills that can be sustained in the extra-institutional community, there are many more children for whom the "outside" world does not provide the behavioral crutches necessary to prevent behavioral collapse. Those whose behavior requires a more extensive and more constant array of "props" than the community offers, depend on the ward, the classroom, the personnel and the facilities of the institution to support their repertory of useful behavior. An analysis of these behavioral crutches and their function for each child should help us to delineate the components of the institutional environment that must be redesigned in order to provide our more severely retarded children with maximal behavioral support.

3.0 Communication

3.1 New articles:

- 3.11 Behavioral individuality in four cultural-familially retarded brothers. Submitted for publication.

From their case records, we could barely distinguish among these siblings, but their response patterns in the laboratory were highly individual. The data provide a striking example of the continuing need for more sensitive, objective, clinically and educationally relevant behavior evaluation procedures.

- 3.12 Behavior modification in the home: Parents adapt laboratory-developed tactics to bowel-train a 5½-year-old. Submitted for publication.

With minimal professional guidance, parents of a pre-institutional child were able to pinpoint his most troublesome behavior (encopresis) and, with a combination of punishment (restraint and isolation) contingent on soiling and reinforcement (cookies and praise) contingent on using the toilet, they eliminated encopresis in two months. The case illustrates the ease with which parents may be taught to modify problem behaviors.

3.2 Publications anthologized:

- 3.21 Reduction in rate of multiple tics by free operant conditioning methods. Journal of Nervous and Mental Disease, 1962, 135, 187-195.

Reprinted in:

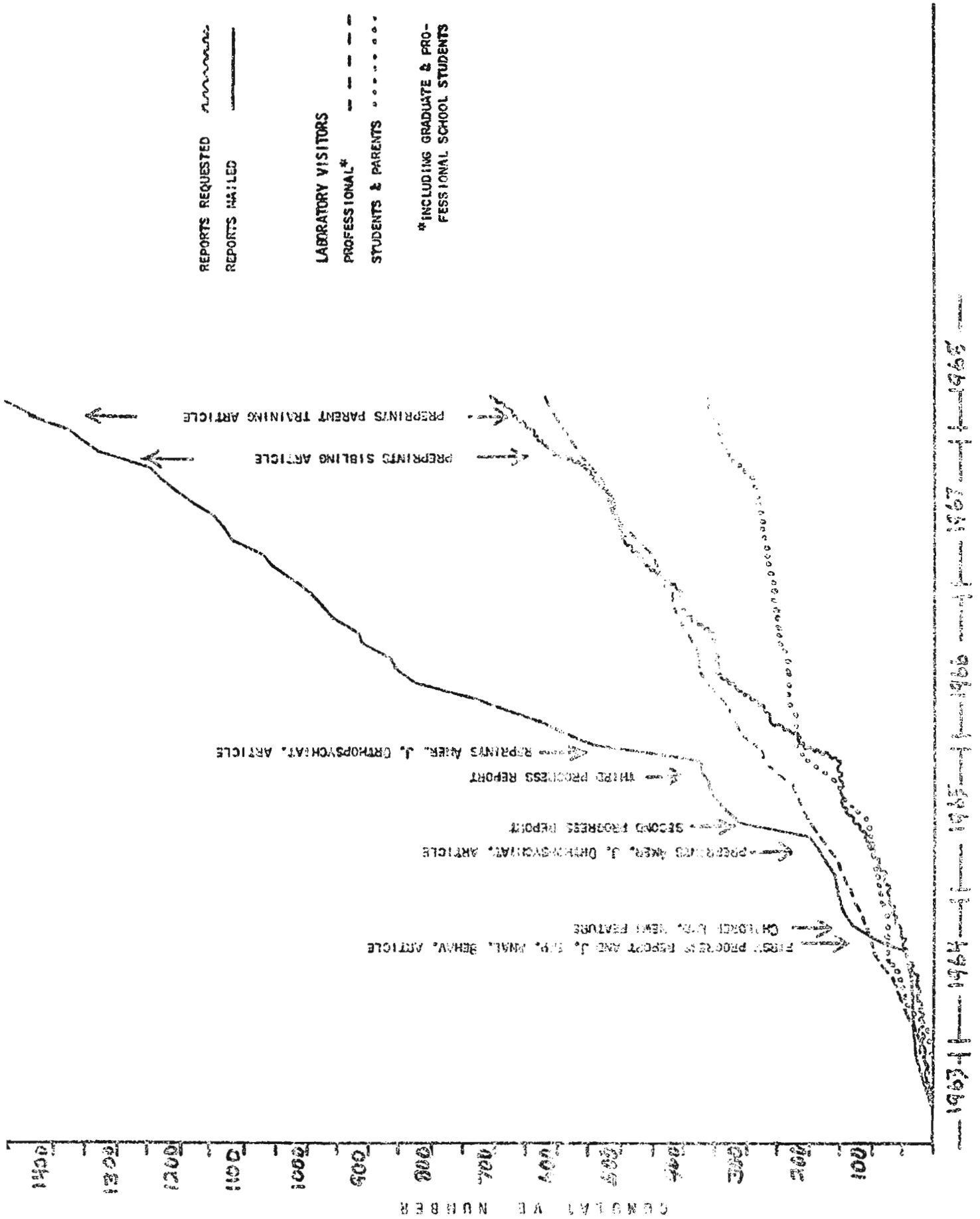
Ulrich, R., Stachnik, T., & Mabry, J. (Eds.) The control of human behavior. Chicago: Scott, Foresman, 1966. Pp. 113-150.

- 3.3 Distribution of articles: Since October 1965, we have received 548 requests for reprints and reports of our work, and we have distributed a total of 1105 articles and reports. Our active mailing list includes a large number of Fernald personnel to whom we send progress reports, publications, and other items of potential interest. The cumulative record of this communication endeavor is shown in Figure 1.

3.4 Presentations to professional groups:

- 1) Barrett, B. H. Applications of behavior analysis to disordered and retarded behavior. Institute on Behavior Therapy, Children's Bureau, Washington, D. C., June 1966.
- 2) Barrett, B. H. Prosthetic analysis of retarded behavior. Psychology Research Seminar, Veterans Administration Hospital, Boston, July 1966.

FIGURE 1.



1967-1968 1966 1965 1964 1963 1962 1961

3.4 (continued)

- 3) Barrett, B. H., chairman. Symposium on Behavior Evaluation: Laboratory and Field Methods. American Association on Mental Deficiency, Northeast Regional Meeting, Manchester, Vermont, October 1966. Presentations included:
- Barrett, B. H. Strategies and tactics for laboratory behavior evaluation.
- Littell, F. Teacher on the ward.
- Jarvis, L. Evaluating attendant behavior.
- 4) Jarvis, L. The nurse and operant conditioning. Boston University Graduate Nurse Seminar, Walter E. Fernald State School, October 1966.
- 5) Barrett, B. H. Free operant analysis of retarded behavior. Department of Special Education, Boston University, December 1966.
- 6) Barrett, B. H. Experimental studies of retarded behavior. Psychology Colloquium, Boston University, February 1967.
- 7) Barrett, B. H. Naturally acquired and remediated reversals of differentiation and discrimination in retarded children. In symposium on Complex Reinforcement Schedules with Normal and Retarded Children. Society for Research in Child Development, New York, March 1967.
- 8) Jarvis, L. The Wheatley Hall demonstration program. Graduate Nursing Students Master's Program, Boston University, June 1967.
- 9) Barrett, B. H. Implications of functional analysis of severely retarded ward behavior. Mental Health Commissioner's In-Service Education Conference, Boston, October 1967.
- 10) Jarvis, L. Wheatley Hall project. Exceptional Children's Council, Boston University, November 1967.

3.5 Presentations to staff of Fernald School:

- 3.51 Barrett, B. H. Laboratory free operant conditioning techniques for the analysis and modification of retarded behavior. In-Service Nursing Class, October 1965.
- 3.52 Littell, F. Methods for evaluating self-help opportunities for the severely retarded. School Department, November 1965.
- 3.53 Barrett, B. H., & Jarvis, L. The Wheatley Hall Project. Nursing Staff, September 1966.
- 3.54 Barrett, B. H. The individuality of retarded behavior. Neurology Conference, February 1967.
- 3.55 Littell, F., & Jarvis, L. Educators and nurses providing ward education programs. Teachers Alliance, March 1967.

3.5 (continued)

- 3.56 McCarthy, M. A situational analysis of ward behavior. Research and Training Committee, January 1968.
- 3.57 McCarthy, M. Selection of techniques for decelerating disruptive behavior. Research and Training Committee, February 1968.
- 3.58 Jarvis, L. The Wheatley Hall project. In-Service Nursing Class, March 1968.

3.6 Presentations to parent and community groups:

- 3.61 Barrett, B. H. Techniques for locating behavior abilities and deficits in retarded children. Association for Retarded Children, Cambridge, Mass., January 1967.
- 3.62 Jarvis, L. Volunteers at Wheatley Hall. Interact Club of Waltham (Mass.) High School, Brookline (Mass.) Jewish Community Center, and "The Group" of Wayland (Mass.) Lutheran Church.

3.7 Consultant visits and special appointments:

- 3.71 A consultant visit to Western Carolina Center, Morgantown, North Carolina, January 1966, included three presentations: 1) Methods for evaluating new training techniques (Training Teams, HIP program for nonambulatory retarded children), 2) Educational implications of laboratory behavior evaluation (Academic Department), 3) Individualized design of toilet training program (Infirmity Treatment Team).
- 3.72 A consultant visit to Plymouth State Home and Training School, Northville, Michigan, April 1966, included three presentations: 1) A behavior evaluation program for retarded children (Professional Lecture Series), 2) Behavior measurement: A necessity in the development of training procedures (HIP program staff), 3) Problems in the design of laboratory assessment procedures (Research Psychologists).
- 3.73 At New Castle State Hospital, New Castle, Indiana, June 1966, the program director discussed: Procedures for an analysis of discrimination learning in severely retarded children.
- 3.74 At Carter-Memorial Hospital Children's Unit, Indianapolis, June 1966, we discussed: Free operant laboratory procedures for analyzing autistic and schizophrenic children.
- 3.75 The program director served as a consultant to the HIP program, Wrentham State School, Wrentham, Mass., November 1966.
- 3.76 The program director was a member of the Task Force on Residential Programs, Massachusetts Mental Retardation Planning Project. This was an important means of communicating our laboratory and field findings. We offered suggestions for implementing opportunities for the behavioral development of all training school residents in Massachusetts.

3.7 (continued)

3.77 The program director has been appointed a consulting editor of the American Journal of Mental Deficiency.

3.8 Information-seeking visits to other facilities: The program director and staff members have observed and discussed relevant activities at: Seaside Center, Waterford, Connecticut; Center for Research in Language, University of Michigan; Behavior Pharmacology Laboratory and Laboratory of Experimental Behavior Pathology, University of Michigan Medical School; Children's Unit Experimental Psychology Laboratory, Carter Memorial Hospital, Indianapolis; Experimental Psychology Laboratories, Institute of Psychiatric Research, Indiana University Medical Center; HIP Program Ward, Wrentham (Mass.) State School; Children's Rehabilitation Unit, University of Kansas Medical Center; Parsons (Kansas) State Hospital and Training Center; Department of Human Development, University of Kansas; Anna (Illinois) State Hospital; Department of Neurology, Massachusetts General Hospital, Boston; Alcoholism Unit, Psychiatry Service, Boston City Hospital; Psychopharmacology Laboratories, Boston University Medical School.

3.9 Attendance at professional meetings: The program director and staff members have attended meetings of the Northeast Regional American Association on Mental Deficiency, American Association on Mental Deficiency, Eastern Psychological Association, American Psychological Association, American Academy on Mental Retardation, Society of Research in Child Development, Council on Exceptional Children, New England Psychological Association.

3.10 Laboratory tours and discussions:

As shown in Figure 1, in the past 2½ years, 536 people have visited the laboratory, including 366 professionals. Most of the other visitors have been students. More than 300 professionals, students, and parents have visited our ward and classroom programs.

3.11 Program-supported presentations at Fernald School:

3.111 Institution personnel were invited to attend discussion sessions and lectures given by the following individuals during consultation visits to the Behavior Evaluation Program:

Eric Haughton, Ed.D. Precision teaching and evaluation. April 1967.

Donald Cohen, M.D. Experimental analysis of human social behavior. August 1967.

Jay Birnbrauer, Ph.D. Problems in establishing a behavior modification ward for retarded children. March 1968.

3.112 In addition to "live" presentations, we offered several film showings:

An interview with B. F. Skinner -- discussion of many of the studies and theories that formed the foundation of our own work.

3.112 (continued)

Learning and behavior — presentation of some of the basic research conducted by B. F. Skinner and R. Herrnstein at the Harvard Psychology Laboratories.

Man as he behaves — showing O. R. Lindsley's applications of laboratory procedures to analysis of social interactions.

Reinforcement therapy — presentation of behavior modification programs with autistic children at the U.C.L.A. Neuropsychiatric Institute, retarded children at the Rainier School in Buckley, Washington, and chronic schizophrenics at Patton (Calif.) State Hospital.

Teaching the mentally retarded: A positive approach — showing the use of basic conditioning procedures in teaching self-help skills to severely retarded children.

4.0 Habilitation of Fernald residents

4.1 Wheatley Hall residents. Although a well-organized training program does not yet exist, we are increasingly more optimistic that our exploratory efforts will eventually evolve into effective programs for all Wheatley Hall children.

4.11 Attendant-teacher classes.

For several months a few attendants participated as teachers in classes with 13 Wheatley Hall children. This was an effort to involve the ward personnel directly in training activities. The classes demonstrated that many severely and profoundly retarded children, who otherwise spend their days aimlessly wandering the limited confines of a barren day room, could not only engage in constructive behavior in small groups but could also "pay attention" during 1½-hour class sessions.

Unfortunately the classes were discontinued when the institution hepatitis epidemic forced us to terminate all contacts for over three months. Subsequent changes in both project and ward personnel were not compatible with re-establishing this project.

4.12 Around-the-clock evaluation and self-help training. For six months our nurse conducted an intensive evaluation and training effort with six of Wheatley Hall's most difficult children. Under Title I funding we established a six-bed unit, where children slept, ate, played, etc. Unfortunately we did not learn of the irregularity of Title I support until the unit was already in operation. It had to be disbanded because of insufficient funds.

During its brief existence the unit provided opportunity to explore a variety of observation and recording procedures

4.12 (continued)

and to assess the reliability of recording by the unit staff. It became clear that the personnel were not consistent either in their record-keeping or in their attempts at applying differential reinforcement procedures. Recording unreliability showed up as 1) frequent failure to tabulate target behaviors at times when children were disruptive, 2) lack of clarity in specifying target behaviors, and 3) attempts to manipulate too many behaviors in each child (that is, failure to assign priority to target behaviors).

Training in the use of eating utensils, cleaning and setting the table, following instructions, dressing, brushing teeth, combing hair, etc., were attempted, and some children showed signs of progress. However, the frequency and intensity of disruptive behavior interfered greatly with training efforts. Programming a full schedule of recreational activities contingent on absence of disruptive behavior succeeded in decelerating the overall frequency of objectionable behaviors. But when the children were relocated in the general ward the frequency of disruptive behaviors returned to previous levels.

Of the recording procedures tried out on the unit, the most useful one specified 1) the occurrence of a particular behavior, 2) the antecedent stimuli, or circumstances under which it occurred, 3) the consequence it produced, and 4) the effects that the consequence had.

- 4.13 Individual and small group classroom training for selected Wheatley Hall children has been conducted over the past year and a half. The program for small groups covers following instructions, naming objects, identifying numerals, counting, quantity discrimination, color discrimination, telling time, identifying words in different colors, then the same words in one color, followed by identification of the letters in each word, the use of the letters to make new words, and finally reading short sentences in a story book. Errors are being analyzed as indicators of necessary procedural revisions. The specific content of instructional sequences is based on objects found in the classroom and in the ward.

Individual children are being taught to imitate, to respond to commands, and to articulate words correctly. Consequences which have proved to be effective for individual children include M & M's, dried cereal, potato chips, praise, and tokens exchangeable for candy, walks out of doors, automobile rides, etc.

Individual training with children from the short-lived six-bed unit was affected by many of the disruptive behaviors which unit personnel complained of. Most of these behaviors were eventually controlled in individual training, but until they were decelerated, they frequently became "chained" to the behaviors being accelerated.

- 4.2 Educable and trainable children are participating in a project directly derived from laboratory strategies for behavior evaluation. This affiliated effort is funded by Title I. The children are learning to tell time and will eventually receive instruction in reading, use of money,

4.2 (continued)

simple arithmetic, and other basic skills. Of direct relevance to our laboratory work is the fact that in this project children's learning deficits are being described functionally, in terms of the procedures that remediate them. Rather than being evaluated on a program involving plungers and simple visual and auditory stimuli, these higher level children are being screened on commercially available self-instructional programs, presented automatically by machines which also record their responses.

The nature of a child's errors is analyzed to provide objective, highly specific descriptions of his deficits. The programs are then revised in attempts to remediate each deficit. Thus, each emergent deficit is described in terms of its initial pattern and in terms of the procedural variables that prove to be remedial. The time-telling program is currently being revised for analysis of more severe behavioral deficits. One of the most significant findings, to us, is the fact that initial screening located several children with skills well beyond those revealed by conventional assessment procedures. It is conceivable that, eventually, an appropriately modified self-instruction program will add new dimensions to the prescriptive evaluation of a broad range of behavioral retardation.

- 4.3 Vocational rehabilitation. A year and a half ago a second teenage Fernald resident joined our staff. She is being trained to perform general housekeeping tasks around the laboratory, to supervise profoundly retarded children as they are brought to and from the laboratory, and to behave socially in a manner more compatible with her age. Our older trainee, who has been with us for over three years, continues to improve his custodial skills and to be increasingly more helpful in supervising our severely retarded children. The scope of his janitorial duties was increased to include the new classroom area, and we plan to train him to operate a large commercial vacuum cleaner which we recently acquired. Both trainees earn points for successful execution of specific duties on a daily basis. Points are converted to money at the end of each week.

5.0 Training

5.1 Institution personnel.

- 5.1.1 Our activities with the In-Service Nursing Education Program have fluctuated considerably since our last progress report. Our previously active relationship — formal presentations accompanied by special laboratory tours, informal discussions, and demonstrations of relevant laboratory procedures — degenerated for well over a year to the level of informal and irregular discussions with only Wheatley Hall personnel. Recently, the nursing program was re-activated, and the nurse affiliated with our program has been giving lectures on behavior modification and demonstrations of

5.11 (continued)

simple procedures. The program director has once again been asked to give formal presentations to the nursing group, and will begin in a couple of weeks.

5.12 Wheatley Hall In-Service Training is beginning to emphasize participation of ward personnel in training and evaluation of the children who reside there. Several attendants have expressed interest in training children of their choice.

Our nurse enlisted the cooperation of all Wheatley Hall attendants in gathering some pertinent data on all Wheatley Hall children: 1) what each attendant considered to be each child's most disruptive behavior, 2) what they believed each child would work for, and 3) what they thought each child disliked. Since the attendants would like the children to follow simple instructions, they are now using procedures set up by our nurse to determine how often each child looks up when his name is called and how frequently each child comes when called. Attendants who wish to do so are selecting children from the least responsive groups and are attempting to train them to come when called. The attendants are using the consequences that they previously listed as apparently reinforcing for each child. They have also selected two children with particularly disruptive behaviors and are learning to record base-line frequencies before applying deceleration procedures.

5.13 Meetings with ward personnel are held weekly. Our research and training coordinator serves as a consultant to the ward personnel and as a liaison between the laboratory and ward programs. Realistically, the ward personnel set the limits on what can be accomplished. The most we can do is to provide them with 1) systematic ways of keeping records and 2) training in behavior management procedures suitable for them to use in the course of their busy day.5.2 University students. During the past two years our staff has been complemented by two undergraduate special education students from Northeastern University who follow each other in successive six-month rotations as teachers of Wheatley Hall children. They have been taught the rudiments of behavior shaping and techniques of direct behavior acceleration and deceleration, as well as ways of recording their students' progress.

Two doctoral candidates, one from Boston University and one from Catholic University of America, obtained field experience in our program. During their stay with us they trained a few Wheatley Hall children to imitate words.

Three Harvard undergraduates have been given opportunities to work in our laboratory. Two of them fulfilled a psychology course requirement by testing the effectiveness of conjugately controlled closed-circuit television for showing differences in children's rates of responding to see and hear another person. The third student is examining the effects of toys and the presence of an adult on the rate at which a profoundly retarded child engages in head-banging.

- 6.0 Consultation service to parents in local communities is beginning to be explored. Our experience with one family suggests that with minimal professional guidance parents can learn to be effective in controlling the behavior of their own severely retarded children living at home (see section 3.12).

An effort is under way to enlist the participation of Wheatley Hall parents in their children's training. For the past year, our nurse and teacher have been counseling some of the parents who take their children home often. Suggestions are offered to the parents as to how they might use the child's home visit as a training opportunity. The parents of one mongoloid child have even tried having him at home three days a week. We arranged for him to attend a special class in his community on a part-time basis, and the arrangement is working well now that the boy's teacher and parents have learned the toileting schedule that was effective for him in Wheatley Hall.

A more systematic approach is about to be initiated in the hope of finding other parents who wish to provide their children with opportunities that are not available in the institution.