

## Reflections on Some Early Events Related to Behavior Analysis of Child Development

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A series of events related to the early application of behavioral principles to child behavior and development is described. The events began in the 1930s at Columbia University with a solicited letter from John B. Watson suggesting a master's degree thesis problem, and continued through the 1950s and 1960s at the University of Washington. Specifically, these happenings resulted in (a) research demonstrating that Skinner's laboratory method for studying nonhuman organisms could be profitably applied to the laboratory study of young normal children; (b) a demonstration that by successive approximations, a normal child can be operantly conditioned to respond to an arbitrary situation; (c) research showing that the effects of simple schedules of reinforcement obtained with nonhuman organisms could be duplicated in young normal and retarded children; (d) the demonstration that Skinner's operant laboratory method could be adapted to study young children in field situations; (e) research showing that operant principles can be successfully applied to the treatment of a young autistic boy with a serious visual handicap; (f) laboratory studies showing that mothers can be trained to treat their own young children who have behavior problems; (g) an in-home study demonstrating that a mother can treat her own child who has behavior problems; (h) a demonstration that operant principles can be applied effectively to teaching reading, writing, and arithmetic to children with retardation; and (i) publication of a book, *Child Development: A Systematic and Empirical Theory*, in collaboration with Donald M. Baer, by Prentice Hall in their Century Psychological Series.

*Key words:* child behavior, child development, applied behavior, analysis, research methodology

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This paper is a collection of highlights of my experiences as a developmental psychologist who sought to study child behavior from a natural science point of view. It describes the exciting events that accompanied the early application of behavioral principles to child behavior and development at the University of Washington in the 1950s and 1960s.

The first reflection harks back to my graduate student days, and hence serves as an introduction to the events that follow.

### IN SEARCH OF A THESIS PROBLEM

When I was a graduate student in psychology at Columbia University between 1935 and 1937, the department,

as a whole, could be characterized as theoretically eclectic. But in my various readings for Robert S. Woodworth's class in schools of psychology, I found myself drawn to the behavioral approach and wanted to do my master's thesis research on young children as described by John B. Watson in his *Psychology from the Standpoint of a Behaviorist* (1919). In my enthusiasm and naïveté, I wrote to Watson, then vice president of the J. Walter Thompson Advertising Agency, telling him of my interest and asking him to suggest a problem suitable for a master's degree study. He was kind enough to favor me with a cordial reply and proposed that I undertake a study on how young children learn "muscle sense." How, for example, does little Jimmy know that his arms are stretched out at shoulder height when his eyes are closed? He further suggested that I contact Patty Hill-Smith, director of the model kindergarten at the nearby Horace Mann School of Teachers College, for subjects. To me, that sounded like the kind of problem I would like

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to study but I couldn't find a faculty member in the department who was willing to sponsor such a study. So I reluctantly gave up Watson's suggestion and undertook instead a study that entailed the construction of a nonverbal intelligence test for children with retarded development (Bijou, 1938). This problem, which was in keeping with my interest in child development, was readily acceptable to the member of the faculty who specialized in tests and measurement, Henry E. Garrett.

### **DEVELOPING A LABORATORY METHOD TO STUDY CHILD BEHAVIOR**

Because this next highlight refers to a series of events that occurred some years after my graduate days at Columbia University, I'll fill in the gap with some background material.

#### *Background*

After receiving my master's degree, I worked for 3 years as a school and clinical psychologist, after which I decided to continue my graduate work at the University of Iowa where I could study with outstanding professors in child development, Kurt Lewin, in particular. Upon my arrival in Iowa City, I learned to my chagrin that Lewin was a professor in the Institute of Child Development (known then as the Child Welfare Station) and not in the Department of Psychology where I had enrolled. Although I was able to take several courses with Lewin and found him to be most stimulating, I nonetheless realized that my research interests were shifting toward animal behavior and Hullian learning theory, mainly through courses and contacts with my advisor, Kenneth W. Spence. In keeping with my earlier interest in deviant behavior, I elected to do my doctoral research on experimental neurosis in rats based on Pavlov's studies with dogs, focusing on the behavioral effects of difficult discriminations in a restricted laboratory setting (Bijou, 1942, 1943, 1951).

I received my doctorate degree in 1941, spent 1 year as research psychologist at the Wayne County Training School, Northville, Michigan, a school for predelinquent, high-level, mentally retarded youths; 4 years in military service (Army Air Force, as it was known at that time); and an additional year at the Wayne County Training School. In 1946 I was recruited by B. F. Skinner, then head of the Department of Psychology at Indiana University, to be assistant professor and director of the newly formed clinical program. In 1948 I left Indiana University to take an appointment as associate professor of psychology and director of the Institute of Child Development at the University of Washington in Seattle. (At the same time, Skinner left for an appointment at Harvard.) The Institute, founded and directed by Stevenson Smith, a student and close associate of Edwin R. Guthrie (Smith & Guthrie, 1930), was in reality a child guidance clinic with a Guthrie learning theory orientation operating out of the Department of Psychology in Denny Hall.

#### *The Need for a Laboratory Method to Study Children*

Soon after my arrival the Institute was given its own building, which housed a two-unit nursery school that had been in existence for some years. The child guidance clinic was renamed the Child Development Clinic. To complete the new center, a research laboratory was established to study both normal and deviant children in both the nursery school and the Child Development Clinic. In my view, it was essential that the research arm of the Institute have a common methodological and theoretical orientation. So by virtue of my Iowa graduate training, I sought guidance from the work of psychologists who were applying Hullian learning principles to the study of children, namely Robert R. Sears and his colleagues (Sears, 1947a).

Looking into their methodology, I

found that the Sears group was using group-correlational procedures to study relationships between mothers' child-rearing practices and attitudes and children's behavior in preschool (Sears, Whiting, Nowlis, & Sears, 1953), and projective doll play to study the strength of fantasy expression of aggression (Sears, 1947b). Because I was interested in a method for the study of individual children, I focused on their use of projective doll play and found that it consisted of presenting a young child with dolls representing a situation, such as the family, and instructing the child to "play with the toys." An observer was used to note and record verbal and nonverbal behavior, and the protocols obtained were interpreted in terms of concepts like aggression, nurturance, and frustration.

This method for the study of individual children seemed to be incompatible both with the method used in my research on experimental neurosis and conflict in animals and with ideas from discussions with Skinner on a functional analysis of individual behavior. Consequently, I shifted my search for a model in the direction of the work of Skinner and his students, beginning with Skinner's *Science and Human Behavior* (1953), which had only recently been published.

My first attempt was a compromise between a within-subject operant laboratory method and a between-subjects design (Bijou, 1955). I built an apparatus that required a child to drop a hard rubber ball into a hole in order to receive a trinket, thus producing a situation that yielded objectively countable responses and clearly discernible consequences.

I carried out two studies on the effect of intermittent reinforcement on subsequent extinction. In the first, 18 4-year-olds, divided into two groups, served as subjects. In one group, each child earned six trinkets for six ball-drop responses followed by a 3.5-min extinction period. In the other group, each child also earned six trinkets but the trinkets were distributed over 30

ball-drop responses and a 3.5-min extinction period. During extinction, the first group made an average of 15 responses; the second group made an average of 22 responses. The difference of seven responses was statistically significant. The study was replicated on 21 4-year-olds with one change in the apparatus. To make the stimulus accompanying the delivery of the trinket more distinctive, a buzzer was added to the sound of the motor that operated the trinket-delivery device. Findings from this study verified, even more dramatically, those obtained in the first study. Despite these positive results, I was dissatisfied because the method had an obvious shortcoming: It did not yield data that were conducive to a functional analysis of the behavior of an individual child. Furthermore, the number of responses produced in these studies seemed more suitable for theory testing than for inductive empirical analysis.

In my second attempt at a method compatible with a natural-science approach, I followed operant procedures scrupulously (Bijou, 1957a). This time I constructed an apparatus with a lever (mop handle) for responding, because the ball-drop response had led to unnecessary complications (e.g., a child would now and then miss the hole and chase around the room after the rolling ball). I purchased a Gerbrands cumulative recorder to record responses and the delivery of reinforcers, and a Gerbrands feeder to dispense small objects: trinkets, miniature homemade cookies, and low-calorie candies. With these new devices I studied the behavior of individual 4-year-olds on several fixed-interval and fixed-ratio schedules of reinforcement and obtained hundreds of responses in orderly relationships with the schedules.

On my next trip from Seattle to the East Coast, I took the opportunity to visit with Skinner and showed him samples of the data on normal preschool children. He expressed his pleasure and wished me well in my future research. At the time of this meet-

ing, he and Charles B. Ferster were preparing their book, *Schedules of Reinforcement* (1957).

### **HAND SHAPING THE BEHAVIOR OF A YOUNG CHILD**

In 1957, I transformed a mobile house-trailer into a mobile research laboratory that was designed to hold conditions constant in studies that were to be done at various nursery schools in the Seattle area (Bijou, 1958a). In a discrimination learning study in the mobile laboratory (Bijou, 1961), after a 1-day orientation to the situation, the child entered the laboratory room, dashed to the apparatus table, sat down, and watched the blue jewel lights, which signaled when to press the lever to obtain trinkets that fell into a nearby receptacle. The dropping of each trinket was preceded by a brief hum of the motor that operated the delivering device (Gerbrands feeder).

On one occasion in 1960, I invited William S. Verplanck, a member of the University of Washington summer school faculty and now professor emeritus of the University of Tennessee, to join me in observing the children from behind a one-way mirror. Not having ever seen a child in an operant learning situation, he was fascinated with what he was seeing. After watching for a while, he suggested that we try to hand shape a child to pull down the window shade on the opposite wall. I decided not to, thinking it was not in the domain of an experimental analysis of child behavior. Nonetheless, I later found myself giving the idea further thought and decided to try to shape this arbitrary response.

I removed the apparatus, table, and chair, and left only the trinket receptacle that was attached to the wall under a hole. I selected a child, Billy, who had not been involved in the ongoing discrimination study, gave him time to explore the room, then delivered several trinkets, resulting in his

hovering near the receptacle. I systematically reinforced his movements as he wandered further and further from the receptacle site until he finally reached the opposite wall of the room. This was the scene: After receiving a trinket, Billy would move away from the receptacle until he heard the sound of the dispenser motor, whereupon he would dash back to get the trinket. Then off he would go until he again heard the sound of the motor. While he hovered about at the opposite wall of the room he was reinforced, first for touching the window shade, then for holding it, and finally for pulling it down. So there Billy stood, pulling down the window shade to produce the motor sound and the resulting trinket.

Billy's performance was a clear demonstration that an arbitrary response, and therefore any operant response an individual is capable of emitting, can be established by the proper arrangement of contingencies of reinforcement. So shocked was I that for a long time I couldn't get myself to tell anyone about the demonstration, not even Verplanck. I was apparently persuaded that there was something ethically wrong about specifying a human being's response and then producing it by arranging the proper environmental conditions. Although I gradually recovered from the shock, I find I'm still careful about whom I tell the story to, for reasons that are more acceptable now than they might have been in those early years of behavior analysis, when child behavioral psychologists were looked upon as mechanistic rather than wholistic in their approach, as being concerned with "trivial" bits of behavior rather than "rich" human processes, such as thinking and feeling, and focused on scientifically controlling children's behavior rather than understanding and helping them learn and develop.

### **DUPLICATING FINDINGS FROM ANIMAL LABORATORY RESEARCH**

Between 1956 and 1960, the Institute staff and students at the University

of Washington were studying single and multiple schedules of reinforcement, conditioned reinforcement, and discrimination learning with normal preschool children at the Institute research laboratory and in the mobile laboratory (e.g., Bijou, 1957b, 1958b) and with retarded children at the newly established laboratory at the Rainier State School in Buckley, Washington (e.g., Orlando & Bijou, 1960; Orlando, Bijou, Tyler, & Marshall, 1960). Although the results from the studies were consistent with the findings on nonverbal animals, we soon learned that we had to be extremely careful in giving instructions to new subjects. Even the simplest instructions could be and were misunderstood, thereby delaying the child's interaction with the task.

During this period, we also did some exploratory studies with older subjects. One group made up of normal preadolescent and young adolescent boys and girls was given the task to press a lever to receive pennies dispensed on a ratio schedule of reinforcement. We soon found that they paid no attention to the schedules of reinforcement, merely working the lever as fast as they could, collecting the pennies that fell into the receptacle, and leaving with their "loot."

The other group consisted of male hospital patients in the Seattle Veterans Administration Hospital. Here the patients' task was to press a lever for tokens that were exchangeable for items from the canteen. They, too, disregarded the schedules of reinforcement and viewed the task as a puzzle, resorting to different solutions: responding fast, responding slowly, and combinations of both.

Both of these informal studies raised questions about the control of schedules of reinforcement for older and much more verbal subjects in the situations studied, but because we were primarily interested in young normal and retarded children, these findings did nothing to deter us from continuing with our research programs.

### **APPLYING REINFORCEMENT AND EXTINCTION TO AMELIORATE PROBLEM BEHAVIOR IN A YOUNG CHILD IN A NATURAL SETTING**

The next highlight could be considered a landmark experimental study in that it was carried out in the early 1960s by teachers in the Institute's nursery school in the context of its regular school operation.

The study involved a 3.5-year-old girl, Dee, who soon after her admission to the school, displayed socially withdrawn behavior: She hid her face with her hands, isolated herself from the group, and most of the time sat or crawled on the floor or ground. On the assumption that she was engaging in regressive behavior due to stress from some unknown source, during the first 2 weeks of school the teachers typically gave her lots of attention and comfort while she was on the floor or ground.

Because there was no indication that this type of treatment was effective in bringing about a change in Dee's behavior, the director of the nursery school consulted Montrose M. Wolf, then a research assistant professor, and currently Professor of Human Development at the University of Kansas. His advice: Have the teachers and aides give attention to Dee only when she was doing things while standing or walking, and ignore her, by pretending to be busy, while she was sitting or crawling on the floor or ground. Under this regimen, within 1 week, to the delight of the staff, Dee was on her feet about 75% of the time, participating in the usual nursery school activities.

After some persuasion by Wolf, the nursery school staff reluctantly agreed to reverse the conditions—giving attention for off-feet behavior and ignoring on-feet behavior—to see whether the dramatic change in Dee's behavior could be attributed to the treatment program. After only 2 days under the reversed condition, Dee was back on

the floor about 82% of the time. The initial treatment procedure was reinstated, and in 1 week she was again engaging in nursery school activities, standing up or walking at all appropriate times. A final check at the end of the school year showed that her social and motor behavior could not be distinguished from that of the other children.

This simple study (Harris, Johnston, Kelley, & Wolf, 1964) had an impact on all the members of the Institute staff. First, it convinced the nursery school teachers that behavioral principles could be used productively as a basis for managing and guiding the children in their care. Second, it motivated them to launch a series of field studies on other problem behavior, such as excessive crying, whining, shyness, aggressiveness, and isolation from the group (e.g., Allen, Hart, Buell, Harris, & Wolf, 1964; Harris, Wolf, & Baer, 1964; Hart, Allen, Buell, Harris, & Wolf, 1964). (Little did we know at that time that we were setting the stage for research now known as social skills training.) Third, the nursery school staff began to take advanced courses and degrees, so that they could be more effective in their research and the application of behavioral principles. Fourth, the nursery school and research staffs cooperated in developing a field method for collecting and analyzing data for descriptive and experimental studies in natural settings (Bijou, Peterson, & Ault, 1968; Bijou, Peterson, Harris, Allen, & Johnston, 1969) that was widely adopted. And fifth, it revealed to all members of the Institute staff that journal editors strongly resisted publishing experimental studies involving a single subject.

#### **APPLICATION OF BEHAVIORAL PRINCIPLES TO A VISUALLY HANDICAPPED AUTISTIC CHILD**

A pioneering study of a visually handicapped autistic child, which took

place in the early 1960s, was the next highlight. It began with a telephone call from the physician in charge of the children's ward of the Washington State Hospital, telling me that he had in his care a 3.5-year-old "schizophrenic" boy who had had surgery on both eyes to remove cataract-infected lenses, and who, in the opinion of the consulting ophthalmologist, would lose his macular vision if he did not wear his glasses. For over a year his parents, hospital personnel, and specialists of one kind or another had tried and failed to get Dicky to wear the glasses. The physician went on to say that he had heard that the people at the Institute of Child Development were good at "habit training," so he was calling to find out whether we would help. I said we would, despite the fact that we had heretofore worked only with young normal and retarded children.

When I asked Mont Wolf, and a graduate student, Todd R. Risley (now Professor of Psychology at the University of Alaska), and Hayden Mees, clinical psychologist at Washington State Hospital, whether they would be interested in working with such a child, they eagerly took on the challenge. They began by evaluating Dicky and found that in addition to his visual problem, he had serious behavioral problems, namely severe and prolonged tantrums and problems related to going to bed, eating, and interacting with others. And to top it all, his speech was limited to echolalia. Wolf and Risley quickly recognized that they would have to reduce or eliminate Dicky's various problem behaviors before they could embark on a glasses-wearing program.

They trained nurses, attendants, and the parents to carry out the treatment programs and to keep systematic records on each of the problem behaviors, breaking new ground each step of the way. As the behavior problems were gradually brought under control, the glasses-wearing program was initiated. Here, the investigators had to intervene directly in the initial stages of getting

Dicky to put on and wear his glasses. Furthermore, they had to eliminate his new-found delight of throwing the glasses at different targets around his room. Notwithstanding these hurdles, after 7 months of intensive treatment, Dicky was wearing his glasses most of the time and his behavior problems were under sufficient control to allow him to return home (Wolf, Risley, & Mees, 1964). The saga continues.

At the age of 5, Dicky was enrolled in the nursery school of the Institute of Child Development to prepare him for a special class in a public school. He was by no means a typical nursery school child. The nursery school staff, in consultation with Wolf and Risley, had to set up programs to reduce the tantrums that had recurred while he was living at home, eliminate his inclination to pinch peers, establish toileting behavior, and expand his meager social and verbal skills. They accomplished these objectives. Dicky was ready to enter a public school at the beginning of the next school year (Wolf, Risley, Johnston, Harris, & Allen, 1967).

Recently (1993) Risley learned that Dicky is living in Portland, Oregon, and arranged to visit him. Risley reported (personal communication) that the young man was living independently and was maintaining a good relationship with his father. Thirty-three years old at the time of the visit, he reads, writes letters, has relatively good social skills, and is a dependable part-time custodian in the apartment complex in which he lives.

I must admit that the only justification I had for accepting Dicky's case was the optimism and confidence I had gained from a visit in 1960 to a project by Charles B. Ferster and Marion DeMyer at the Indiana University Hospital in Indianapolis (Ferster & DeMyer, 1961). Working in a laboratory setting with automated dispensing devices, these investigators were demonstrating that they could expand the repertoires of young autistic children by applying operant principles. Wolf

and Risley's work with a single young autistic child clearly showed that these principles could also be applied in natural settings to establish acceptable personal and social behavior and to eliminate problem behavior.

### PARENT TRAINING IN THE CLINIC LABORATORY

The Child Development Clinic of the Institute at the University of Washington was the locus of another cherished reflection. Robert C. Wahler, then a research fellow, now Professor of Psychology at the University of Tennessee, undertook several investigations to explore whether parents could be trained to serve as therapists for their own children (Wahler, Winkel, Peterson, & Morrison, 1965).

These studies were concerned, not with producing long-term changes in a child, as in the Wolf et al. study (1964), but rather with discovering how problem behavior is maintained and how appropriate or desirable changes might be instituted. The method here consisted of evaluating the problem, orienting the mother to the procedures that would be used to treat the problem, and then scheduling the mother and child for 1-hr play sessions in which the mother was guided in her interactions with the child. Mother and child were left alone in a playroom equipped with a variety of toys, while a clinician, observing through a one-way glass in an adjacent room, instructed the mother through the use of light signals, seen only by her, to reinforce socially acceptable behavior and to ignore problem behavior. In addition, both the clinician and an observer operating in a second observation room recorded mother-child target interactions on a Gerbrands cumulative recorder. The subjects were three mother-child dyads: 1 6-year-old boy who was "very commanding" and 2 4-year-old boys, one "very dependent" and the other "extremely stubborn."

As an example of the procedures and results, the study of the mother of

the commanding 6-year-old, Danny, is described in some detail. Danny was brought to the clinic because he forced his parents to comply with his every wish (e.g., he virtually determined his bedtime, foods, play times, etc.). His parents reported that "they were simply unable to refuse his demands and rarely attempted to ignore or punish him. On the few occasions when they had refused him, they quickly relented when he began to shout and cry" (Wahler et al., 1965, p. 117).

On the basis of an evaluation interview, it was decided that Danny's commanding behavior, defined as any verbal or nonverbal instructions to his mother (e.g., pushing her to sit down, saying "Now we'll play this," or "Do it my way,") would be weakened or eliminated through extinction and his cooperative behavior, that is, nonimperative verbal and nonverbal behavior, would be strengthened through positive social reinforcement.

At the beginning of each of two baseline sessions, the mother was told, "Just play with Danny as you would at home." During these sessions, Danny showed a high rate of commanding behavior as his mother made comments such as "OK, if that's what you think," or "Am I doing it right?" and a low rate of cooperative behavior.

During the second phase, also consisting of two sessions, the mother was instructed through the signaling system to ignore Danny's commanding behavior and to attend to all instances of cooperative behavior. Now Danny's rate of commanding behavior fell to almost zero, and his cooperative behavior rose markedly.

The test of the mother's differential behavior was made in the single session of the third phase. She was now told to interact with her son just as she had during the baseline sessions. Compared with the two previous experimental sessions, the change in the mother's behavior had the effect of once again increasing Danny's commanding behavior and decreasing his cooperative behavior to almost zero.

Findings from this and the other two studies in Wahler et al.'s (1965) research programs were significant because they demonstrated that the interrelationships that maintained the problem behavior of these 3 young boys could be readily identified, and that the mother could be trained to modify them by extinction, time-out (used with the child described as "extremely stubborn"), and positive reinforcement. The implication is that mothers who are willing and able to follow instructions can readily be trained in a clinical or laboratory setting to deal with the problem behaviors of their own young children.

### PARENT TRAINING IN THE HOME

Impressed by the Wahler et al. (1965) findings, a group from the Institute and the Department of Psychology undertook to train a parent to serve as therapist for her child in their home with the hope of demonstrating long-term changes (Hawkins, Peterson, Schweid, & Bijou, 1966). The subject, Peter, was described as "extremely difficult to manage." He kicked objects and people, removed or tore his clothes, made rude remarks, teased his younger sister, threatened people, hit himself, became furious at the slightest frustration, demanded constant attention, and was rarely cooperative. In an evaluation interview, nine categories of problem behavior were identified which, taken together, were termed objectionable behavior.

The study was conducted in four stages consisting of 45 1-hr sessions, all in the home with the younger sister present. During the 16 sessions of baseline, in which the mother interacted with her son in her usual way, the number of Peter's objectionable behaviors ranged from 18 to 113 per session. Prior to the second phase—the first experimental period of six sessions—the mother was told to respond to her son's behavior according to the clinician's signals. Signal A: tell Peter to stop his



on-going behavior; Signal B: put him in his room and lock the door (this cue would be given only when Peter failed to respond to his mother's admonition); and Signal C: give him attention, praise, and affectionate physical contact. Under these conditions, Peter's objectionable behaviors decreased sharply, ranging from one to six per session.

At the beginning of the third 14-session phase, the mother was instructed to behave once again as she had during baseline sessions. Although Peter's objectionable behaviors increased under this arrangement, they did not reach the level observed under the first baseline condition. Here the range was from two to six per session.

In the fourth phase of the study, the A-B-C signal system was reinstated. In these six sessions, the undesirable behaviors decreased as they had in the first experimental period, with incidents again ranging from two to six per session.

The fifth and final phase, a three-session follow-up evaluation, took place 45 days after the last experimental session. In the interim, there had been no contact between the clinician and the mother. However, the mother had been told that during the interval she could use the new procedures whenever they seemed appropriate. The follow-up check indicated that Peter's objectionable behaviors remained as they had been in the last experimental period. Furthermore, the mother volunteered that her son was now well behaved and was far less demanding. The training program was evidently both feasible and effective.

Not only did the Wahler et al. (1965) and Hawkins et al. (1966) studies attract considerable attention from clinical child psychologists, social workers, and teachers, they also set the stage for programs of parent and family training in the home, for example, the Portage Early Childhood Education Project (Shearer & Shearer, 1972).

### **APPLICATION OF PROGRAMMED INSTRUCTION PRINCIPLES TO TEACHING RETARDED CHILDREN**

This highlight occurred during 1961–1962 after my return from a sabbatical year of study with Skinner at Harvard. While in the Northeast, I visited the purportedly outstanding programs for the education and rehabilitation of young retarded children in that area. Impressive as some appeared to be, I came away with the strong conviction that an instructional program based on operant principles would be superior to anything I had seen.

So, upon my return to Seattle, I arranged with Charles H. Martin, superintendent of the Rainier State School, to set up an experimental class at his institution for young retarded problem children who were making little or no progress in school. Cecilia Tague-Harper and John D. Kidder served as research teachers, and Jay S. Birnbrauer, then Assistant Professor of Psychology and at present Professor of Psychology at Murdoch University in Western Australia, and Montrose M. Wolf, who had had research experience in teaching reading with Arthur W. Staats at Arizona State University (now Professor of Psychology at the University of Hawaii), were consulting psychologists.

The aim of the program was twofold: to demonstrate that operant principles could be successfully applied to teach academic skills to retarded children, and to develop programmed materials for academic and social learning.

The 27 boys and girls who participated in the 3-year study ranged in age from 6 to 14 years and in mental age from 4 to 10, with a mean IQ of 63. School achievement measured on standardized scales indicated reading ability to be "upper first grade" to "not measurable." Eleven of the children were diagnosed as clinically brain damaged, 3 had Down syndrome, 4

were cultural-familial, and 9 were undifferentiated. All displayed problem behavior in the classroom.

Physically structured to accommodate individualized instruction and develop independent work skills, the classroom consisted of six desks arranged in the central area, two work tables for assignments that required large working spaces, three tables for writing exercises, and three enclosed study cubicles with a desk, a teaching machine, and two chairs for tutorials. There were, in addition, supporting facilities: a waiting room, a time-out room, and an observation room with a large one-way mirror (Bijou, Birnbrauer, Kidder, & Tague, 1966; Edgar & Sulzbacker, 1992).

The staff had the arduous double task of conducting the classes of six children each, as well as constructing carefully graded programs of curriculum material based on the children's performance. The program sequences included reading, writing, arithmetic, spelling, telling time, making change, and other correlated practical subjects. They also devised supplementary programs that supported academic learning, specifically, increasing attending behavior and working independently.

As an aside, it should be noted that the reading program developed in this project is still in use and is now known as the Edmark Reading Program, and is available commercially in computer form with a touch screen.

To cope with problem behavior, the staff devised an extrinsic motivational system (Birnbrauer, Wolf, Kidder, & Tague, 1965), based on the research of Staats and his colleagues (e.g., Staats, Staats, Schutz, & Wolf, 1962), that utilized tokens in the form of marks given for academic progress and classroom deportment. The system worked this way: Each child was given a card on which the teacher entered every mark the child earned. When the card was filled, it was redeemable for toys, edible items, pencils, or money, or it was credited to a money account with the

privilege of spending it in town or on a special outing.

The Rainier School project, too, attracted the widespread attention of teachers and administrators in special education and served as the basis for numerous spin-offs in this field, notably the engineered classroom in a Los Angeles public school district. It also became the prototype for much of the research at the Child Behavior Laboratory at the University of Illinois in Champaign-Urbana (e.g., Bijou & Grimm, 1973; Bijou, Grimm, & Parsons, 1973).

### **PUBLICATION OF A BOOK ON CHILD DEVELOPMENT**

The final highlight is the publication of a book with Donald M. Baer, titled *Child Development: A Systematic and Empirical Theory* (1961). The book was an outgrowth of a third-year undergraduate course in child development that Don Baer and I were teaching at the University of Washington. After using one of the popular child development textbooks for several semesters, we felt a pressing need for a supplementary book whose theory of child development (a) would be compatible with the research in progress at the Institute; (b) would provide the underpinnings for the application of behavioral principles to the treatment of children with behavior problems, to early childhood educational practices, and to parenting skills; and (c) would at the same time provide the student with alternative interpretations of findings described in the child development textbook we were using in the course. So we embarked on the task of preparing an appropriate manuscript for such a book. After numerous revisions, with before-and-after trial runs with students, we felt we had the desired product. With the encouragement of Kenneth MacCorquodale, Assistant Editor of Prentice Hall's prestigious Century Psychological Series, we sub-

mitted our final manuscript, which was readily accepted.

### SUMMARY

Herein is an account of a series of cherished events related to the early application of behavior principles to child behavior and development at the University of Washington in the 1950s and 1960s. The preamble to these experiences was an event that occurred while I was a graduate student at Columbia University. The circumstance was a solicited letter from John B. Watson in which he suggested a thesis problem for my master's degree research. Although I was unable to follow his suggestion for lack of a faculty sponsor, Watson's letter served as an inspiration to continue my interest in studying children from a behavioral perspective.

Following are the highlights that took place:

1. A clear demonstration that the laboratory method developed by Skinner for studying nonhuman organisms can be profitably applied to the study of young normal children.

2. The demonstration that the behavior of a normal preschool child can be operantly conditioned to any arbitrary situation by successively approximating the final response.

3. The finding that the effects of simple reinforcement schedules shown in nonhuman organisms can be demonstrated with young normal and retarded children.

4. The demonstration that the laboratory method developed to study the behavior of young children can be extended to field situations.

5. The successful treatment of a visually handicapped, autistic child in both hospital and preschool settings.

6. The laboratory study demonstrating that with training, mothers themselves can treat their young children who have behavior problems.

7. The field-experimental study demonstrating that a mother can, in the

home setting, treat her own young child who has a behavior problem.

8. The demonstration that operant principles can be effectively applied to the teaching of reading, writing, and arithmetic, and to the management of retarded children in a classroom setting.

9. The publication of a book, *Child Development: A Systematic and Empirical Theory*, in collaboration with Donald M. Baer in Prentice Hall's Century Psychological Series.

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