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Training Autistic Children to Urinate in the Toilet Through Operant Conditioning Techniques[1]

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The purpose of this study was to evaluate the use of operant conditioning techniques to toilet train children in an autism ward of a hospital for developmentally disturbed children. Five profoundly retarded males with clear clinical manifestations of autism were selected as subjects. Records of the urination behavior of these subjects were kept during a baseline period and throughout the application of procedures. Appropriate urination behavior was immediately followed by positive reinforcers, such as candy, verbal praise, and physical affection. Inappropriate urination behavior was immediately followed by negative reinforcers, verbal as well as physical. The results of this study show that operant conditioning techniques can be used to change the urination behavior of profoundly retarded autistic children even where other methods have failed. Factors requiring further investigation for their possible impact on the effectiveness of these procedures in toilet training autistic children are also discussed.

One of the most important but difficult problems confronting those concerned with treating hospitalized autistic children is that of training them in basic social skills. As Hundziak, Maurer, and Watson (1965) point out, those treating severely mentally retarded children in institutions face the same problem. Among these basic social skills, acquisition of control over

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toileting behavior is especially important. Not only is toilet training one of the prerequisites for admission to most schools in the community, but it facilitates participation in a whole range of activities in the world outside the hospital or institution. Since Ellis (1963) outlined a stimulus-response reinforcement approach to procedures for toilet training severely defective patients, a number of studies have reported the practical application of operant conditioning techniques to toilet train mentally retarded subjects (Azrin, Bugle, & O'Brien, 1971; Azrin & Foxx, 1971; Cassell & Colwell, 1965; Dayan, 1964; Giles & Wolf, 1966; Hundziak et al., 1965; Kimbrell, Luckey, Barbuto, & Love, 1967; Pumroy & Pumroy, 1965; Van Wagenen, Meyerson, Kerr, & Mahoney, 1969; Waye & Melnyr, 1973).

Azrin and Foxx (1971) devised two elimination signaling apparatuses and used them to toilet train profoundly retarded adults. They stated that these apparatuses enabled the trainer to respond rapidly to each elimination and still (1) train several patients at once, (2) leave the toilet facility briefly (e.g., to shower another resident) and still be able to return quickly, and (3) teach the residents responses related to toilet training without having to check the pants of other individuals. Furthermore, the apparatuses eliminated the need for visual checking to determine if someone sitting on a toilet was voiding. The advantages of using mechanical devices in an institution with a large patient population and a low staff-patient ratio may be significant, but there is less need for such labor-substituting approaches in wards such as ours where there is a rather high staff-patient ratio (25:15). In such situations, the advantage of the devices' capacity to provide perfect records of the subjects' elimination may be outweighed by the time lag in responding to elimination when such machines are used. Watson (1970) claims that reinforcement should optimally be administered within a half second or less after the behavior occurs. Reliance on mechanical devices does not ensure optimal response time and may even work against timely reinforcement if they are used to increase the number of subjects handled by each trainer.

Azrin et al. (1971) also used these devices to toilet train profoundly retarded children, and claimed remarkable results. According to them, by the end of a 2 to 4 month training program the children ceased wetting their pants almost entirely and continued to be dry after training was discontinued. They claimed further that these results occurred within several days after the method was implemented, that is, that incontinence approached zero within a few days. Their method seems to be most unique in its immediate and accurate detection of elimination, which has the advantages and disadvantages discussed in the preceding paragraph. The reinforcements they used and their reinforcement contingencies do not seem to differ from conventional operant conditioning techniques.

Operant conditioning techniques have been reported to be effective in modifying the behavior of previously inaccessible autistic children in areas

other than toilet training (Ferster & DeMyer, 1961; Wolf, Risley, Johnston, Harris, & Allen, 1971; Wolf, Risley, & Mees, 1964; Freeman, Ritvo, & Miller, 1975). There have been no reports, however, of the use of operant conditioning procedures to toilet train hospitalized autistic children. My clinical experience in treating and supervising the treatment of the elimination problems of a population of about 1,000 autistic and profoundly retarded children at Aichi Prefectural Colony is that it is much more difficult to toilet train autistic children than even profoundly retarded children, in terms of both effort and length of time required. When applying operant conditioning techniques to autistic children one would not expect to see the dramatic rates and degree of progress that Azrin et al. (1971) observed when they used such techniques to toilet train profoundly retarded children. The present study systematically applied these techniques to the toilet training of five children in an autism ward of a hospital for developmentally disturbed children to determine how effective they might be in teaching this basic social skill to autistic children.

SUBJECTS

Selection

Among the inpatients of the Autism Ward of Central Hospital, Aichi Prefectural Colony, Japan, those children with the most difficult problems concerning urination behaviors were selected for this study. The criteria for selecting the children with the most difficult problems were (1) higher frequency of problem behaviors, such as bladder incontinence or urinating in inappropriate places; (2) prior failure of repeated efforts by ward staff to toilet train the child.

Clinical Description

All the subjects were profoundly retarded males with clear clinical manifestations of autism. They were all aloof, and had difficulty in mixing and playing with other children. A brief description of each subject follows.

Subject 1 was a 7-year-old boy who used other people or their body parts as impersonal objects and had a pathological preoccupation with particular nonhuman objects. Other characteristic behaviors included visual and auditory avoidance (such as cupping his ears), tantrums, ritualistic mannerisms, and manipulation of objects. Speech had been lost, but he did respond to his name and to the command, "Come here." He did not maintain eye contact. He had good motor capability and drank large quantities of water. He could pull his pants down but could not pull them back up.

Subject 2 also was 7 years old and exhibited visual and auditory avoidance. He had never acquired speech, and did not even respond to verbal commands. He would enter into eye contact, but sometimes he would only look at people out of the corner of his eye. Although he had fair motor capabilities, he did not remove or replace his clothing.

Subject 3 was a 9-year-old who repeatedly engaged in self-directed aggression. He would spin himself or other objects around, as well as manipulate objects. Speech had been lost, but he did respond to his name and to the command, "Come here." He was able to lower his pants and pull them back up. He had good motor capability.

Subject 4 was a 7-year-old who used other people or parts of them impersonally. He engaged in repeated self-directed aggression and tantrums. He had a pathological preoccupation with particular objects and with manipulating them. He was hyperkinetic, had lost his speech, and did not respond to verbal commands. His motor capability was good. He could lower his pants and pull them back up.

Subject 5 was a 6-year-old boy who was insensitive to pain or temperature. He had lost his speech and did not respond to verbal commands. He had poor motor functions, as indicated by unstable walking and frequent falling. He did not have eye contact. He did not remove and replace his own clothing.

PROCEDURES

For a period of 1 or 2 months after the children were selected as research subjects, baseline records were kept on the time of day and frequency of each child's urination (1) in places other than the toilet, (2) in the toilet, but at the instigation of a nurse, and (3) in the toilet at the child's own instigation. During this same period other behaviors were also observed to determine the most appropriate rewards and punishments for each child. Since the children were supervised and observed 24 hours a day, 7 days a week, it was possible to maintain complete and accurate records during this period and throughout the study.

Ward Facilities and Activities

The Autism Ward in which this study was conducted has a general orientation towards operant conditioning techniques. The ward contains a day room, dormitory, a dining room, a group therapy room, two special training booths, a bathroom consisting of four toilets that can be observed from an observation and recording room through a one-way mirror, and a

receptacle for cleaning pants. The usual population of the ward consists of 15 autistic children. Twenty-two nurses and three child psychiatrists work in the ward. These experienced nurses carried out the toilet training in this study under the supervision of the author. Ward staff held a weekly case conference to check the urination records and to discuss modifying the scheduled training procedures.

General Procedures

The observation and toilet training of the children for this study were carried out around the clock, 7 days a week. Daily during waking hours the subjects were taken individually to the toilet every 2 hours and whenever they overtly expressed the need or acted as if they needed to go. In order to establish self-initiated elimination, the children were dressed in ordinary pants and briefs. Diapers were not used, even in cases of incontinence. Water-drinking facilities were freely available in the ward, and the fluid intake of the children was not restricted during either the baseline or the training periods. In these ways the training situation was kept as close as possible to the conditions of living at home to which the learned elimination habits were eventually to be transferred.

On the basis of observations collected during the baseline period, reinforcements were chosen that were most appropriate for each individual child. During the training period the chosen reinforcements were administered exclusively in association with urination behavior in order to increase their effectiveness. When administering tangible reinforcements, the nurses were encouraged to give prior vocal cues, such as "Good boy!" or "No!"

Positive Reinforcement

Initially, candy and verbal praise were given immediately after the child urinated in the toilet at the instigation of a ward nurse. All the nurses always carried candy in their uniform pockets so that it would be readily available for immediate rewards. As habits of using the toilet began to be acquired, the conditions for receiving a reward were changed so that it would be given only after the child had urinated in the toilet at his own instigation.

Negative Reinforcement

Punishment for urinating outside the toilet, wetting pants or the floor, included physical violence (a couple of intense spanks on the

buttocks) and the task of removing the wet pants and taking them to the cleaning receptacle. Punishments were administered immediately after inappropriate urination occurred. Nurses accompanied physical punishment with verbal reinforcements and made every effort to bring the child's toileting under some degree of verbal control. After each incident of inappropriate urination followed by negative intervention the nurses would ignore the child except to exclude him from ordinary play activities in the ward for as long as 10 minutes. During this time he was kept under strict but unobtrusive observation. In the case of subject 3 a special negative reinforcer was devised and is described in the Results section.

Recording and Checking Data

Whenever one of the subjects in the study urinated the incident was recorded. Each record categorized the incident as previously explained: whether the child urinated (1) in a place other than the toilet, (2) in the toilet, but at the instigation of a nurse, or (3) in the toilet at the child's own instigation. Every day one nurse was assigned to keep the urination records for all subjects in the study. The other nurses who were observing and training the children would report to this recording nurse each time they observed a child urinating. The recording nurse recorded these reports in the appropriate categories on special forms. At the same time the attending nurses kept their own independent records of the daily frequency of each child's urination by category. The daily record compiled by the recording nurse was delivered to the author's laboratory where a research assistant, who had no other contact with the ward, calculated the distribution of urination incidents for each subject every 10 days. The attending nurses made a similar graph for each subject from their own records. At the weekly ward conference the laboratory and ward records were compared for consistency. In this way the reliability of the data was ensured.

RESULTS

The results in each case will now be described in terms of baseline urination behavior, the particular operant conditioning procedures employed, and their outcome. In parentheses after each mention of a reinforcement administered, its effect on increasing the child's appropriate urination or decreasing inappropriate urination is described as follows: very sensitively responded (VSR), sensitively responded (SR), ambiguously responded (AmR), and no response (NoR). The graphs of the records of each child's urination behavior were obtained by plotting the ratios of incidents of self-

initiated toileting to total incidents of urination in each 10 day period. These percentages reflect the total elimination behavior of each child better than simple counts of the number of times the child was incontinent each day.

During the baseline period the behavior of subject 1 (see Figure 1) was characterized by extreme pollakiuria due to drinking large quantities of water, frequent wetting of his pants and the floor, and walking around the ward indifferent to wet pants. Immediately after a nurse initiated him in using the toilet, she verbally reinforced him, saying "Good boy!" (VSR), hugged him (VSR), and helped him to jump by holding his hands (SR) (Figure 1, period I). Around a month and a half after these procedures were first implemented he had begun to respond to the reinforcers and had used the toilet a few times on his own initiative. Candy (VSR) served as a much more effective reinforcer (Figure 1, periods II and III). Negative reinforcements to urination in his pants or on the floor included scolding by a nurse saying "No!," "That's very bad!" (VSR), making him take off his wet pants and put them in the cleaning receptacle (SR), and spanking (VSR). When reinforcements were withdrawn (Figure 1, No reinforcement), self-ini-

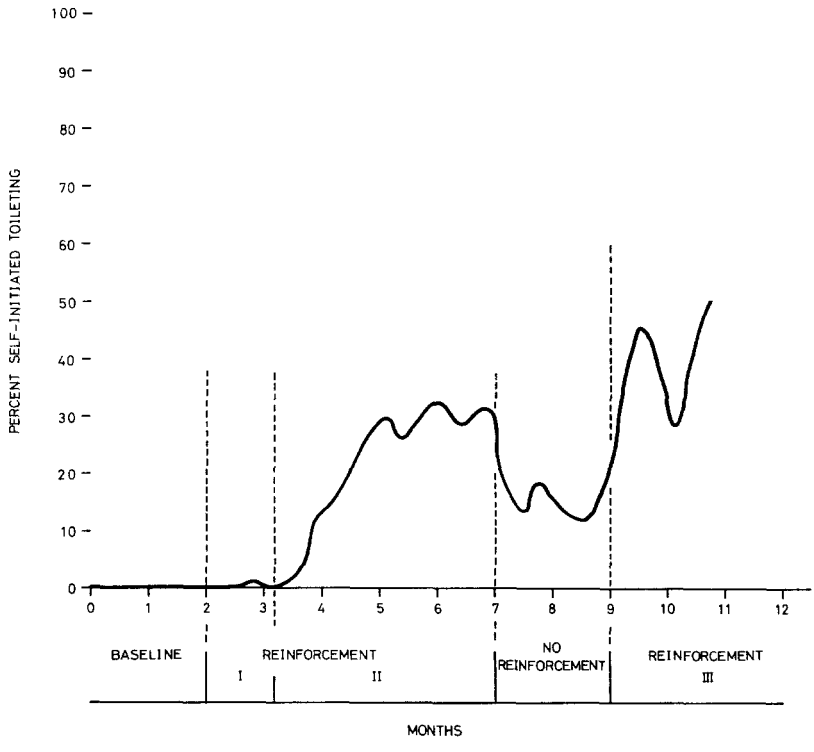

Fig. 1. Appropriate use of the toilet as a percent of total incidents of urination: subject 1.

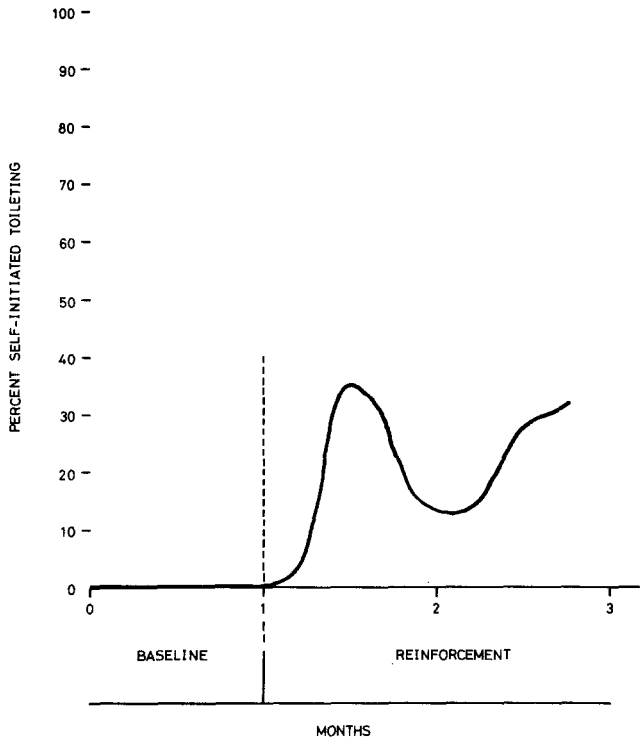

Fig. 2. Appropriate use of the toilet as a percent of total incidents of urination: subject 2.

tiated toilet usage decreased. After that, reapplication of reinforcements such as hugs (VSR), verbal praise (VSR), candy (VSR), and spanking (VSR) made appropriate toileting increase (Figure 1, period III). In the course of the application of these procedures this boy also began to develop eye contact and became more responsive to staff attitudes.

During the baseline period subject 2 (see Figure 2) frequently urinated in his pants and on the floor. He would also walk around the ward seemingly oblivious to wet pants. When reinforcement was initiated, the child was reinforced positively by verbal praise from the nurse, "You are a good boy!" (AmR), and by candy (VSR) immediately after he urinated in the toilet. Negative reinforcers were scolding, "Bad!" (AmR), and physical violence (VSR). These procedures proved effective relatively quickly, although self-initiated toileting did decrease after an initial increase. This may perhaps be attributed to a temporary instability in the administration of reinforcements. With continued, consistent application of reinforcements the child's urination behavior became cumulatively more responsive to them. The child was discharged 4 months after operant conditioning pro-

cedures were first applied. He lives at home now and there are no reports of problems with his urination behavior. One factor in the child's improvement was overcoming his extreme anxiety concerning the toilet at the beginning. He gradually developed an understanding of the relationship between elimination and going to the toilet. His emotional contact with the staff also improved during the training period.

The baseline behavior of subject 3 (see Figure 3) was characterized by pollakiuric wetting of his pants and occasional urination on the floor without wetting his pants. Before the training conducted under this study began, attempts had been made to reinforce his other-initiated toileting positively with praise (SR) and candy (AmR) and to use negative reinforcement for inappropriate toileting, administering verbal reprimands (SR) and spankings (SR). Since these conventional operant conditioning techniques did not result in any significant increase in self-initiated toileting and because of this child's compulsiveness and relatively adequate comprehension despite his autism, we devised a special punishment for him. For 3 days, three times a day, and for 10 minutes every time, we tied a plastic urine collecting bag

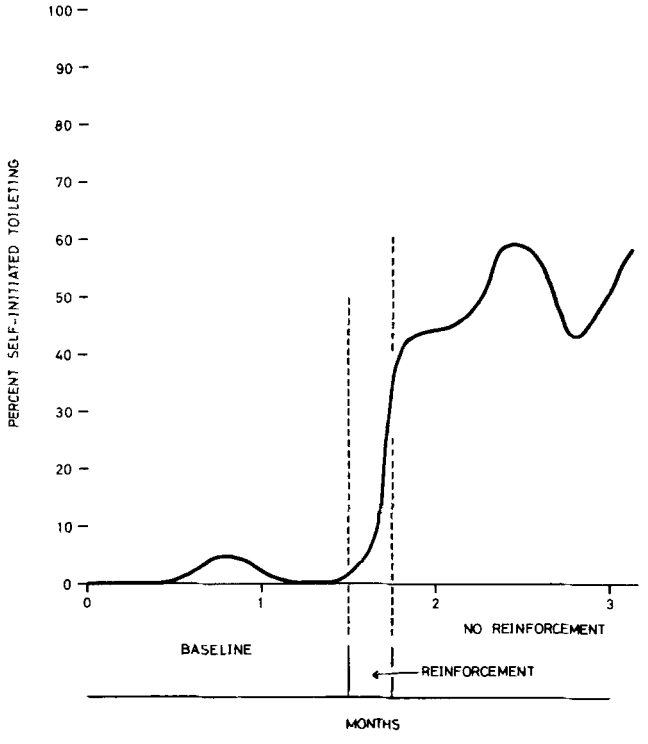

Fig. 3. Appropriate use of the toilet as a percent of total incidents of urination: subject 3.

around his external urogenital organs (VSR). Although this procedure was not directly contingent on his inappropriate urination, it resulted in a quick decrease in inappropriate toileting and a dramatic increase in self-initiated toileting. After the administration of this punishment stopped, the boy continued his self-initiated toileting at the same level, with some minor fluctuations.

During the baseline period subject 4 (see Figure 4) urinated frequently on the floor without wetting his pants. Because of his extreme aversion to edibles, candy (NoR) could not be used as a reinforcer. Instead, verbal praise (AmR) and hugs (AmR) were consistently employed after each incident of other-initiated use of the toilet. At the same time, inappropriate urination was followed by physical violence (VSR) and scolding (AmR). For a few months these procedures had no impact on this child's toileting behavior, but by the 4th month of the training period he began to respond to reinforcers by increasing his use of the toilet. As a result of persistent intervention by the staff, he also began to show some emotional response to staff members.

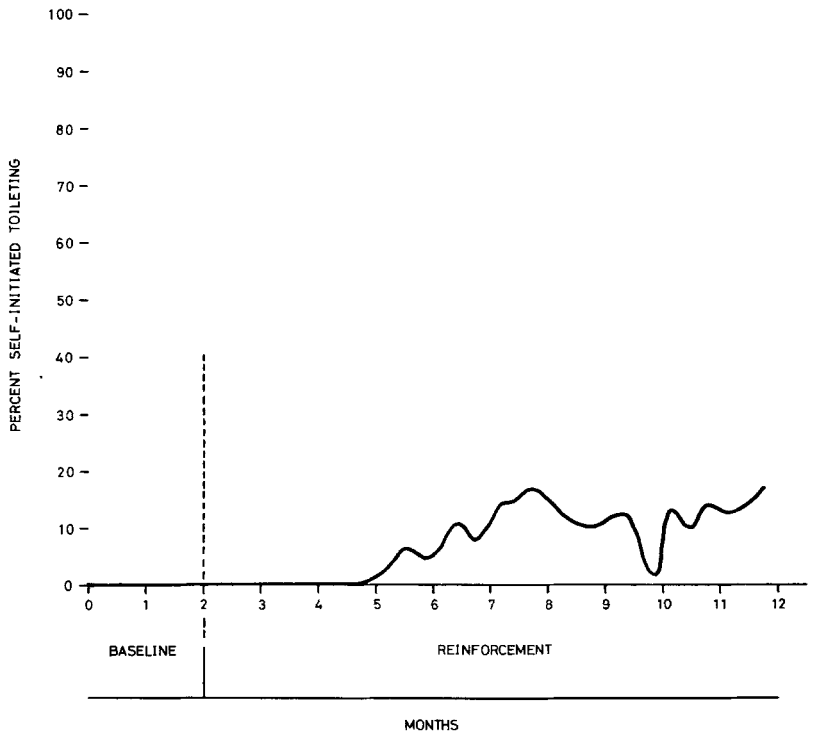

Fig. 4. Appropriate use of the toilet as a percent of total incidents of urination: subject 4.

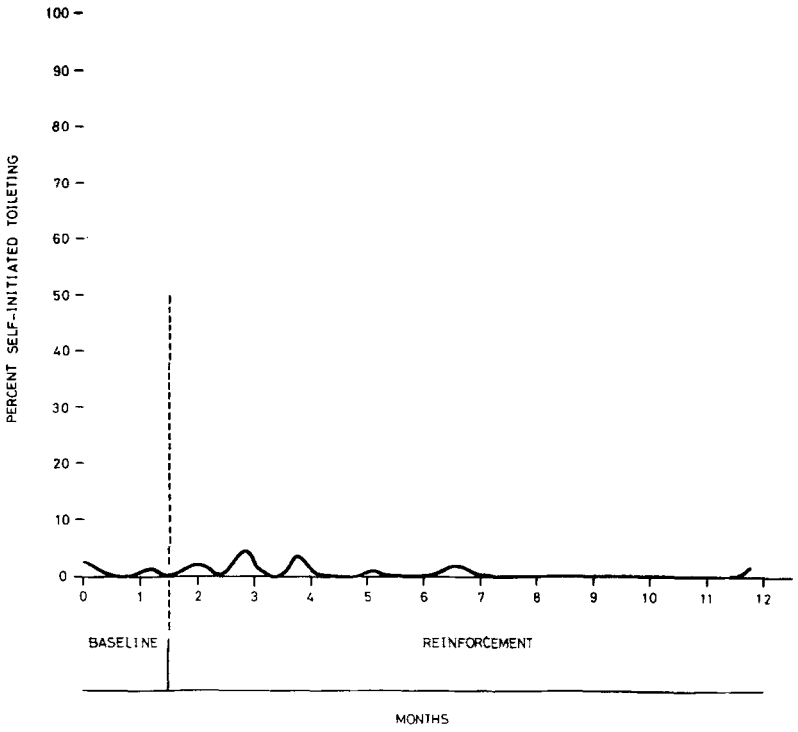

Fig. 5. Appropriate use of the toilet as a percent of total incidents of urination: subject 5.

The baseline behavior of subject 5 (see Figure 5) was marked by urine incontinence and walking around the ward indifferent to wet pants. Sometimes immediately after being taken to the toilet by a nurse and not urinating there he would urinate someplace else. Even when he was brought to the toilet as often as 12 times a day he would still be incontinent. He remained insensitive to all reinforcers, including candy (NoR), verbal praise (NoR), hugs (NoR), verbal reprimands (NoR), and physical punishments (NoR). Although operant conditioning procedures were applied for a period of 12 months, they proved to be completely ineffective in changing this boy's toileting behavior.

DISCUSSION

The outcome of toilet training each autistic child in this study could be evaluated as follows: good for subjects 1 and 3, fair for subjects 2 and 4, and very poor for subject 5. These results would seem to confirm the clinical

judgment that one should not expect the same dramatic results in toilet training autistic children through operant conditioning as Azrin et al. (1971) experienced with profoundly retarded children. None of these children completely eliminated inappropriate urination. Of the two who responded relatively rapidly to the procedures applied, subject 3 had been subjected to a punishment that was not an operant conditioning contingency as it is usually understood, and subject 2's initial increase in appropriate toileting was not maintained consistently except after continued administration of reinforcements over a longer period. Subject 4's fair outcome was achieved only after 12 months of persistent work.

At the same time the study also showed that operant conditioning procedures could be employed effectively where other methods had failed. Even though the rate and degree of increased urination in the toilet by these autistic children might not seem remarkable in comparison with the reported outcomes for profoundly retarded children, when compared with repeated failure of other methods to bring about any increase in appropriate use of the toilet, a 20 to 60% increase is significant. The results of this study indicate that operant conditioning procedures merit further investigation to improve their effectiveness in toilet training autistic children.

The study also provides some indications of the important factors to be investigated.

First, our experience raises questions about the appropriate length of time for measuring baseline urination behavior. Azrin's "three-day, or at the most two-week, baseline measure of incontinence for each subject" (Azrin & Foxx, 1971; Azrin et al., 1971) seems much too short when working with autistic children. It would seem that we should spend more time measuring their baseline record of elimination as well as obtaining clues to determine the most effective positive and negative reinforcers.

Second, Ellis (1963) recommends a 90 day treatment program, including a 30 day observation period, as sufficient for applying operant conditioning procedures to toilet train severely defective patients. Our experience would indicate that a longer training period is needed to toilet train autistic children by means of operant conditioning.

Third, there is the question of what characteristics of autistic children are the best predictors of the efficacy of operant conditioning as a method of toilet training. None of our subjects talked, but two did respond to their names and to simple commands. These two, subjects 1 and 3, had a relatively good outcome in our study. Those subjects who did not even respond to their name or to simple commands had fair or very poor outcomes. Subject 5 was the only child who did not respond to physical pain. All the other children showed a strong avoidance response to physical punishment, although they varied in their responses to different rewards. Subject 5 was

also the only child on whom operant conditioning had no effect, even after 12 months of persistent work. These results would seem to suggest that: (1) even if the child does not talk, the presence of even minimal receptive language would tend to indicate greater probability of success in using operant conditioning to toilet train the child; (2) if the child does not respond to any reinforcer, even physical pain, there is a high probability that operant conditioning will not succeed. A tendency to avoid physical discomfort would seem to be a minimum prerequisite for using operant conditioning to establish a toileting habit.

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