

USE OF TOKENS AS REINFORCERS IN TOILET
REGULATING FOUR PROFOUNDLY RETARDED
ADOLESCENT FEMALES

A Thesis

Presented to
the Department of Psychology
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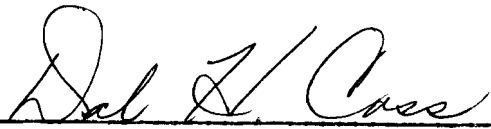
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Chapter 1

INTRODUCTION

Until recently mental institutions primarily have served as custodial care centers for the severely and profoundly retarded. Treatment and care programs were directed from a medical viewpoint and consisted of caring for each resident's primary needs. All ward activities and functions were directed by the section physician and nursing staff. The section psychologist spent the majority of his time performing psychodiagnostic services. Each patient's prognosis was usually bleak and uncertain since his acquisition of self-help skills depended mostly upon his maturation. It was quite common for professional workers to become discontent and pessimistic with their work since so little observable improvement occurred (Kessler, 1966, p. 196).

Public institutions desperately needed a means of training the retarded that would be practical, economical, and efficient. Yet such a procedure had to be simple enough in structure that day care personnel could understand it.

Behavior Modification with Retardates

With the advent of behavior modification a new philosophy concerning the learning ability of the profoundly and severely retarded individual originated. Verplanck (1956) constructed a paradigm to shape human behavior based upon operant principles

(Skinner, 1938). A rapidly accelerating number of articles soon began appearing concerning the use of operant conditioning with retardates (Orlando & Bijou, 1960; Ellis, Barnett, & Pryer, 1960; Orlando, 1961). In a review of the prominent literature, Headrick (1963) suggested various ways behavior modification could assist in programs for the retarded. Baumeister (1967) further elaborated on how the technique could be useful in establishing training programs. He pointed out that not having to communicate verbally with the subject made operant conditioning more valuable in the area of severe retardation than any other form of training.

In the past decade retarded children have been taught various self-help skills by utilizing operant techniques (Hollis & Gorton, 1967, pp. 20-24). Emphasis has been placed in the areas of dressing, bathing, eating, and toilet training. Retarded children previously believed incapable of learning were conditioned to perform these skills in a remarkably short length of time (Roos & Oliver, 1969, pp. 325-330).

Use of Behavior Modification to Toilet Train Retardates

The use of behavior modification to toilet train retardates has become increasingly popular since 1963. The studies discussed below have shown that simple reinforcing appropriate behavior results in increasing such responses. However, not all of the literature (Hundziak, Maurer, & Watson, 1965) suggests that inappropriate behavior decreases as a reciprocal result.

Ellis (1963) proposed a practical paradigm to toilet train retardates based solely on the principle of primary reinforcement.

Ellis based his molar theory on elementary stimulus-response principles. He hypothesized that if the untrained individuals had not suffered severe damage to their central nervous systems, then their incontinency was due to either a deficiency in training or to a lack of ability to associate conventional methods of training with controlling their sphincter muscles. If so, the subjects should be capable of training by following Ellis' design.

He proposed that only trained personnel participate and that they remain assigned to the project permanently. Subjects should be ambulatory and manifest few motor difficulties or handicaps. The patients' daily schedule would be as routinized as possible with a rather restricted bland diet. Toilet responses and other noteworthy behavior were to be carefully recorded by the ward personnel at all times. If the subject emitted an appropriate response, he was to be reinforced immediately. On the other hand, if the subject emitted an inappropriate response, he was to be ignored for fifteen minutes before being changed. Attendants were to be divided into two groups. One group reinforced and the other group cleaned up so that an incontinent subject would not receive attention from those persons that normally reinforced him. Discrimination between these two groups would be facilitated by each group wearing different and highly distinguishable clothing. The patients' toilet behavior would be shaped and the amount and extent of reinforcement would be reduced. Ellis felt that if a rigorous seven day a week schedule was maintained, marked improvement would occur within ninety days.

Hundziak, Maurer, and Watson (1965) ran a comparison study in which twenty-nine severely retarded boys were used to test the

effectiveness of operant conditioning as opposed to conventional training. The subjects were randomly assigned to three groups comprised of a control group which received no consistent training, an operant conditioning group which was reinforced with primary reinforcers for emitting appropriate responses, and a conventional training group which was scolded for soiling and praised for appropriate toilet behavior. The procedures followed were very similar to those Ellis (1963) suggested which are described above. A pre-test, post-test design using the sign test to examine the hypotheses was utilized. The experiment took place over a period slightly greater than a month. The results indicated a significant increase in total toilet behavior of the operant group. As might be expected, the conventional group showed improvement but not significantly. The appropriate urinations of the control group improved significantly but no improvement in defecation was observable. Unlike the studies discussed below (Dayan, 1964; Kimbrell, Luckey, Barbuto, & Love, 1967; Levine & Elliott, 1970), the subjects' inappropriate soiling and wetting showed no decrease. One subject of the group learned to communicate his toilet needs whereas the rest of the subjects went to the toilet only when led. The investigators also found that only an indirect relationship existed between chronological age and toilet training.

In a related study, Raumeister and Klosowski (1965) attempted to increase appropriate toilet behavior of severe retardates by rewarding them with primary reinforcements. Most of the residents' appropriate toilet behavior increased but no mention was made concerning decreasing inappropriate behavior.

Other studies using operant techniques found that inappropriate toilet behavior decreased as a result of reinforcing appropriate behavior. Ellis' paradigm was used by Dayan (1964) with twenty-five severely and profoundly retarded boys. At the start of the program the subjects soiled 1200 pounds of laundry per week. Following Ellis' (1963) basic principles, the subjects were placed on the toilets every two hours. Six months later the amount of laundry soiled was 600 pounds which was the average amount for each unit at the institution. Evidence was also found that defecating and wetting on the floor decreased significantly.

Kimbrell, Luckey, Barbuto, and Love (1967) compared operant techniques to traditional procedures in toilet training severely and profoundly retarded girls. Forty subjects were divided into two groups in order to evaluate the different procedures. As expected, the operant group was using half as much laundry as the conventional group after seven months of training. In addition, the experimental subjects made statistically significant gains in such areas as self-help bathing, dressing, communication, and locomotion.

Levine and Elliott (1970) designed a large scale operant program to determine if cottage attendants could carry out a practical program after receiving a ten hour course in behavior modification. The success of the program was measured by the reduction in the amount of soiled laundry at the end of ten weeks. As in the Dayan (1964) study, the subjects were reinforced with candy and other primary reinforcers for appropriate toilet usage. The amount of soiled linen was reduced to 58 percent of the baseline amount.

Of the literature reviewed, only Giles and Wolf (1966) cited the use of punishment as a procedure used in toilet training retardates. The aversive consequences were used only temporarily when positive reinforcement failed to be effective in modifying inappropriate behavior. Examples of punishment used were termination of meals, time out periods, restraining jackets, and leaving subjects unchanged. These procedures were phased out gradually in favor of positive reinforcement as the subject learned to eliminate appropriately. The use of negative reinforcement (termination of punishment when an appropriate toilet response was emitted) had little effect on the toilet behavior of the subjects.

Response generalization was believed to have occurred to the degree that the reinforcement procedures controlled the toilet behavior. By the end of eight weeks all five subjects had increased in the amount of appropriate emissions and all but one had practically ceased inappropriate eliminations. The authors pointed out that any change of behavior in such a program is significant as it demonstrates that the subjects are capable of learning. They also stated that assigning labels such as "autistic" or "grossly brain damaged" because of a child's low functioning all too often leads to permanent custodial care rather than a search for a simplified training procedure.

Use of Tokens as Secondary Reinforcers

Ayllon and Azrin (1965) have developed a systematic technique of reinforcing desired behavior with tokens which serve as secondary reinforcers. Although their studies have been concerned with long

term psychotic patients, the principles they applied are also applicable to use with the mentally retarded (Sherman and Baer, 1969). Birnbrauer, Bijou, Wolf, and Kidder (1965) demonstrated the effectiveness of using tokens in conjunction with programmed instruction of the retarded in educational situations.

Girardeau and Spradlin (1964) designed and carried out a program to develop self-help skills of severe retardates. The patients were reinforced on various schedules of reinforcement with tokens which were later exchanged for candy, clothing, privileges, and other desired reinforcers. Although this project met with some difficulties because of an abundance of variables, results showed a significant increase of appropriate behavior due to the reinforcement procedures.

Present Study

All of the reviewed studies concerned with toilet training used some form of positive reinforcement in the programs. Only Giles and Wolf (1966) used a means of punishment. They used aversive stimuli to extinguish independent variables which interfered with the training. The present study proposed to investigate the consequences of both reinforcement and reinforcement and punishment combined. It should be noted that the use of the term punishment in this study refers only to deprivation of tokens, not the application of aversive stimuli.

The goal of the program was twofold. Encouraging appropriate toilet behavior was to be attempted first by reinforcing it with tokens that were exchangeable for primary and social reinforcements.

This was to be accomplished in the reinforcement-training phase. Second, discouraging inappropriate eliminative behavior was to be attempted by depriving a subject of previously earned tokens if wetting or soiling occurred. This was to be accomplished in the conjunctive reinforcement phase which was a combined fixed-ratio, fixed-interval schedule of reinforcement.

Of particular importance to this research was learning if profoundly retarded adolescent girls were capable of being toilet regulated using a system of secondary reinforcement. Not only does this paradigm require that the subjects learn the value of tokens, but it also requires that they learn to associate tokens with using the toilet appropriately.

Also of interest was the practicality of the procedure in an institutional setting. In order to have any utility, the child development personnel must be able to understand the procedures and follow through with them as well as performing their regular duties.

Statement of the Hypotheses

The following null hypotheses were evaluated to determine the effectiveness of the experimental procedures.

1. The proportion of appropriate urinations during the final week of the reinforcement-training phase will not be significantly greater than the proportion of appropriate urinations during the base rate phase.
2. The proportion of appropriate defecations during the final week of the reinforcement-training phase will

- not be significantly greater than the proportion of appropriate defecations during the base rate phase.
3. The proportion of appropriate urinations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate urinations during the final week of the reinforcement-training phase.
 4. The proportion of appropriate defecations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate defecations during the final week of the reinforcement-training phase.
 5. The proportion of appropriate urinations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate urinations during the base rate phase.
 6. The proportion of appropriate defecations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate defecations during the base rate phase.

Chapter 2

METHODS AND PROCEDURE

Subjects

Four profoundly retarded female in-patients served as subjects in this study. These patients were selected because they met the following criteria. First, they fell within the severe category in regard to adaptive behavior in that they were capable of responding to environmental stimuli but required constant care for their basic self-help needs. Second, none of these subjects had been toilet trained. Third, they were ambulatory and their vision was within normal limits. Fourth, they had never been involved in a token-reward program.

The chronological ages of the subjects were thirteen, sixteen, seventeen, and nineteen years. The social ages of the subjects were 1.3, 1.3, 1.3, and 1.8, respectively as measured by the Vineland Social Maturity Scale. The causes of retardation were unknown disease, phenylketonuria, meningitis, and microcephaly, respectively.

Apparatus

Necessary equipment included six sets of thirty-six plastic tokens used as secondary reinforcers, four identification chains which were worn by the subjects to hold their tokens, containers for depositing the tokens, an egg timer used by the workers to

measure the delay intervals, a stop watch used by the workers in teaching the subjects the value of tokens, and a supply of candy, ice cream, and other primary reinforcers which were exchanged for tokens.

Procedure

The procedures incorporated in the study were divided into the following four phases to assist statistical analysis: base rate and token training, reinforcement-training, reinforcement and deprivation of reinforcement training, and conjunctive reinforcement. The study originally included a multiple base rate design to demonstrate that the reinforcement procedures were responsible for improvement of toilet behavior. Each subject was introduced to the reinforcement-training phase at a one week interval so that she could serve as a control to the others. During this phase it was decided that such a design was not necessitated. Thus, it was subsequently eliminated.

The base rate phase consisted of an adjustment period which lasted three weeks and a token training period which concluded when a subject learned the value of tokens. During the adjustment period the subjects' daily schedule was modified to rigid experimental conditions. Their diets were restricted to bland meals in order to make the primary reinforcers more desirable. Rigorous meal and bedtime schedules were followed in order to maintain schedule consistency in the program. Subjects seldom were allowed to leave the unit unless they were in need of medical attention. The subjects were taken to the toilet five times a day and allowed to remain

for ten minutes. No verbal or other form of reinforcement was given if a subject made an appropriate response.

At the conclusion of the first three weeks the subjects were taught the value of tokens by requiring them to place nine tokens into a cylindrical container. Initially, each time a token was dropped, the subject was reinforced with food and praise. As the child improved at this task a fixed-ratio schedule was introduced until she was able to place the tokens in the can at a mean time of ten seconds per token. As soon as a subject demonstrated improvement in this procedure she was given the tokens in the toilet area regardless of her performance, led to the token room where she would deposit them, and then taken to the canteen and reinforced.

During this period of the phase the subjects were allowed to get up from the toilets as soon as they had eliminated appropriately in order to test any effect of negative reinforcement. If being required to sit on the toilets was a punisher, then being allowed to leave the toilet area after making a response should have resulted in an increase of such responses. Since no difference in results could be detected in this and the initial three weeks, it was determined that such effect was negligible. Thus, both phases were used to serve as base rate.

The reinforcement-training phase consisted of making reinforcement contingent upon appropriate toilet behavior at any one of three toilet sessions. If the subject eliminated appropriately, she was given the tokens and led to the front of the unit where she subsequently deposited them. She was then taken to the canteen and reinforced with food.

This procedure was followed by a reinforcement and deprivation of reinforcement phase designed to discourage inappropriate eliminations. After the subject received tokens for appropriate behavior, she was obliged to wait a short period of time before she was allowed to deposit her tokens. If she then soiled or wet herself during this interval her tokens were removed and she was not allowed to go to the canteen. The delay interval was expanded to as long as four hours requiring the subjects to remain continent in order to be reinforced.

The final phase introduced in the program was a conjunctive schedule of reinforcement. Each time a subject defecated or urinated she was given one set of three tokens which she accumulated until 3:00 P.M. each day. If at that time a subject had enough sets of tokens to receive reinforcement, she was taken to the canteen by a volunteer worker. The amount of sets required for each individual varied according to her toilet regulation progress. If she did not have the required amount of sets, she was allowed to keep them and collect more for appropriate behavior in hopes of going the following day. If a subject had more than enough sets, she was allowed to save the remainder.

The subjects were punished for inappropriate behavior by forfeiting one set for each occurrence during her waking hours. All toilet periods were made contingency sessions in this phase so that a subject could earn five sets a day.

Chapter 3

RESULTS

A non-parametric statistical analysis was used to evaluate the hypotheses since the nature of the data was frequency of responses. The data used to determine the significance of each hypothesis was cast into a two-by-two table. One dichotomous variable was whether eliminative behavior was appropriate or not. The other variable was a comparison of one phase of the project as opposed to another.

To assess the validity of each hypothesis for the group, the chi-square test of significance of a set of results (Edwards, 1956) was applied to the exact probability of each individual's results associated with each contingency. When the results were large enough to produce an expected frequency of five or more responses in each cell of the table, the chi-square test for two independent samples was used (Siegel, 1956, pp. 104-110). Since the hypotheses were one-tailed, the value of each chi-square was converted to a z score by taking the square root of the chi-square value. If the table was in the direction predicted by the hypothesis, z was assigned a positive value. If instead it came out in the opposite direction of that predicted, z was assigned a negative value. The probability of obtaining a z score of this size or larger was obtained from a table of a normal curve.

When any cell of a table contained less than five frequencies, the Fisher exact probability test was used (Siegel, 1956, pp. 96-104). When using this method, the exact probability of obtaining a particular table and tables more in favor of the hypothesis were calculated. Each set of the four probabilities was subjected to the chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393).

Hypothesis 1

The proportion of appropriate urinations during the final week of the reinforcement-training phase will not be significantly greater than the proportion of appropriate urinations during the base rate phase. In order to evaluate if reinforcing appropriate urinations increased such behavior significantly, it was necessary to compare the base rate against the reinforcement-training phase. Since the base rate should have remained fairly constant with only minor fluctuations occurring due to independent variables, the entire results of each subject during this phase were used. Since each subject's results were expected to improve each week due to better association between reinforcement and behavior, only the last week of data of the reinforcement-training phase was used as obtained frequencies to compare against the base rate.

The results of the chi-square test for two independent samples (Siegel, 1956, pp. 104-110) performed on each subject are presented in Table 1. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) rejected the null hypothesis ($\chi^2 = 17.23$, $df = 8$, $P < .05$).

Table 1

Summary of Results Pertaining to Hypothesis 1

<u>S</u>	<u>χ^2</u>	<u>df</u>	<u>P</u>
1	.216	1	.32
2	4.548	1	.02
3	3.356	1	.04
4	.272	1	.70

Hypothesis 2

The proportion of appropriate defecations during the final week of the reinforcement-training phase will not be significantly greater than the proportion of appropriate defecations during the base rate phase. In order to evaluate if reinforcing appropriate defecations increased such behavior significantly, it was necessary to compare the base rate against the reinforcement-training phase. Since the base rate should have remained fairly constant with only minor fluctuations occurring due to independent variables, the entire results of each subject during this phase were used. Since each subject's results were expected to improve each week

due to better association between reinforcement and behavior, only the last week of data of the reinforcement-training phase was used as obtained frequencies to compare against the base rate.

The results of the Fisher exact probability test (Siegel, 1956, pp. 96-104) performed on each subject are presented in Table 2. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) accepted the null hypothesis ($\chi^2 = 10.60$, $df = 8$, $P < .30$).

Table 2

Summary of Results Pertaining to Hypothesis 2

<u>S</u>	<u>df</u>	<u>P</u>
1	1	.59
2	1	.02
3	1	.56
4	1	.75

Hypothesis 3

The proportion of appropriate urinations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate urinations during the final week of the reinforcement-training phase. In order to evaluate if punishing inappropriate urinations decreased such behavior significantly, it was necessary to compare the reinforcement-training phase against the final conjunctive schedule of reinforcement

phase. Since gradual improvement of each subject was expected throughout both phases only the last week of each phase was used in the analysis.

The results of the chi-square test for two independent samples (Siegel, 1956, pp. 104-110) performed on each subject are presented in Table 3. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) accepted the null hypothesis ($\chi^2 = 6.76$, $df = 8$, $P < .70$).

Table 3

Summary of Results Pertaining to Hypothesis 3

<u>S</u>	<u>χ^2</u>	<u>df</u>	<u>P</u>
1	.005	1	.47
2	10.812	1	1.00
3	.063	1	.40
4	.863	1	.18

Hypothesis 4

The proportion of appropriate defecations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate defecations during the final week of the reinforcement-training phase. In order to evaluate if punishing inappropriate defecations decreased such behavior significantly, it was necessary to compare the reinforcement-training phase against the final conjunctive schedule of reinforcement

phase. Since gradual improvement by each subject was expected throughout both phases only the last week of each phase was used in the analysis.

The results of the Fisher exact probability test (Siegel, 1956, pp. 96-104) performed on each subject are presented in Table 4. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) accepted the null hypothesis ($\chi^2 = 2.85$, $df = 8$, $P < .95$).

Table 4

Summary of Results Pertaining to Hypothesis 4

<u>S</u>	<u>df</u>	<u>P</u>
1	1	1.00
2	1	.80
3	1	.30
4	1	1.00

Hypothesis 5

The proportion of appropriate urinations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate urinations during the base rate phase. In order to evaluate if the entire procedure improved the subjects' urinations, it was necessary to compare the base rate against the conjunctive reinforcement phase. Since the base rate should have remained fairly constant with only

minor fluctuations occurring due to independent variables, the entire results of each subject during this phase were used. Since each subject's results were expected to improve each week due to a better association of reinforcement and deprivation of reinforcement with her behavior, only the last week of data of the conjunctive reinforcement phase was used to compare against the base rate phase.

The results of the chi-square test for two independent samples (Siegel, 1956, pp. 104-110) performed on each subject are presented in Table 5. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) accepted the null hypothesis ($\chi^2 = 14.59$, $df = 8$, $P < .10$).

Table 5
Summary of Results Pertaining to Hypothesis 5

<u>S</u>	<u>χ^2</u>	<u>df</u>	<u>P</u>
1	1.727	1	.10
2	4.856	1	1.00
3	3.570	1	.03
4	.329	1	.28

Hypothesis 6

The proportion of appropriate defecations during the final week of the conjunctive reinforcement phase will not be significantly greater than the proportion of appropriate defecations during the

base rate phase. In order to evaluate if the entire procedure improved the subjects' defecations, it was necessary to compare the base rate against the conjunctive reinforcement phase. Since the base rate should have remained fairly constant with only minor fluctuations occurring due to independent variables, the entire results of each subject during this phase were used. Since each subject's results were expected to improve each week due to a better association of reinforcement and deprivation of reinforcement with her behavior, only the last week of data of the conjunctive reinforcement phase was used to compare against the base rate phase.

The results of the Fisher exact probability test (Siegel, 1956, pp. 96-104) performed on each subject are presented in Table 6. The chi-square test of significance of a set of results (Edwards, 1956, pp. 391-393) accepted the null hypothesis ($\chi^2 = 6.22$, $df = 8$, $P < .70$).

Table 6

Summary of Results Pertaining to Hypothesis 6

<u>S</u>	<u>df</u>	<u>P</u>
1	1	.44
2	1	.84
3	1	.21
4	1	.57

Chapter 4

DISCUSSION

Reinforcing appropriate urination responses resulted in a significant proportionate increase of that behavior. This finding is consistent with the findings of Hundziak, Maurer, and Watson (1965) and Baumeister and Klosowski (1965). Reinforcing appropriate bowel movements did not result in improvement of behavior, however. Part of the reason for this may have been due to the infrequency of several of the subjects to emit enough responses for the reinforcement to have been effective. An intensified bowel training program such as that implemented by Giles and Wolf (1966) was considered as a means of increasing the accuracy of responses. However, to do so would have delayed the subsequent phases. Since the limited time of the project was of prime concern, the reinforcement and reinforcement-deprivation phase was entered. It was hoped that by proceeding with the next phase appropriate bowel movements would increase as a consequence of generalization from urination training.

No significant proportionate decrease of either soiling or wetting occurred as a combined result of reinforcing subjects with tokens for appropriate behavior and depriving them of tokens for inappropriate behavior rather than only reinforcing appropriate behavior. Two possible explanations may account for the lack of

improvement. The punishment might not have had any inhibitive effect on the subjects, or the tokens may have lost their reinforcing quality as longer intervals separated the presentation of tokens from the exchange for backup reinforcers. The latter reason appears to be more probable from observations of the subjects. The subject whose toilet behavior worsened during this phase manifested an extremely low attention span. Before she ever lost any tokens, her appropriate urinations decreased significantly. This apparently occurred because the tokens were no longer reinforcing to her after the delay intervals had been lengthened. Appropriate urinations of subjects with longer attention spans increased after they had been punished for inappropriate behavior following token reinforcement.

The frequency of bowel movements had not increased by the last week of the final phase of the project. Neither had the subjects' appropriate defecations improved significantly. Thus, the subjects apparently did not generalize bowel control training from bladder control training as was hoped. This finding was consistent with that of Giles and Wolf (1966) who found that the two processes were totally separate in control of functioning.

The application of the entire procedures did not result in significant improvement of either appropriate urinations or defecations. By the time the conjunctive reinforcement phase was entered, the subjects with longer attention spans were urinating appropriately most of the time. The subject with the lowest attention span had regressed to a point below her base rate behavior. Therefore, it appeared that the procedures might have been more effective if

they were used with higher functioning individuals. Future research is necessary to substantiate this theory.

No significant modification of bowel movements occurred during the project. The tokens were never effective in increasing the number of appropriate responses. Therefore, their effectiveness as reinforcers in this area was not established. Usually when a subject had an appropriate bowel movement, she also urinated. Thus, the subjects may have associated the tokens with the urinations rather than defecations. In future training projects, shaping eliminative behavior individually might insure more success than attempting to shape both simultaneously (Giles & Wolf, 1966). When a subject demonstrates increased proficiency at one behavior, then the second should be shaped.

Gardner (1969) has pointed out many violations of refined experimental procedures have occurred in earlier operant studies. In order to carry out this study in a practical setting, it was necessary to deviate from the pure research paradigm that Gardner suggests.

The subjects were not chosen at random but instead were selected from the roster of one residential unit according to criteria listed in Chapter 2. Therefore no claims could be made pertaining to toilet training any profound retardate but instead the findings must be restricted only to those type of individuals selected. Only four subjects were selected to participate in the study out of the eighteen girls residing there. This allowed a comprehensive examination of each subject's progress but restricted generalizations of the results.

Several practical difficulties somewhat limited the effectiveness of the program. The child development personnel included only those persons who previously had been assigned to the unit. Only three of the twelve workers had participated in prior behavior modification studies, and only one of these had any formal course in it. Thus, the majority of the workers had to be taught the techniques of operant conditioning as well as the underlying rationale during the training procedures.

Occasionally sickness and vacations required the participation of other workers from different units and the rapid briefing they received created difficulties in adhering to strict operant procedures. Midway through the study an epidemic of shigela broke out and isolation procedures were maintained throughout the institute. As a result workers from the experimental unit frequently were transferred temporarily to assist other units often leaving only two workers to perform all duties and carry out experimental procedures. Other ongoing programs often demanded the attention of the child development personnel. Because of this, keeping to the schedules in the program was not always possible.

Chapter 5

SUMMARY

Previous research (Hundziak, Maurer, & Watson, 1965; Baumeister & Klosowski, 1965; Roos & Oliver, 1969) has demonstrated the effectiveness of using primary reinforcers to increase appropriate toilet behavior. The purpose of this study was to determine if appropriate toilet behavior increased as a result of token reinforcement and inappropriate toilet behavior decreased as a result of token reinforcement and deprivation. Four profoundly retarded adolescent females served as subjects in a toilet training program.

The program consisted of four phases: base rate and token training, reinforcement-training, reinforcement and deprivation of reinforcement training, and conjunctive reinforcement. The subjects were taught the value of tokens as secondary reinforcers while base rate data was collected. During the reinforcement-training phase earning of tokens was made contingent on appropriate toilet behavior at any one of three training sessions. The tokens were immediately exchanged for food and walks off the unit.

When the reinforcement and deprivation of reinforcement phase was entered, gradually lengthened delay intervals were introduced between the presentation of tokens and the exchange of tokens for primary reinforcers. If a subject became incontinent during the interval, her tokens were removed. After the intervals had been

extended to four hours, a conjunctive schedule of reinforcement was begun. Each subject was required to accumulate a certain number of sets of tokens in a twenty-four hour period in order to receive backup reinforcers. If a subject had not acquired a sufficient amount of tokens, she was allowed to retain those that she had earned in hope of earning enough for the following day.

The accumulated data was evaluated by using the chi-square test of significance of a set of results (Edwards, 1956). Results indicated that reinforcing subjects for appropriate toilet behavior increased the number of appropriate urinations but had no effect on bowel control. Since urinations occurred more frequently than defecations, associating them with tokens was easier. When the delay intervals were introduced and subsequently lengthened, the reinforcing quality of the tokens decreased with one subject who had a short attention span. Thus the proportionate amount of appropriate urinations decreased. Inappropriate urinations of subjects who had longer attention spans decreased as a result of the combined reinforcement and deprivation of reinforcement procedures. Thus, the entire procedure might have been more effective if it had been used with higher functioning individuals.

The proportion of appropriate defecations never increased throughout the project. Since tokens were never associated as reinforcers with appropriate defecations, depriving the subjects of them as a means of punishment was not effective. In future training projects, shaping eliminative behavior individually might insure more success than attempting to shape both simultaneously (Giles & Wolf, 1966). When a subject demonstrates increased

proficiency at one behavior, then the second should be shaped.

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