Reinforcement of Sitting Behavior in Retardates in an Institutional Setting

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REINFORCEMENT OF SITTING BEHAVIOR IN RETARDATES
IN AN INSTITUTIONAL SETTING

by

Robert James Bonner

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Faculty of the School of Graduate
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of the
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Robert James Bonner
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INTRODUCTION

The behavior of patients in residential institutions has been effectively controlled in recent years through the application of operant conditioning techniques. Originally developed in the animal laboratory, these techniques have been similarly used with human subjects to shape and maintain new behavior, strengthen currently existing appropriate behavior, and to eliminate or modify inappropriate behavior. In residential institutions, much of the research has been concerned with shaping new responses to replace behavior which is harmful, maladaptive, or otherwise disruptive.

In a study with hospitalized psychiatric patients, Ayllon and Michael (1959) employed the nursing staff as "behavioral engineers" to control the violent fighting behavior of a patient through social reinforcement of an appropriate class of competing responses which included lying, squatting, or sitting on the floor. The psychotic verbal behavior of another patient was extinguished by withholding attention in the presence of this response, while appropriate or "sensible" verbal behavior was reinforced with attention. In a similar study (Ayllon and Haughton, 1962) self-feeding was established in a group of chronic schizophrenics, many of whom had previously received attention (coaxing, persuading, and spoonfeeding) for refusing to eat. When all attention was withheld at mealtime and a criterion time limit was placed on entering the dining room, beyond which
the meal was missed, all patients learned to eat without assistance and ate between 70 and 90 percent of all meals. Later, admission to the dining room was made contingent upon the performance of both a motor response and an appropriate social response, thus demonstrating that food had become an effective reinforcer for controlling the behavior of these patients. Wolf, et al., (1964) successfully modified the behavior problems of a hospitalized autistic child using withdrawal of attention (being put in his room) to extinguish such behaviors as temper tantrums and throwing eyeglasses. Food reinforcers were used for training the wearing of glasses and to establish imitative verbal behavior (mimicking). Although each of these studies was designed to modify a specific behavior or group of behaviors, the applicability of these techniques to other situations is evident.

Recently, systematic contingency programs, often referred to as token reward programs or token economies, have been established in many institutions for the purpose of shaping and maintaining the behavior of all patients on an entire ward. Such programs combine the presentation of tokens (usually checkers, poker chips or small metal disks) in set ratios with primary reinforcers such as food and drinks as well as other previously established conditioned reinforcers such as trinkets, toys, jewelry and grooming aids, to reinforce a wide variety of appropriate behaviors. According to Skinner (1965), a token is tangible and a form of conditioned generalized reinforcer, which acquires its reinforcing power by initially being paired with, and later exchanged for more than one type of primary reinforcer.
Because they may be intermittently exchanged for a variety of primary reinforcers, tokens are not dependent upon momentary states of deprivation. Consequently, they maintain stable rates of behavior over considerable time periods without the effect of satiation which often occurs when using a large density of primary reinforcers. This attribute makes a token economy an especially feasible project in an institutional setting where the behavior of many patients must be systematically controlled over long periods of time.

Token economies have been successfully used with both institutionalized retardates and patients in mental hospitals for shaping and maintaining behavior in the major areas of self-care skills, cooperative social behavior (group play-activities), appropriate verbal behavior, and performance of specific work tasks such as making beds, sweeping floors, and running errands. Ayllon and Azrin (1965) were the first investigators to establish and determine the effectiveness of tokens in an institutional ward setting at the Anna State Hospital in Illinois. Based on this research, Girardeau and Spradlin (1964) set up a token economy in a cottage of moderately and severely retarded adolescent girls at the Parsons (Kansas) State Hospital and Training Center. After a point system evaluation of the baseline level of each patient on a list of specific behaviors, tokens were presented on an individual basis for successive approximations to desired terminal behaviors. Emphasis was thus placed on qualitative as well as quantitative improvement of behavior. Initially, tokens could be immediately exchanged for a variety of items from the ward...
store. However, as terminal behaviors were individually shaped, the time between token presentation and exchange was gradually lengthened. At the end of four and one-half months, there was an average increase of 16 points per girl over baseline levels on the behavioral checklist. This program was later expanded (Lent, 1965) to include girls ranging in age from 8 to 21 years. Personal, social, domestic, and occupational skills were emphasized with the ultimate goal of gradually returning many of the patients to the outside community as productive, partially self-sufficient citizens.

When release from an institution is not possible, it is desirable to create an environment which approximates the outside community as closely as possible. Sidman (1965) established a token economy, on a larger scale but similar to that of Girardeau and Spradlin, with 72 severely and profoundly retarded boys at the Fernald State School in Massachusetts. In addition to self-care, social skills, and housekeeping tasks, programs for self-feeding, dressing, verbal acquisition and toilet training were also established and maintained by a staff of twelve "volunteer" workers, each assigned to work intensively with two or three children in the areas of greatest individual need. Tokens were of three different colors; red for off-the-ward workers, yellow for token stealers, and blue for general distribution on the ward. The method used was that of reinforcing a response which was already in the patient's repertoire and gradually introducing new responses through shaping, thus minimizing failures while maximizing progress. The ward attendant staff was an integral part of the program.
and maintained the training procedures at times when the volunteer staff was not present. A similar program was established by Atthowe and Krasner (1968) with chronic schizophrenics and brain damaged patients on an 86-bed ward of the Veterans Administration Hospital at Palo Alto, California. Tokens were presented for performing desirable behaviors in relation to self-care skills, attending behaviors, social behavior, and the demonstration of responsibility. These tokens could be exchanged for passes to the movies, cigarettes, and money. Social approval of appropriate behavior was also given, especially during behavior shaping, while inappropriate behavior was not attended to. At the end of one year after initiating the token program, over 90% of the patients had meaningfully participated, and there was a significant increase in the performance of those behaviors which were reinforced.

The studies which have been briefly described above are only intended to be representative of the many token reinforcement programs which are currently being applied and improved in various institutional settings. The present study is a token reinforced sitting program which was conducted at the Fort Custer State Home in Augusta, Michigan, as a component part of an ongoing token economy established by Nelson and Whaley (1967), on a ward of severely retarded female patients. Originally organized as a diaper folding industry, this program was later expanded to include teeth brushing and hand and face washing. Approximately one half of the patients, most of them older diaper folders, were recently transferred to other wards and
were replaced by younger patients who had had little, if any, behavior shaping. In addition, many of these new patients engaged in a variety of disruptive behaviors such as persistent running, jumping, climbing on tables, and rocking. The token program described in this study was designed to replace these disruptive behaviors with sitting behavior at desired times during the day, through the establishment of tokens as effective reinforcers for appropriate sitting behavior.
METHOD

Subjects

The subjects were 36 female patients classified as either severely or profoundly retarded ranging in chronological age from 11 to 23 years. All of the patients could walk and approximately 46% had some degree of verbalization.

Apparatus

The only piece of technical equipment used in this study was a Gerbrands model PA variable interval programmer. This apparatus was equipped with any one of five variable interval tapes (16 mm movie film) with average intervals of 2.0, 2.5, 3.0, 3.5, and 4.0 minutes. Other materials used, including black checkers which served as tokens, were M&M's and Froot Loops, used as primary of back-up reinforcers for tokens. Canvas token bags were worn by the program workers. A sign with the words "QUIET TIME" in 6-inch orange letters on a 30 x 36-inch black background was constructed to hang on the front wall of the ward day room. This sign was to serve as a discriminative stimulus for sitting quietly. A "time out" box, 60 inches high and 33 x 40 inches at the base was constructed in a back corner of the ward day room. It was made of 3/4 inch plywood nailed to a frame of two-by-fours, and had steel reinforced corners, 1 1/2 inch panel door and a steel screen top. There were enough benches and chairs on the
ward to seat the 36 patients, with no more than four patients per bench and one patient per chair.

Procedure

Prior to the present study, an attendant imposed procedure called "Quiet Time" had been the method of maintaining order on the ward at desired times during the day. This procedure consisted of the attendant giving a verbal command to the entire group such as, "It's quiet time, girls, everyone sit down on a chair and keep quiet." Those patients who did not respond appropriately to the verbal instruction were individually instructed to sit down and/or taken by the arm and placed on a chair. Once everyone was sitting on a chair, little attention was paid to whether patients got out of their chairs, sat on the floor, laid on the tables or walked around the room, as long as relative quiet was maintained. Often the attendant did other work and did not verbally or physically attend to a patient unless she was noticeably noisy or physically disruptive. Such patients were again told to be quiet or were physically placed on chairs accompanied by threats of physical punishment for further disruptive behavior.

Baseline

For the present study, baseline data were collected by two observers over a seven day period on the number of patients not sitting on chairs or benches during quiet time. One of the ward attendants was instructed to institute a quiet time session for a 30-minute period.
in the morning and again in the afternoon. During these sessions at five-minute intervals, the two observers counted the number of patients who were out of their chairs. The numerical data were expressed in percentages for each five-minute sampling interval as well as for the total thirty-minute session. The formula for computing these percentages was:

\[
\frac{\text{number of patients out of chairs}}{\text{total number of patients on ward}} \times 100.
\]

Phase I: Establishment of Tokens for Sitting.

The systematic sitting program was begun by the experimenter and seven co-workers (including one attendant) who served as behavioral technicians. One morning and one afternoon session, each 30 minutes in length, were held each day. Chairs and benches were arranged in a semicircle and the "QUIET TIME" sign was hung on the front wall of the ward day room. The patients were given the verbal instruction, "It's quiet time, girls, sit down on a chair and be very quiet." Those patients who did not respond appropriately to the instruction were taken by the arm and placed on a chair. Care was taken so that there were no more than four patients per bench and one patient per chair.

Each of the eight technicians wore a canvas token bag around his waist and worked with a small group of four or five patients. Initially, any sitting position was acceptable. A token was
presented to one patient in the group at a time and was immediately exchanged for an M&M candy. After several presentations of this type to each patient, a token was presented to each consecutive member of the group and was exchanged in the same order, thus extending slightly the time interval during which the token had to be held before it could be exchanged for candy. This time interval was gradually extended from several seconds to approximately 1/2 to 2 minutes over the initial 16 sessions. The technicians were instructed to give social reinforcement (praise, such as, "You're holding your token, Linda, that's a good girl.", accompanied by a pat on the head or shoulder) to those patients in their groups who held their tokens and exchanged them when requested to do so. Praise was also given for sitting quietly. Every two or three minutes one of the technicians stood by the "QUIET TIME" sign, pointed to it, and asked the patients to look at the sign and be very quiet.

If a patient got out of her chair, the token was taken away and she was instructed to return and sit down. Any patient not returning when instructed to do so was not attended to until she did return. The number of technicians was gradually decreased from eight to three during the initial 16 sessions, with the remaining technicians working with successively larger groups of patients. The three technicians who remained to program the completion of the study included the experimenter, one co-worker, and one ward attendant.
Phase II: Extension of the Presentation-exchange Interval.

The procedure used in the second phase of the sitting program was similar to that followed in the first phase. During the second phase 21 morning and 21 afternoon sessions, each 30 minutes in length, were held. In order to place all of the patients on the same schedule of reinforcement, a variable interval programmer attached to a buzzer was used to alternately signal the presentation and exchange of tokens. For the first 12 sessions a variable interval tape averaging 2 minutes between signals was used. Each 10 times thereafter the length of the interval between signals was increased an average of 30 seconds over the immediately preceding tape.

A set of procedural instructions (see Appendix A) was given to each of the technicians. They were instructed to differentially reinforce the desired topography of sitting upright in the chair with feet on or near the floor. When the buzzer sounded, tokens were given first to those patients who sat appropriately without being told. Verbal prompts such as, "Sit up straight in your chair.," or "Put your feet down." were then given individually to those in each group who were sitting inappropriately, and a token was presented immediately when the patient assumed an appropriate sitting position. Tokens were exchanged in the same manner as in Phase I. Social reinforcement (praise, such as, "You're sitting up very straight, Kathy, that's a good girl.") was given during token presentation and exchange, to those patients who sat appropriately. As in the first phase, the patients were instructed to look at the sign every two or three minutes.
Tokens were taken away from those patients who got out of their chairs and from those who made excessive noise such as screaming, crying and yelling. Beginning with session 47, tokens were also taken away from patients who sat inappropriately, as all patients had demonstrated appropriate sitting behavior without prompting by this time. If a patient made a continuous disturbance such as prolonged hitting, kicking, screaming or running around the room after losing her token, she was removed from the sitting program and placed in the ward "time out" box for a minimum period of two buzzer signals. The procedure of withdrawal of or time out from positive reinforcement for the purpose of punishing a response has been demonstrated by Ferster and Appel (1960) and Baer (1961). Data on the number of patients getting out of their seats during a 30-minute session were collected using the 5-minute time sampling technique employed to collect baseline data. The numerical data were expressed in percentages for each 30-minute session.

Phase III: Stimulus Reversal and Reinstatement of Reinforced Sitting.

In order to determine the relative effect which the primary reinforcer (candy) and the conditioned reinforcers (tokens and praise) had upon sitting behavior, a reversal of the reinforcement conditions was instituted. This procedure, which comprised sessions 57 through 60, consisted of alternately presenting and exchanging tokens on a 3.5 minute variable interval schedule to all patients not sitting on chairs or benches. The reinforcement conditions were, in effect, reversed.

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from those in the second phase. A set of reversal procedure instructions (see Appendix B) was given to each of the technicians. Any patient who sat down on a chair or bench had her token taken away and was instructed not to sit down. The "QUIET TIME" sign was not displayed during this phase. Data on the number of patients sitting down on chairs or benches during a 30-minute session were collected, again using the 5-minute time sampling technique previously employed. The frequency data were transformed into percentages for each 30-minute session.

After three sessions employing several procedures, the procedure used in the second phase was reinstated. A variable interval tape averaging 4 minutes was used to signal the alternate presentation and exchange of tokens for appropriate sitting behavior. No social reinforcement was given in this phase as had been done in the second phase, although attention was again called to the "QUIET TIME" sign. Twelve 30-minute sessions were held and data were collected using the time sampling procedure.
RESULTS

The results of the sitting program (except for treatment phase I during which tokens were being established as reinforcers and frequency data were not collected) are presented graphically in Figure 1. Each point on the frequency polygon represents the group percentage of inappropriate responses (getting out of chairs) during one 30-minute session. Alternate points designate morning and afternoon sessions. The percentage for each session was computed from frequency data collected at six 5-minute sampling intervals.

During baseline, which consisted of sessions 1 to 14 in Figure 1, the incidence of inappropriate responses per session varied from 36 (17.6%) to 113 (53.8%). The mean percentage for all 14 sessions was 37.5% with very little difference between morning and afternoon sessions (36.1% and 38.8% respectively). The incidence of inappropriate responses which occurred during any single sampling interval varied from 3 (8.8%) to 21 (68.8%).

Sessions 15 to 56 in Figure 1 comprise treatment phase II during which tokens were presented and exchanged on increasing variable interval schedules. Each number above the abscissa represents the average interval length in minutes which was used in each successive block of sessions. A marked decrease in the frequency of inappropriate responses compared with baseline levels was observed in this phase. The incidence of inappropriate responses per session varied from 0 to 13.
(6.2%) with a mean percentage of 1.8% for all 42 sessions. The greatest number of responses which occurred during any single sampling interval was four (11.4%). In this phase, there were 21 incidents of patients being placed in the ward "time out" box for continuous disruptive behavior. Fourteen of these incidents occurred during the first 12 sessions and the remaining seven incidents occurred throughout the last 30 sessions.

As expected, there was a substantial increase in the number of inappropriate responses which occurred during the stimulus reversal (sessions 57 - 60 in Figure 1). The incidence of inappropriate responses per session varied from 105 (45.7%) to 182 (89.2%) with a mean percentage of 75.1%. The incidence of inappropriate responses which occurred during any single sampling interval varied from 11 (35.5%) during session 57 to 32 (94.1%) during session 59.

With the reinstatement of the treatment conditions using a 4.0 minute average variable interval reinforcement schedule, the frequency of inappropriate responses decreased to an average of 0.5% for the twelve sessions which comprised this phase. The incidence of inappropriate responses per session varied from 0 to 4 (2.2%) and the greatest number of responses which occurred during any single sampling interval was 2 (6.7%). The last five sessions had no inappropriate responses. The program was unexpectedly terminated after the 12th session due to an outbreak of shigella on the ward which necessitated that the ward be quarantined.
DISCUSSION

The main objective of this study was to establish appropriate sitting behavior in institutionalized retardates through the use of primary and conditioned reinforcers. From the results which were obtained in each phase of the procedure, it is plausible to assume that the observed frequency changes in sitting behavior were a function of the contingent presentation of candy, tokens, and social reinforcement (praise). It is quite unlikely that uncontrolled intervening variables could account for the observed increase in the inappropriate response frequency from 0.5% during the last session of the treatment conditions in phase II (session 56 in Figure 1) to 45.7% during the first session in which the reinforcement contingencies were reversed (session 57). It is further unlikely that such variables could account for the similar decrease in the inappropriate response frequency from 95.1% during the last session of the reinforcement reversal (session 60) to 2.2% during session 61 in which the treatment conditions were resumed. The magnitude of these frequency changes which occurred coincidentally with the change in the reinforcement contingencies would indicate that the independent variables were indeed responsible for such changes.

It was mentioned in the procedure section that praise was not presented during the treatment reinstatement phase of the program.
The results indicated, however, that the frequency of inappropriate responses average 0.5% during this phase compared with 1.8% during treatment phase II in which praise was presented. In light of these results, it may be questioned whether praise was a meaningful reinforcer, relative to candy and tokens, in the establishment and maintenance of sitting behavior in treatment phases I and II.

Although data were not collected throughout the entire study on the effect which the "QUIET TIME" sign had on the sitting behavior of the patients, incidental data were collected on three sessions during the reinstatement portion of phase III. The sign was hung on the wall without any announcement five minutes prior to the start of the session. A count of the patients who sat down at that time and who remained sitting until the session began, yielded 12, 10, and 14 patients for the three sessions respectively. At the end of the same sessions, a count of the patients who got out of their chairs immediately upon removal of the sign yielded 19, 22, and 17 patients respectively. It would appear from these figures, that for some of the patients, the sign had become a discriminative stimulus for sitting through the reinforcement of sitting behavior in its presence.

Beyond the fact that the "time out" box served to remove continuously disruptive patients from the sitting program, any incidental effect which it may have had upon sitting behavior remains speculative. A total of 12 patients were placed in the box 21 times during the 42 sessions of treatment phase II. Three of these patients accounted for 11 of the 21 incidents; thus it is possible that for these few patients, the box was not an effective means of punishing
disruptive behavior.

Perhaps more important than its experimental relevance, the sitting program was and continues to be of practical value to the ongoing ward training program. Initially, sitting on chairs and benches served as an appropriate competing response to a wide variety of disruptive behaviors emitted by many of the patients. It simultaneously served as the response which was used in establishing and strengthening tokens as conditioned reinforcers for approximately 50% of the patients who had recently been transferred from other wards and had received no prior token training. Although terminated for a period of two months by the outbreak of shigella on the ward, the sitting program has since been reinstated at various short periods during the day (usually 10 minutes or less). Such periods include the passing of medications, toileting periods, hand and face washing before going to the dining room, and teeth brushing.

The study was also of practical value in that it introduced the ward attendant staff to the application of operant conditioning techniques to various problems on the ward. It is hoped that through serving as behavioral technicians in the present study, the attendants have discovered a more effective method for modifying behavior than they had previously used. The fact that many of the post-termination sitting sessions are maintained by the attendants (often in the absence of psychology personnel) suggests that they do consider these procedures to be effective.
APPENDIX A

INSTRUCTIONS FOR "SITTING PROGRAM" WORKERS

1. When buzzer sounds, give tokens first to those girls in your group who are quiet and sitting upright with feet on or near the floor.

2. Give tokens to other girls after they assume this position (with prompt if needed.)

3. Always exchange tokens in like manner.

4. Avoid presenting or exchanging tokens in the same order each time. Skip around and do not be repetitious.

5. Remove token immediately when a resident gets out of her seat, is very noisy, or lies down on a bench (i.e., with feet pulled up on chair, hanging legs over arms of chair, or leaning over in chair).

6. Put a patient in "time out" box for frequent violation of above criteria and also for getting out of chair frequently or prolonged excessive noise.

7. Give verbal praise to those patients who sit appropriately according to the conditions specified in instruction 1.
APPENDIX B

INSTRUCTIONS FOR "SITTING PROGRAM" REVERSAL

1. When the buzzer sounds, give tokens to all girls who are not sitting in chairs or on benches.

2. Give tokens to those girls who have been sitting only after they stand up (with prompt if necessary).

3. Exchange tokens in like manner.

4. Remove token immediately when a patient sits on a chair or bench. Sitting on the floor or on tables is permissible as is any standing position.

5. Give verbal praise to patients who are not sitting on chairs or on benches.
FIGURE CAPTIONS

Figure 1  Group percent inappropriate responses per 1/2 hour session.

NOTE: Data collected at 5-minute sampling intervals.
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