THE EFFECTS OF TOKEN REINFORCEMENT AND SELF-RECORDING ON THE SELF-MEDICATING BEHAVIOR OF INSTITUTIONALIZED PSYCHIATRIC PATIENTS

A Master's Thesis

presented to

The Faculty of the Graduate School

Appalachian State University

In Partial Fulfillment of the Requirements for the

Degree Master of Arts in

Psychology

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by

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December, 1974

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Acknowledgements

The writer wishes to thank the members of his thesis committee, Drs. Alexander Manning, Richard Levin and James Long, for their guidance, encouragement and patience.

Special thanks go to Dr. Manning for laying much of the ground work for this experiment.

Thanks are also due to the staff of the Behavior Modification wards of Broughton Hospital. Without their assistance the study would not have been possible.

ABSTRACT

One of the major problems in outpatient psychiatric treatment has been the extreme irregularity with which patients use their medicines. Believing that one approach to this problem involves the teaching of self-medication skill to patients during psychiatric hospitalization, this experiment attempted to assess the effects of token reinforcement and self-recording on that behavior. Results indicated that tokens could effectively increase the frequency of the self-medicating response, but self-recording may not be able to maintain that increase. Different approaches to the problem are discussed.

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Failure to use prescribed medicines properly is one of the major problems in the continued treatment of discharged, psychiatric patients. This problem is well documented in research literature. For example, Willcox, Gillian and Hare (1965) assayed urine specimens from 120 outpatients for whom phenothiazines or other related drugs had been prescribed. These researchers discovered that the specimens from 44% of the patients failed to contain the expected metabolic products of the drugs. The results of repeated testing were consistent and indicated that patients simply were not taking their medicines. Other studies (Renton, Affleck, Carstairs and Forrest, 1963; Parkes, Brown and Monck, 1962) report similar findings. Additionally, the latter studies suggest that unreliable medication intake contributes to increased readmission rates.

Renton et al. (1963) in investigating the post-hospital treatment of 132 schizophrenics determined that of the 122 patients, whose continued use of neuroleptic drugs had been requested, 46% were not taking the medicines as ordered and a majority of that percentage had ceased taking their medicines entirely. Furthermore, the readmission rate for the group whose intake was casual was significantly higher than the rate for patients who reliably took their medicines. The work of Parkes et al. (1962) also involved investigating the community care of 96 discharged, schizophrenic patients. Through interviews with patients and their families, the researchers estimated that approximately 30% of the

patients quit consuming their medicines. Again, those patients with reliable medication intake appeared to have significantly lower readmission rates as compared to the rates of patients who discontinued medication usage.

Believing that some costly hospital readmissions were precipitated by inadequate medication intake, several investigators sought to remedy the problem by introducing long-acting, injectable phenothiazine tranquilizers. Advocates of this approach assumed that by providing more continuous medication with such drugs, the dependency on the patient to maintain regular oral medication could be eliminated and readmission rates reduced. Support for this approach was offered by Denham and Adamson (1970). They selected 103 hospitalized patients and calculated the number of readmissions compiled by that group during a period of one year preceding the initial drug injections. They subsequently compared the pre-drug readmission rate with the rate achieved following the use of long-acting drugs. Their figures revealed a dramatic decrease of 70% in readmission rates. A similar study by Rasmussen (1970) attained results equivalent to those found by Denham and Adamson.

Another group of workers considered the problem of medication usage arising from inadequate opportunity afforded most patients in assuming responsibility for taking their drugs while hospitalized. Their approach at remediation was to establish self-medication programs for patients during

hospitalization. Kennard (1960) and Mastrobuona, Snow and Stevens (1962) discussed the procedures involved in formulating such programs; however, only two studies actually investigated the effect of this approach on readmission rates. Ravensborg (1968) reported that only one of the 26 patients discharged since the one and a half year inception of the program had returned. Although supporting figures were not listed, Pope (1966) claimed that rehospitalization was significantly reduced in a study involving approximately 300 patients.

Whether long-acting injectable drugs or self-medicating schemes are employed, most of the studies report that a small number of patients remained unreliable in using their prescribed medicines. Patients either forget to report or refuse to report for injections or they have not learned to accept the responsibility of caring for their drugs. Thus, additional methods to promote responsible intake of medicines seem needed.

Recently, the learning theory approach based on contingency management has been one of the most successful techniques used in shaping and maintaining selected behaviors of psychiatric patients. The pioneering work of Ayllon and Azrin (1965 and 1968) aptly exemplifies this method. These researchers, employing a token economy system, sought to increase the frequency of work related and self-care behaviors of a group of female chronic schizophrenics at Anna State

Hospital in Illinois. To accomplish their goals, Ayllon and Azrin constructed the patients' environment so that patients received token reinforcement whenever they performed such tasks as making their bed, mopping the floor or engaging in work assignments. The tokens could then be exchanged for reinforcers such as snacks, TV time and going off the wards. This system of rewards contingent (i.e. dependent) upon the emission of specified behavior did effectively increase and maintain the frequency of job performance. Ayllon and Azrin also determined that the noncontingent distribution of tokens led to a decrease in job attendance.

A number of articles describing different uses of token economies within psychiatric facilities have followed the original work of Ayllon and Azrin. For example, Atthowe and Krasner (1968) determined that token reinforcement significantly increased the frequency of patient attendance at group activities and that the "social responsiveness" of the patients also significantly rose even though it was not one of the target behaviors. Steffy, Hart, Craw, Torney and Mortlett (1966) indicated success in modifying the aggressive and violent behaviors of 34 female patients. Lloyd and Abel (1970) demonstrated that modification of socially acceptable behavior increased the amount of time patients spent out of the hospital. A novel use of token reinforcement was illustrated by Wincz, Leitenberg and Agras (1972), who investigated the effects of tokens on the modification of

delusional verbal behavior in chronic psychotics. They selected ten patients diagnosed as being paranoid schizophrenic and measured their baseline rate of delusional talk over three separate conditions: (1) during therapy sessions, (2) on the ward and (3) during interviews with a psychiatrist. Following baseline data collection, patients were alternately given either feedback on appropriateness of their speech or tokens contingent on the emission of non-delusional verbal behavior. The results of the study revealed that both tokens and feedback were effective in reducing the percentage of delusional talk. Also, tokens were found to be more effective than feedback.

Another important technique used in modifying patients' behaviors has involved the concept of self-control. In listing what they perceived to be the components of that conceptual system, Bandura and Perloff (1967) included the factors of the self-assessment of behavior, the self-recording of behavior, the self-determination of reinforcement and the self-administration of reinforcement. Recently, one of those factors, the self-recording of behavior, was demonstrated by McFall (1970) to be singularly effective in altering the frequency of responses. McFall tallied the base rates of smoking behavior for 16 subjects and compared those rates with the ones achieved during periods when subjects were asked to record either the number of cigarettes smoked or the number of instances in which a decision was made not to smoke.

He discovered that the frequency of smoking increased if subjects had recorded the number of cigarettes smoked while smoking frequency decreased if they had recorded decisions not to smoke.

Other works authenticating the efficacy of self-recording procedures have also appeared. Broden, Hall and Mitts (1971) achieved positive results in applying this technique to the problems of increasing the study behavior of an eighth grade girl and of decreasing the talk-outs of a junior high school boy. Long (1972), in assessing the effects of several self-management procedures, found that merely by having students log points earned for engaging in such behavior as being present for class, having a clean work area and completing assignments increased the percentage of appropriate classroom behaviors while simultaneously decreasing the percentages of time off-task and disruptive behaviors. Finally, Maletzky (1974) used behavioral self-recording as a means for successfully treating the following behaviors: (1) facial tics, (2) compulsive scratching, (3) disruptive hand waving and (4) inappropriate out-of-seat response.

Kazdin and Bootzin (1972) have reported that although token economies have successfully maintained target behaviors while in operation, behavioral gains were not preserved when reinforcement was withdrawn. Therefore, procedures which facilitate the maintenance of performance in nontoken

situations are required. Could not self-management techniques be combined with token reinforcement to produce such facilitative effects? Also, could not this approach be applied to the specific problem of self-medication?

The purpose of the present study was therefore undertaken to test the effects of token reinforcement and self-recording on the frequency of self-medication behavior of a group of institutionalized psychiatric patients. More specifically, the study attempted to determine if (1) token reinforcement could increase the frequency of self-medicating response and (2) self-medication could be maintained solely by use of self-recording techniques.

Method

Subjects and Setting

The experiment was conducted on the behavior modification ward of a large mental hospital located in North Carolina. Three male patients served as the subjects (Ss). The Ss were selected because of their unreliability in reporting for medicines.

S_1 was a 28 year old white male who had been institutionalized for the past four years. His prescribed medicine was Serentil three tablets to be taken four times a day. S_2 was a 28 year old black male whose current hospitalization had persisted for one year. His medicine was the same as that of S_1. S_3, a 27 year old white male, had resided at

the hospital most of the previous eight years. He was prescribed Navane, three capsules at bedtime and Artane, two capsules at bedtime. All Ss had been given a psychiatric diagnosis of schizophrenic reaction, chronic undifferentiated type.

Response Definition

Self-medication was defined as the S reporting through his own initiation to the Nurses Station within an interval of plus or minus ten minutes of the prescribed time, selecting and taking the appropriate medicines. A failure to self-medicate occurred if patients did not report during the appropriate time span. Following that failure, patients were asked to come to the ward station where they were then handed their medicines. To prevent the dispensing of medicines to other patients from prompting self-medication responses, medication times of the Ss were scheduled before that of the general ward population.

Observational Techniques and Reliability

Prior to the beginning of the experiment, patients were assigned individualized medication trays and containers, which were located within the nursing station. Each patient was also provided with both written and verbal instructions as to what medicines to take (the shape, size and color of the drugs) and when each medicine was to be taken. The location of the medicines allowed the ward attendants to

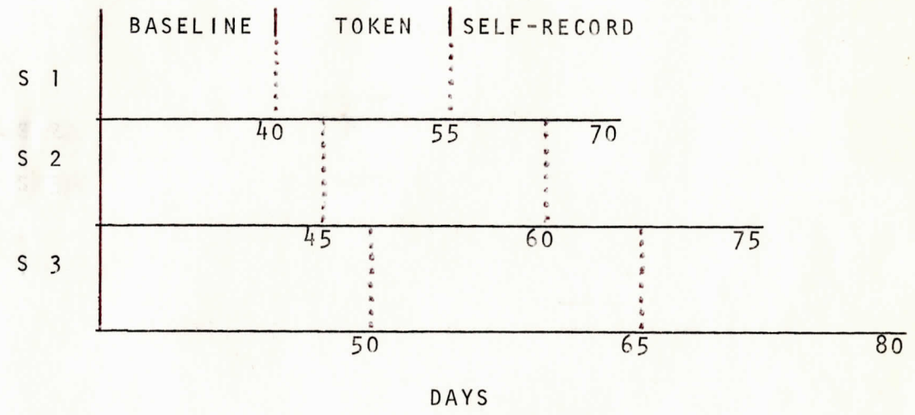
observe the Ss and to collect data on the frequency of self-medication responses. (See Appendix A). The attendants had also been given verbal and written instructions regarding what constituted self-medication behavior. (See Appendix D). In addition, attendants were asked to behave as inconspicuously as possible in collecting the data and not to provide clues as to medication time. Reliability of the data was determined during the beginning and middle portions of the experiment. The experimenter conducted these reliability checks by casually observing the Ss and collecting data separate from that gathered by the attendants. To prevent the experimenter's presence from prompting medicating responses, he visited the ward on numerous occasions in addition to scheduled medication periods.

Reliability between the attendants and the experimenter in recording self-medication data was established on three occasions (once for each subject). The results of their reliability checks were 88%, 90% and 96%. Agreement occurred when the attendant and the examiner recorded the same behavior for the same interval. The percentage of agreement was calculated by dividing the number of agreements by the total number of intervals for which behaviors were recorded. The reliability values indicate that the level of agreement between observers was adequate to permit a valid interpretation of the data.

Experimental Conditions

A multiple baseline design was used to evaluate the effects of the experimental variables. This specific design

involved the measurement of the same behavior in several Ss under several stimulus conditions. All Ss participated in each experimental phase, but baseline periods varied between Ss with treatment conditions being presented in staggered fashion. The amount of time the Ss spent in the different phases and points in time of treatment implementation are illustrated in the following diagram:



Baseline. After Ss had been instructed on proper medication usage, they were requested to begin self-medicating. The measures for their baseline performance of that response were then collected in the manner described above. No manipulation was attempted during baseline. Attendants merely recorded the frequency of self-medication.

Token Reinforcement for Self-Medication. As part of their total treatment plan, the participants in this experiment were involved in a token economy program. (See Appendix B). All patients on the behavior modification ward received tokens (i.e. points) for engaging in such behaviors as dressing neatly, making beds and attending work assignments. Patients used the points to purchase clothes, off-ward privileges, snacks

and other back-up reinforcers. This condition existed throughout the study. However, during the second phase of the study (Token Reinforcement for Self-Medication), Ss received points immediately follwoing a self-medication response. Each reinforcement for self-medication was worth approximately five cents in the total economy system.

Self-Recording. Token reinforcement for self-medication was discontinued after 15 days. The self-recording phase was then initiated. Ss were asked to record whether or not they took their medicines during the prescribed period and without being urged to do so. Each S was provided with an individual chart which was posted inside the patient's locker. (See Appendix C).

Results

Figure 1 indicates the percentage of self-medicating responses attained by each subject during baseline, token and self-recording phases of the experiment. The percentages are for five-day intervals. Included in Figure 1 is a band of two standard deviations above and below the mean percentage of appropriate responses produced during baseline. The values of this band are listed in Table 1 with the average percentage achieved during token and self-recording phases.

As can be seen from Figure 1, baseline rates for Ss 2 and 3, although initially high, declined and stablized in the later portions of that phase. The behavior of S1 appeared to be consistent throughout the baseline.

Figure 1

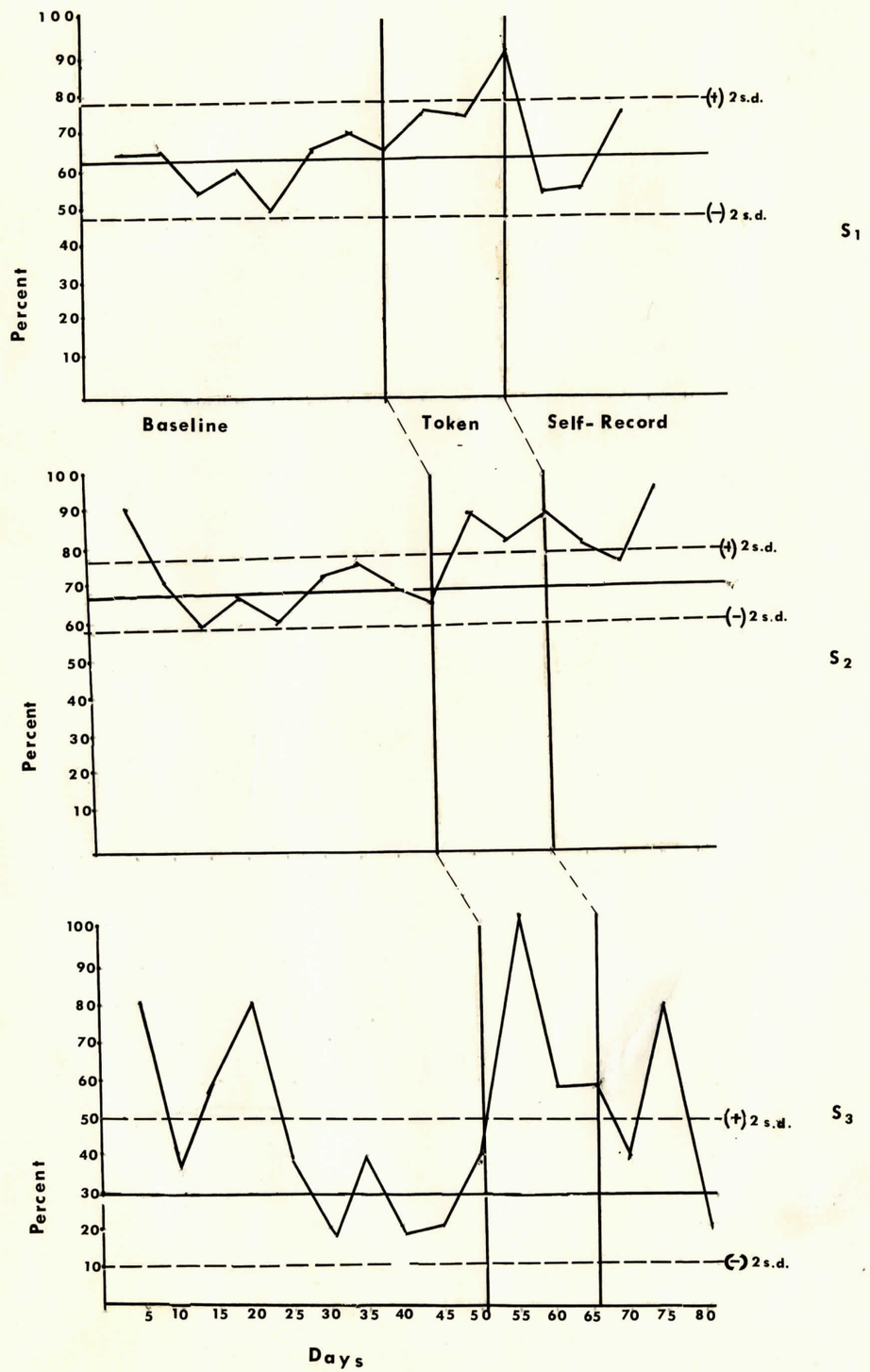


Table 1

MEAN PERCENTAGE OF APPROPRIATE RESPONSES AND BASELINE STANDARD DEVIATION

	Treatment		
	Baseline	Token	Self-Recording
S 1	x = 62.5 s.d. = 7.5	78	62
S 11	x = 68 s.d. = 5.1	85	83
S 111	x = 30 s.d. = 10	73	47

During the token reinforcement phase, all Ss achieved levels of self-medication greater than two standard deviations above mean percentages achieved during baseline. S_1 demonstrated a gradual, steady ascent in appropriate self-medicating responses. The difference between his average percentages for the two phases showed an increase of about 16% during the token phase. When S_2 received token reinforcement for self-medicating, his percentage of desired responses increased even more rapidly than S_1. However, that increase soon leveled off. The mean percent of self-medicating for S_2 during the token phase was approximately 18% greater than that achieved during baseline. S_3 also demonstrated a sudden increase in the number of appropriate responses when tokens were added. Unlike either of the previous Ss, however, his performance at the end of the token period had declined. Nonetheless, his overall performance level was above the band of the baseline mean, with the difference between the two means being approximately 43%.

When self-recording was initiated, the percent of appropriate responses decreased with all Ss. However, even with an initial decrease, S_2 maintained a response level superior to his baseline level. S_1 increased his percentage of desired responses at the end of this phase; yet as can be seen from Table 1, his mean percentages for the self-recording and baseline periods were essentially equal.

Although S_3 demonstrated some attempt during the middle portion of this phase to regain his previous level of functioning, his average percentage for the self-recording phase remained within the standard deviation band of the baseline mean.

Discussion

In examining why Ss 2 and 3 showed a decline in response rates from their initially elevated baseline level, it seems plausible to attribute much of that effect to the novelity of the experiment. Very likely, the beginning rates were artifically high. The latter rates, following adaptation to the newness of the situation, were probably more representative of naturalistic observations. It was because of this artificality that the initial data from the first 20 days of the experiment were excluded in computing mean percentage of desired response during the baseline phase. Such exclusion allowed for what seemed a more realistic evaluation of treatment effects.

The second phase of this study adequately demonstrated that token reinforcement could be effectively used to increase the frequency of self-medicating responses of psychiatric patients. Although reacting in differential fashion all Ss appreciably improved in their performances of the target behavior. However, the study equally demonstrated that the removal of tokens lead to a substantial decline in performance, thus supporting the view of Zimmerman, Zimmerman and Russel (1968) that tokens may be more prosthetic than therapeutic.

A secondary goal of the experiment was to assess whether self-recording would effectively supplant token usage. The results incidated it did not. In assessing why the Ss failed to maintain previous performance levels during self-recording, one glaring element arose. The S who retained his increased response rate during the self-recording phase was, in fact, the only S who conscientiously recorded his medicating behavior. The other two Ss failed to record their responses even though they verbally agreed to do so. Another factor which possibly contributed to the performance decline during self-recording involved the contrasting effects produced when treatments were abruptly shifted from the token condition to a non-token state. Undoubtedly, the rapid transition left the value of response consequences at a much less reinforcing level than they previously had been. A final possible explanation for the lowered response rates was that the Ss were simply attempting to return to the behavioral conditions which had initially led to token reinforcement.

In trying to establish why self-recording was effective for S_2, the experimenter reasoned that perhaps the feedback quality of the records was sufficient to sustain the S's behavior. Or, perhaps a desire to please the ward personnel contributed to the reinforcing characteristics of self-recording.

Aside from the limited sample size, there are several additional reasons why one should be cautious about generali-

zing the results of this investigation to other settings. On one hand, whether patients did or did not report, they were eventually forced to take their medicine. Also, the ward environment probably served as a powerful stimulus prompting medicating responses. On the other hand, a failure to imbibe medicines during a specified time period does not mean that medication intake will cease entirely. Quite possibly appropriate amounts of medicines will be taken, only at times differing from those prescribed.

Since the ultimate goal of any therapeutic approach is to teach patients how to manage responsibly their own behaviors, future research into the general area of teaching self-controlling procedures and into the specific domain of teaching self-medicating response seems needed. To that end certain suggestions are offered. Instead of recording the frequency of a response, an individual might be asked to reinforce its occurence. For example, immediately following the emission of a selected behavior the subject could read a positive self-statement, or maybe he would give himself a cigarette or piece of candy. Another approach could involve using different schedules of token reinforcement to reduce or retard the extinction process. No matter what approach is employed, it would seem valuable to compare patients taught self-medicating skills with those not taught to do so on some relevant variables--probably readmission rates. In that manner, the efficacy of teaching such skills could be assessed.

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Appendix A

Instructions for Recording Medicating Responses

Patient_____

Setting_____

Medication_____

Instructions to observer: Place a circle (O) in the appropriate box if the patient reports and self-medicates within plus or minus 10 minutes of the prescribed time. If the patient fails to do so, place a cross (X) in the box. If the patient is not scheduled to take medication at that hour, place an asterisk (*) in the proper box.

Date	Medication Time	Total self-med. res.	Tot. opportunities
	8 1 6 9		

Appendix B

USE THIS SIDE OF CARD ONLY

WORK ASSIGNMENT-IT-OT-VR-SWS

A.M.	POSITIVE	P.M.
5	Stays dressed properly	5
5	Remains in work area	5
5	Arrives on time	5
5 5	Follows directions	5 5
5 5	Shows Initiative	5 5
5	Social Interaction (specified patients)	5
5	Helping others	5
5555	Other (clarify)	5555

	NEGATIVE	
555	Not obeying directions	555
5 5	Leaving work area	5 5
5	Late for work	5
5 5	Cursing (clarify)	5 5
30	Fighting (clarify)	30
10	Screaming (clarify)	10
10 10	Begging (clarify)	10 10
10 10	Arguing (clarify)	10 10
30	Stealing (clarify)	30
10	Sexual Misbehavior (clarify)	10
5555	Other (clarify)	5555

TOKEN ECONOMY DAILY WORK CARD

5 5 5 5 5 5 5 5 — 10 10 10 10 10 10 10 10

POSITIVE

		Work Assignment	
5	Getting up		
5	Make Bed	1. 5 5 5 5 5	
10	Clean Room	2. 10 10 10 10 10	
5	Wash Face-Hands	Shower	10
5	Dressed Properly	Takes Medication	555
5	Brush Teeth	Social Interaction	555
5	Shave/Comb Hair	Put Up Clothing	5
555	Clean Clothing	Retire between 9 & 10:00	555
555	Use Utensil		
555	Return Tray		

NEGATIVE

30 30	Fighting	Cursing	555
5555	Not Obeying Dir.	Laying on Floor or Couch	10 10
555	Messy W. Tobacco	Sexual Misbehavior	20 20
30 30	Stealing	Annoying Other Patients	20 20
30 30	Destructive	Smoking in Bed	500
10 10	Screaming		

5 5 5 5 5 5 5 5 — 10 10 10 10 10 10 10 10

Appendix C

Instructions for Self-Records

Each time you take your medicine during the prescribed time period and without having to be reminded, place a plus (+) sign in the appropriate box. If you have to be reminded to take your medicine, place a minus (-) sign in the box for that time period.

MEDICATION TIMES

	Date	6:50-7:10	10:50-11:10	4:00 -4:20	7:25-7:45
Tues	8-20-74				
Wed	8-21-74				
Thurs	8-22-74				
Fri	8-23-74				
Sat	8-24-74				
Sun	8-25-74				
Mon	8-26-74				
Tues	8-27-74				
Wed	8-28-74				
Thurs	8-29-74				
Fri	8-30-74				
Sat	8-31-74				

Appendix D

Instructions for Dealing With Patients Participating In Self-Medication Training:

1. Patients will be expected to report and medicate approximately 15 minutes before the usual time that non-participating patients receive their medicines. Patients will be given a time interval of plus or minus 10 minutes of the prescribed time to self-medicate.

    Ex: Jack Spratt normally gets his medicines at 8 and 12. During the study, Jack is asked to report at 7:45 and 11:45 to select and take his medicines. Jack will be allowed intervals from 7:35 to 7:55 and from 11:35 to 11:55 to report and medicate.

2. It is extremely important not to provide clues which signal the arrival of medication time. Only if the patient fails to report during the 20 minute interval should he or she be asked to come for medicines.

3. Whether or not the patient reports and medicates during each prescribed interval is to be recorded daily.

4. During the initial phase of the program, please do not reinforce participating patients for their medicating responses.

5. Please allow patients to get their medicines; give as little help as possible.

VITA

Donald Thomas was born on August 4, 1946 in Winchester, Kentucky. After migrating to North Carolina, he attended and was graduated from Walter M. Williams High School in Burlington, North Carolina. Following his high school graduation, he entered Appalachian State University and completed two years of undergraduate training. He then enrolled in North Carolina State University where, in 1970, he was awarded a Bachelor of Science degree in Zoology. During the next two years, he continued to take both undergraduate and graduate courses in Psychology at North Carolina State University.

In September of 1972 he entered Appalachian State University Graduate School and has since been receiving graduate training in Clinical Psychology.