THE EFFECTS OF BEHAVIORAL CHARTING, TOKEN
REINFORCEMENT, AND SOCIAL REINFORCEMENT
ON THE PRODUCTION RATES OF SHELTERED
WORKSHOP CLIENTS

DISSERTATION

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By

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This investigation concerned the effects of behavioral charting, token reinforcement, social reinforcement, and combinations of behavioral charting with token or social reinforcement, upon the production rates of sheltered workshop clients. The differential effects of these reinforcement methods were investigated by arranging for the application of each reinforcement mode in a sheltered workshop setting and comparing the mean production rates achieved by two groups of sheltered workshop clients under each reinforcement condition.

Ten clients of Goodwill Industries of Fort Worth were randomly assigned to either a token (TR) or social reinforcement (SR) group. Each group was then randomly assigned to one of two regular Goodwill workshop supervisors trained in the treatment procedures. Subjects worked on a simple packaging task. The number of packages clients completed during each daily half-hour session served as the dependent variable. A t-test determined that there was no significant difference in productivity between the groups prior to treatments.
The experimental period consisted of six five-day treatment stages. The first stage was a baseline or control phase in which reinforcement was unmanaged. In the second stage, supervisors charted subjects' daily production totals for them on quadrille graph paper. No other contingent reinforcement was provided. In Stage 3 behavioral charting was continued, while TR group clients also received tokens, exchangeable once a week for ten cents each, when their production level exceeded their previous day's rate. A minimum of social reinforcement accompanied the delivery and exchange of tokens with clients. Subjects in the SR group received charting combined with production-contingent verbal and nonverbal expressions of praise from the supervisor. During Stage 4 both groups received charting only. In Stage 5 charting was withheld and only token or social reinforcement was applied to the respective groups. The final stage was a replication of the charting, plus token and charting, plus social reinforcement conditions.

It was determined from an analysis of variance of the resulting weekly group production means that the cumulative effect of all reinforcement modes applied was highly significant (F=7.47; df=5, 40; p.<.00005). However, multiple comparisons of treatment means failed to detect significant differences between most of the specific reinforcement modes. Charting combined with social reinforcement appeared to have the best results with this small group of clients, but this
combination procedure was only slightly better than using charting or social reinforcement alone. Both token and social reinforcement were somewhat more effective than charting alone. All modes of contingent reinforcement employed were better than unmanaged reinforcement. The SR group performed significantly better than the TR group (p. < .05), suggesting the importance of including social reinforcers in a token system. There was discussion of undifferentiated reinforcement effects and their possible influence on the outcome obtained.

The findings derived from this sample led to the conclusion that positive reinforcement, and specifically social reinforcement used both alone and in combination with behavioral charting, can be a very effective mode of reinforcement for sheltered workshop clients. It was suggested that more attention might be devoted in rehabilitation facilities to using the simpler and more readily available forms of reinforcement which behavioral charting and social reinforcement represent.
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CHAPTER I

INTRODUCTION

Community sheltered workshops throughout the United States are currently serving more than 200,000 persons annually. In the past decade this number has included a considerably greater proportion of mentally retarded, mentally ill, and culturally disadvantaged persons than has traditionally been served by the community-based rehabilitation agency (6). Consequently, increasingly more persons are being referred to sheltered workshops on the basis of behavior problems only, rather than, or more often along with, physical handicaps (6, 25, 29).

Traditional methods of rehabilitation and training are proving inadequate for dealing with the more severe behavioral deficits and maladjustments seen in so many of today's clients. Only one in every six of these persons served by sheltered workshops becomes employable in competitive settings (6). New approaches and techniques of training are needed if the workshop is to meet the growing demand for community-based treatment of disabled and disadvantaged persons (25, 38).

As in many other areas of treatment of behavior problems, there is a growing interest within the rehabilitation field in techniques based upon reinforcement theory and
operant conditioning principles. Behavior modification, which incorporates operant techniques, is based largely on the methods of B. F. Skinner and focuses on overt behavior and systematic manipulation of environmental contingencies. Methods of contingency management have been used successfully to change human behavior in such settings as mental hospitals (1, 33), schools (3, 13, 22, 24, 30, 31, 40), and institutions for the mentally retarded (4, 11, 14). In all of these settings behavior modification techniques have been used to achieve the same kinds of results as those sought in rehabilitation centers (25), and there is now a growing volume of data demonstrating the effectiveness of behavioral approaches in developing and modifying a wide variety of client behaviors in rehabilitation facilities (8, 9, 10, 17, 19, 27, 34, 35, 38, 41, 42, 45, 46).

There is, however, relatively little controlled investigation of operant conditioning techniques in the specific setting of the sheltered workshop. Of the studies which have been performed in this setting, most have attempted to systematically manipulate various types of incentives, or reinforcers, to effect increased production from subjects or to modify maladaptive behaviors. Reinforcers which have been used in controlled studies have included money (2, 5), special privileges or activities such as time off from work or access to recreation areas (2, 9), tokens or coupons which could be exchanged for desirable items (8, 9, 17, 46),
and systematic informational feedback to subjects on their production rates using progress graphs or behavioral charts (20).

Although the investigation of the relative effectiveness of various modes of reinforcement with a variety of different populations has been proceeding for several years, findings have been contradictory and inconclusive (18, 21, 37, 42, 43, 44); and few have been performed with rehabilitation clients. Three modes of reinforcement—token, social, and behavioral charting—have all been demonstrated to produce positive behavior changes in rehabilitation clients; but there is a need for experimental evaluation of the relative effectiveness of these modes, when used both alone and in combinations of charting with token or social reinforcers, in promoting desired behavior changes in rehabilitation subjects. The present study therefore attempted to contribute information on the differential operation of behavioral charting, token reinforcement, social reinforcement, behavioral charting combined with token reinforcement, and behavioral charting combined with social reinforcement on the behavior of sheltered workshop clients, in order to define more precisely the type of reinforcement which may be used reliably and effectively to motivate workshop trainees and in order to assist in the development of more successful and economical training procedures for persons served by the work-oriented rehabilitation facility.
Statement of the Problem

The problem of this study concerned the effects of behavioral charting, token reinforcement, social reinforcement, as well as combinations of behavioral charting with token or social reinforcement upon the production rates of sheltered workshop clients.

Purpose of the Study

The purpose of this study was to compare the differential effects of five modes of reinforcement--behavioral charting, token reinforcement, social reinforcement, behavioral charting combined with token reinforcement, and behavioral charting combined with social reinforcement--on the production rates of sheltered workshop clients.

Hypotheses

The following hypotheses were tested in this study:

I. The application of a behavioral charting procedure will produce significantly greater mean production rates among sheltered workshop clients than will an unmanaged reinforcement procedure.

II. The application of token reinforcement combined with behavioral charting will produce significantly greater mean production rates among sheltered workshop clients than will an unmanaged reinforcement procedure.

III. The application of social reinforcement combined with behavioral charting will produce significantly greater
mean production rates among sheltered workshop clients than will an unmanaged reinforcement procedure.

IV. The application of behavioral charting combined with token reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of a behavioral charting procedure alone.

V. The application of behavioral charting combined with social reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of a behavioral charting procedure alone.

VI. The application of behavioral charting combined with token reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of token reinforcement alone.

VII. The application of behavioral charting combined with social reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of social reinforcement alone.

VIII. The application of token reinforcement alone will produce significantly greater mean production rates among sheltered workshop clients than will the application of behavioral charting procedures alone.

IX. The application of social reinforcement alone will produce significantly greater mean production rates
among sheltered workshop clients than will the application of behavioral charting procedures alone.

X. There will be no significant difference between the mean production rates of sheltered workshop clients receiving token reinforcement and those receiving social reinforcement, in the absence of behavioral charting procedures.

XI. There will be no significant difference between mean production rates of sheltered workshop clients receiving token reinforcement in combination with behavioral charting and those receiving social reinforcement in combination with behavioral charting.

Significance of the Study

The choice of adequate reinforcers is vital to the success of any contingency management program (26, 29). The need for extensive exploration of various classifications and modes of reinforcement with rehabilitation clients has been expressed by Goldin, Margolin, and Stotsky (15). With the heterogeneous group of persons often represented in sheltered workshop populations, the question of determining what kind of reinforcers work best for whole groups of individuals is necessarily complicated. However, when attempting to administer both individual as well as large-scale and inclusive operant conditioning programs, establishing the modes of reinforcement which will be most effective for a varied population of clients and least costly, in both money and staff time, becomes a matter of administrative and
economic priority. For example, for a sheltered workshop facility attempting to institute work adjustment training procedures based upon operant conditioning principles, questions might arise concerning the types of reinforcers which would be most economical, flexible, and effective in modifying trainee behaviors. Would tangible rewards, such as tokens, be more effective than simpler-to-dispense social praise? Would the motivational value of token and social reinforcers be enhanced by combining them with daily feedback to trainees on their production? Or would the providing of production rate information to clients on charts or graphs in itself constitute as effective a reinforcer as would social and token reinforcement alone or in combination with the charts?

In his critique of behavior modification methods in rehabilitation, Patterson (32) stressed the fact that no one had actually tried to find out how the act of simply telling a client what he is expected to do compares as a facilitator of behavior change with some of the more protracted methods of contingency management. Behavioral charting, and to some extent social reinforcement, provide methods which involve conveying specified behavioral expectations to clients and supplying them with consistent, systematic informational feedback on their progress in reaching the defined goals (22). Since only one study had examined the effects of supplying rehabilitation subjects with daily feedback on their
production through graphs or behavioral charts (20), there was a need to determine if results similar to those obtained in that study could be produced with sheltered workshop clients. Further, no studies were found which attempted to determine whether the use of a behavioral charting procedure was more effective in increasing productivity than using token or social reinforcement. In light of the success witnessed in other settings using behavioral charting in combination with other forms of reinforcement (22), it appeared that the effects of this combination reinforcement procedure should be investigated in a rehabilitation setting. Finally, the use of social reinforcement alone, in the form of praise and gestures of approval, had not been studied systematically in a sheltered workshop setting. Its possible influence in enhancing the effects of token reinforcement systems was noted by Couch (9), but there existed a need to compare the effects of social reinforcement, when used as the only form of contingent reward, with a token reinforcement system having the factor of social reward removed or minimized.

The present study did not attempt to test the potential of token reinforcement systems as they are normally carried out. Comparisons between token reinforcement and social reinforcement in this study were confined to analysis of the effects on productivity produced by clients' receiving plastic tokens versus their receiving verbal and nonverbal praise.
The present study was unique, then, in that it attempted to contribute information on the differential effects of behavioral charting, social reinforcement, a modified form of token reinforcement, and combinations of these modes on the production behavior of sheltered workshop clients in order to add to the research literature on reinforcement techniques and to aid in the development and improvement of rehabilitation training programs for handicapped and disadvantaged persons.

Definition of Terms

For the purposes of this study, the major variables were operationally defined as follows:

**Behavioral Charting.** The number of bags completed by an individual subject during each daily half-hour session was counted and the total recorded by a point on a chart plotted on quadrille graph paper. Each point on the graph corresponded to the day the count was made (indicated along the abscissa of the graph) and to the number of items completed on that day (indicated along the graph's ordinate). See Appendix A for a copy of the form for the behavioral charts used in this study.

**Positive Reinforcement.** Positive reinforcement consisted of the presentation, following specified production behaviors, of behavioral charting, token reinforcers, social reinforcers, or behavioral charting combined with token or social reinforcers.
Production Rates. The number of bags completed by subjects during daily half-hour experimental sessions comprised their production rates.

Sheltered Workshop Clients. Client referred to those persons who were enrolled in the Work Adjustment or Specific Skills Training programs at Goodwill Industries of Fort Worth and whose instruction was financed by a referring individual or agency, such as Texas Rehabilitation Commission. This term also included persons, other than staff members, who were employed as production and clerical workers by Goodwill Industries of Fort Worth.

Social Reinforcement (SR). Social reinforcement consisted of verbal statements or nonverbal gestures of a positive and rewarding nature which were delivered by a supervisor to a client following the client's performance of a specified production behavior. Examples of such reinforcement are (a) statements such as, "That's good; you did better today;" "You're improving;" "Very good work;" and (b) gestures such as touching client on arm or shoulder, patting on back, smiling, et cetera.

Token Reinforcement (TR). Tangible rewards for improved production took the form of round, white, plastic discs which were given to trainees following their performance of the criterion behaviors. Tokens were exchanged weekly for money, each token being worth ten cents. For the purposes of this study, social reinforcement, which might normally
accompany the delivery and exchange of tokens with clients, was minimized.

**Unmanaged Reinforcement (UR).** Unmanaged reinforcement referred to the absence of systematic or contingent reinforcement. This term was used since one can never be sure of the type and schedule of reinforcement present in any given situation (42).

**Limitations of the Study**

Because of the open environment of the workshop setting in which this study took place, all possible competing contingencies for each subject could not be completely controlled.

Workshop production demands limited the number of clients available to the experimenter for use in this study and caused the absence of some subjects from several experimental sessions.

A small sample was utilized because of the relatively small population available, because of the limited number of subjects within this population who met the criteria for participation in the research, and because of several unexpected subject drop-outs. Since only one-half hour daily was provided for experimental sessions, the number of subjects who could be administered the often lengthy reinforcement procedures was necessarily limited as well.

Conclusions drawn from this study should not be generalized to samples from dissimilar populations.
Basic Assumptions

Although random selection of subjects was not feasible in this research, the subjects were assumed to be representative of the client population served by most community sheltered workshop rehabilitation centers. This assumption is supported by comparing the description of the clients chosen for this study (see Table I, p. 53) with the description of subjects provided in similar studies (9, 20, 45, 46) and with descriptions of the general United States sheltered workshop population provided in such reports as "Sheltered Workshops in the United States: An Institutional Overview," in Rehabilitation, Sheltered Workshops, and the Disadvantaged (6).

The assumption was made, for this study, that money (ten cents per token) would serve as an adequately motivating back-up reinforcer for the tokens dispensed to the TR group subjects.

The assumption that production rate is an important variable in the job success or failure of many sheltered workshop clients is supported by Chaffin (7).

Treatment of Data

An $F_{\text{max}}$-test (23) was performed to test the assumption of homogeneity of variance of initial production rates. In addition, a $t$-test (12) was performed to establish the comparability of the two treatment groups in their initial production rates.
In order to determine the overall effects of the reinforcement modes employed, a two-way analysis of variance for repeated measures (39) was carried out on the group production means resulting from experimental procedures. To determine whether the differential reinforcement effects hypothesized were obtained, multiple comparisons were computed for individual pairs of treatment means, using the Tukey (b) method suggested by Winer (39, p. 81).

The .05 level of confidence was the required significance level for all statistical tests. Although the tenability of each hypothesis was tested by statistical analysis, treatment of the data also included inspection of individual subject response records and graphic representations of the group performance profiles.
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CHAPTER II

REVIEW OF RELATED LITERATURE

In this chapter the empirical data pertinent to the present study is reviewed and is related to the major research questions under investigation. The chapter is divided into (a) a brief overview of the historical background and present status of behavior modification research and application, (b) a survey of the current state of behavioral research in rehabilitation, and (c) a review of research directly related to uses in rehabilitation settings of the positive reinforcement modes dealt with in the present investigation: behavioral charting, token reinforcement, social reinforcement, and behavioral charting combined with other forms of reinforcement. A brief review of some of the research comparing token and social reinforcement is also included.

Behavior Modification

Behavior modification techniques have been associated primarily with the work in modern learning theory and operant conditioning of B. F. Skinner (68, 69) and along the behavior therapy lines of Joseph Wolpe (82). The techniques of major concern in the present study are associated with Skinnerian operant conditioning principles, which are derived
from the theorem that behavior is strengthened or weakened depending upon the consequence (or reinforcement) that follows it (73). This investigation deals with methods of positive reinforcement.

In an early application of positive reinforcement, Fuller (26), in 1949, used a sugar-milk solution to teach new behavior to a human vegetative subject. Many of the clinical applications of positive reinforcement and of operant conditioning principles in general, were developed by Lindsley (51). The procedures have had demonstrated effectiveness with psychiatric patients in a number of studies (2, 4, 39, 47, 74, 84). Ayllon and Azrin (2) described how a "token economy" was established on a mental hospital ward. Positive reinforcement in the form of token reinforcers which could be exchanged for desirable items or activities were used to promote and maintain adaptive social, work, and self-care behaviors in patients. Behavioral methods also have been very helpful in handling emotionally disturbed children (36, 38, 49, 55, 79, 81).

Delinquent behavior has been modified by Phillips, Fixsen, and Wolf (62) in a residential setting called "Achievement Place." Other demonstrations of behavioral procedures with delinquents have been performed by Bednar and Zelhart (5) and by Lent (56).

Behavior modification has been used with success in classroom settings (10, 19, 27, 44, 46, 57, 59, 60, 80).
The importance of the systematic and contingent application of social reinforcement, in the form of teacher attention and praise, in altering student behavior was illustrated by Hall, Lund, and Jackson (35) and by Allen, Hart, Buell, Harris, and Wolf (1). Bijou (7) outlined the possibilities behavioral methods hold for education.

Operant conditioning techniques have been especially useful in work with mentally retarded subjects (9, 13, 21, 23, 54, 72). Girardeau and Spradlin (29) showed that behavior changes could be facilitated in mental retardates using tokens which could be exchanged for desired objects and activities. Zimmerman, Zimmerman, and Russell (87) used tokens to improve instruction with a group of retarded subjects.

Excellent reviews of the behavior modification literature have been published by Beech (6), Bijou and Baer (8), Cahoon (16), Gelfand and Hartmann (27), Leff (49), and Staats and Staats (71). Also, books of readings including extensive coverage of many of the classic studies are provided by Ullmann and Krasner (74) and by Ulrich, Stachnik, and Mabry (75).

Behavior Modification in Rehabilitation

Patterson (61) and Staats (70) have urged the use of behavior modification approaches in the field of rehabilitation. After reviewing the literature on the application of behavior modification principles to the treatment of problems
similar to those encountered in rehabilitation centers, Nord (58) and Walls (78) concluded that these techniques have much to offer over traditional approaches. Since clients served by many rehabilitation facilities, particularly by the work-oriented facility, are similar in many ways to those with whom behavioral methods have proven helpful, i.e., psychiatric patients (2, 39, 84), mentally retarded (21, 23, 72), delinquents (5, 13), et cetera, and considering the point made by Carkhuff and Berenson (17) that behavioral approaches appear to work best with persons functioning at lower levels, it would seem that behavior modification has great potential for facilitating behavior changes in rehabilitation settings.

Successful demonstrations have been made of behavioral techniques in a wide variety of rehabilitation settings (14, 18, 20, 21, 40, 41, 43, 65, 66, 83, 88, 89). In medically-oriented rehabilitation centers, Wolf, Risley, and Mees trained an autistic child to wear glasses (81); tokens were used to teach a cerebral-palsied child to stand alone and to fall on command (56); and Brady and Lind (12) used operant conditioning methods to treat hysterical blindness. Following a study by Libb and Clements (52), Booraem and Seacat (11) increased physically injured patients use of corrective therapy exercise equipment by giving each one a nickel for every pull on weights which exceeded their mean rate.
Studies using behavior modification with mentally retarded persons are especially relevant to the training and rehabilitation of such clients in work-oriented sheltered workshops. Edwards and Lilly (23) used reinforcement procedures to modify inappropriate behavior and to teach new, more adaptive behaviors to institutionalized retardates. Crosson (21); Goldin, Margolin, and Stotsky (31); and Tate and Baroff (72) used reinforcement techniques to teach simple manual tasks to retarded subjects. Burchard (13) employed a token reinforcement system to effect an increase in the length of time a group of retardates could sit in a workshop and in a classroom. Other applications of behavior modification methods in rehabilitation settings have been discussed by Campbell (16), Feldman (24), Fordyce (25), Leslie (49), Nord (58), Sherman (67), and Walls (78).

Selected Modes of Positive Reinforcement

Three specific modes of positive reinforcement constitute the independent variables that were investigated in this study. These modes are (a) behavioral charting, (b) token reinforcement, and (c) social reinforcement. The major research connected with each of these reinforcers, and particularly those studies relevant to the area of rehabilitation and to the manipulation of work rates as the dependent variable, will be discussed in separate sections.
Behavioral Charting

The use of behavioral charting, or progress graphs, as a method of information recording and instructional feedback is derived from Skinner's use of "frequency" to measure behavior (68). The behavioral charting technique has been applied to education by Haughton (37) and Lindsley (54). Behavior modification procedure requires that the experimenter or therapist observe and record the frequency of occurrence of the behavior he wishes to change in order to establish the "baseline rate" of responding and to evaluate effects of experimental manipulations. It has been suggested that having the subject count and record his own behavior or showing him his progress as charted by someone else will serve as methods of information feedback and have, in themselves, therapeutic or motivational effects which can influence the rate of the behavior being charted, or just simply counted (22, 46, 78). Lindsley and others have used behavioral charting to improve the academic skills of both slow-learning and normal students (37, 46, 54). The technique also has proven successful in efforts to develop individual self-control over certain undesired habits, such as thinking unpleasant thoughts (22, 30).

Walls pointed out the reinforcement value of having rehabilitation clients count and record their own behavior. He stated, "In many cases, no reinforcement, other than this autorecording, may be necessary to accelerate desired or
decelerate undesired behavior" (78, p. 174). Patterson (61) voiced the need for rehabilitation research into the effects of simpler, informational approaches to changing client behavior as alternatives to more complex and involved reinforcement procedures. Behavioral charting may be one example of such a simpler approach, especially when it is contrasted to such methods as token reinforcement systems.

Zimmerman, Overpeck, Eisenberg, and Garlick (88), in discussing their use of operant conditioning methods in a sheltered workshop, suggested the potential benefits of systematic daily monitoring of production. In a study performed by Zimmerman, Stuckey, Garlick, and Miller (89), charting was applied during the daily recording of production rates on cards, but it was not continuously nor graphically presented for subjects. The effect, however, of simply giving daily information to subjects on their production led in itself to significant increases in work rates.

Daily behavior charts which recorded the number of tokens given and the behaviors for which they were earned were compiled each day in a study performed by Close (18) in a work activity setting. Weekly token totals were charted for each subject and displayed to stimulate group interest in the daily progress of individual subjects. Since this study did not attempt to measure the effect which displaying the behavioral charts had upon the increased rate of target behaviors, the influence that this variable might have exerted upon the overall rate increases is not known.
Jens and Shores (43) completed the only study which was found on the use of charting as the only form of systematic reinforcement in a vocational setting. They investigated the motivational value of using behavioral graphs to increase the production rates of three mentally retarded adolescents enrolled in a training school for retardates. Subjects were two males and one female with Stanford-Binet I. Q.'s in the forties. Every subject worked at each of two simple assembly tasks for a total of thirty minutes per day. An $A_1, B_1, A_2, B_2$ design was used, in which $A$ phases were control periods and $B$ phases represented experimental periods. The experimenters were careful to exclude any judgmental or qualitative statements about the subjects' production during or following the daily counting in order to control for the possible introduction of social reinforcement. No tangible or intangible reinforcement other than the charting procedure was provided for subjects' production. Subjects were helped to count and chart their daily production on graphs. Results showed an increase or decrease in production corresponding to the introduction or removal of counting and charting procedures. The authors stated that "these results support the assumption that such charts do tend to motivate mentally retarded adolescents engaged in simple repetitive work behaviors which are similar to those offered in sheltered workshops" (43, p. 25).
When the behavior to be changed, using behavioral charting as a positive reinforcer, does not progress as desired, other reinforcers may be added and administered contingent on the subject's reaching a predetermined performance goal (78). For example, in the "Precision Teaching" methods of Lindsley and others (19, 44, 46), the student may receive a token or other type of reinforcer when his performance on a given academic task surpasses his previous day's performance, as reflected by his behavioral chart. Although this method has been demonstrated successfully in educational settings, there has been no controlled investigation of the efficacy of combining behavioral charting with other forms of reinforcement in a sheltered workshop setting. Since only one demonstration was found of the use of behavioral charting as the only mode of reinforcement with rehabilitation subjects, an investigation to determine if similar results could be obtained using sheltered workshop subjects appeared to be in order.

**Token Reinforcement**

Various types of concrete or tangible reinforcement have been used very effectively in promoting learning in diverse populations of subjects. Reinforcement in the form of tokens, given immediately upon performance of a specified behavior and exchanged later for objects or activities of value to subjects, has been studied extensively with psychiatric populations by Ayllon and Azrin (2). O'Leary and
Becker (59) used tokens in the form of ratings placed in booklets that could be traded for "back-up" reinforcers to reduce sharply the amount of deviant behavior in a class of seventeen emotionally disturbed nine-year-old children. Hewett (38) also obtained good results with a similar population, using checkmarks on cards as token reinforcers. Students traded their completed work-record cards weekly for candy and small toys. Bednar, Zelhart, Greathouse, and Weinberg (5) used a token system to increase reading skills and reduce behavior problems in delinquent boys at an Arkansas rehabilitation school; and Hoyer, Kafer, Simpson, and Hoyer (39) made pennies used as tokens contingent upon increased verbal behavior in elderly chronic schizophrenics in a psychiatric hospital.

Zimmerman, Zimmerman, and Russell (87) used tokens to improve instruction-following behavior in a group of retarded students. Phillips, et al. (62) administered tokens in modifying maladaptive behavior in pre-delinquent boys. Lent (50) developed personal, verbal, and social skills in a group of mentally retarded girls, ages eight to twenty-one, living in cottages.

Several controlled studies using behavior modification techniques with sheltered workshop clients have utilized tokens to improve clients' production rates. One of the first published studies of this kind was done by Zimmerman, Stuckey, Garlick, and Miller (89) at Indianapolis Goodwill
Industries Rehabilitation Center. Twelve clients, of various handicaps, worked daily on bag-folding and electric terminal board assembly tasks. Clients served as their own controls and were reinforced on an individual basis, but were otherwise treated as a group. Subjects counted and recorded their own work units on production cards, which they turned in daily to their supervisor. Their production rate count was double-checked for accuracy. Points totalling a given quota, set individually for each subject according to his baseline period production, were exchanged for several items or privileges listed in a catalog. Data covering a fifty-working-day period was analyzed. Differential effects of the experimental conditions on clients' production rates were found to be significant at the .001 level. There were increases in production for all subjects when the baseline periods were replaced by the reinforcement conditions. Productivity was somewhat, but not significantly, higher under the second baseline condition than under the first baseline condition. The conclusion made by the experimenters was that "token reinforcement can be successfully applied to the problem of increasing productivity in multiply handicapped clients in a sheltered workshop" (89, p. 40).

Production and work skills have been prime target behaviors for investigations using tokens in work-oriented rehabilitation facilities. Tate and Baroff (72) applied token reinforcement to teach retarded subjects to assemble
stereo components. Similarly, Crosson (21), using tokens, taught severely retarded boys to use a drill press. Burchard (13) increased subjects' sitting behaviors in a workshop and classroom, using token reinforcement. Hunt and Zimmerman (40) allowed subjects to redeem at a canteen coupons earned following increased production. Couch (20) employed tokens backed by both tangible and intangible reinforcers to increase attendance behavior of a group of disadvantaged sheltered workshop clients.

Walls (78) described how token reinforcement was used on an individual basis to improve the work initiative and performance of a twenty-six-year-old retarded female client of the West Virginia Vocational Rehabilitation Center. The client earned points on a work card which, when completely filled in, could be exchanged for a second-hand dress she wanted. With instatement of this reinforcement contingency, the client began immediately to complete all assigned tasks. This client's behavioral improvement was maintained after the external reinforcement contingency was discontinued.

Four target behaviors were selected for modification with token reinforcement in a study done by Close (18). (a) Attendance, (b) punctuality for work, (c) quality and quantity of work output, and (d) social responsiveness were all reinforced in a group of sixteen mentally retarded subjects in a child development center sheltered workshop. Subjects, all males, ranged in age from sixteen to twenty-one, with
I. Q.'s from 30 to 60. Production work included ceramics and wood finishing and small parts assembly—all simple, repetitive tasks. Staff members were trained in operant methodology through discussions and demonstrations prior to experimental procedures. Staff recorded frequencies of all target behaviors during a ten-day baseline period. Noncontingent soda pop breaks were given to subjects during this period. During the reinforcement period, each worker was given a token upon arrival at the workshop, one token for reporting to the work area on time, a maximum of six tokens for completing his assigned task, including cleanup, and a token for displaying appropriate social behavior. Tokens could be exchanged daily for a variety of items or could be stored in the workshop bank.

After ten weeks of experimental procedures, token reinforcement was withdrawn for two weeks for a return to baseline. Then reinforcement was reinstated during the final two weeks of the study. Results showed a significant increase in mean rates of all target behaviors for the sixteen subjects. Rates dropped during the return-to-baseline period and again rose during the final reinforcement stage. Social responsiveness (following directions, positive interaction with staff and co-workers, et cetera) showed the greatest sensitivity to token reinforcement.

Thus, token reinforcement has been used successfully in rehabilitation, including sheltered workshop settings, to
increase a variety of client behaviors such as production rates and social responsiveness. However, tokens paired with behavioral charting and tokens compared with charting or social reinforcers have not been systematically investigated in these settings.

**Social Reinforcement**

The systematic manipulation of secondary reinforcement in the form of attention or positive verbal statements, such as praise, has been studied extensively, especially in educational settings; but surprisingly little investigation of strictly social reinforcement has taken place in rehabilitation.

A classic study in social reinforcement was done by Greenspoon (32) who used simple verbal sounds such as "mm hm" and "huh uh" in conditioning college students to use a greater number of non-plural nouns. The value of intangible social reinforcement in promoting behavior change is well documented (1, 35, 63, 79, 85, 86). Hall, Lund, and Jackson (35) demonstrated how systematic application of teacher attention and praise increased study behavior among students. Tantrum behavior was eliminated in a young child when the parents withdrew their attention to the behavior (79).

Using a type of case familiar in sheltered workshops, Saslow (64) described how a man in a psychiatric ward, who could talk of nothing but his minor physical ailments, began
to work for the first time in fifteen years after social reinforcement was made contingent upon his noncomplaint behavior. Baldrate and Clements (3), reporting on research done with operant techniques in a rehabilitation facility, noted how persons in such facilities who administer reinforcement may accrue reinforcing value themselves.

In a behavioral study reported by Walls (78) at the West Virginia State Rehabilitation Center, social stimuli, as well as concrete reinforcers, were used to assist a seventeen-year-old quadriplegic, brain-injured youth to recover adequate speech. The client had made good recovery of motor skills; but after two months of speech therapy, he still relied on pointing and hand motions for communication. Staff persons refrained from responding to his sign language as much as possible and encouraged him with praise and behavioral responses to his vocalizations. In addition, he received candy for successful performance during speech therapy sessions. The speech therapist developed an objective method to measure the difficulty of the client's verbalizations. After the reinforcement contingencies began, his speech score on this measure steadily improved and was maintained after the reinforcement was removed. Social reinforcement has been used as part of the "Pounce" program at Minneapolis Rehabilitation Center. Within counseling group settings, clients reinforce each
other for dealing honestly with their vocational problems and for trying out new behaviors (77).

Zimmerman, Overpeck, Eisenberg, and Garlick (88) described how isolation (removal from social contact and social reinforcement) at a separate work table, plus withdrawal of the isolation contingency upon subject's performance of criterion behaviors, was successful in increasing productivity and building good work habits in an "extremely distractible" prevocational training program client in a sheltered workshop setting.

Couch (20) stated that social reinforcement in the form of staff attention and praise contributed to increases in rates of attendance behavior of disadvantaged sheltered workshop rehabilitation clients. Staff members administered verbal and nonverbal forms of praise when clients arrived at work. However, Couch's study, which concentrated on comparing the effects of tangible and intangible back-up reinforcement for tokens, did not examine the differences in attendance rates which might be produced if social reinforcement were used alone. No studies were found which investigated the effects of social reinforcers used as the only form of systematic reinforcement in a rehabilitation setting.

**Social Versus Token Reinforcement**

Some attempts have been made to investigate the differential effects, especially on mentally retarded subjects, of social and concrete reinforcement. Studies with retardates
have been done by Black and Thomas (9), Gewirtz and Baer (28), Groom (33), Husted (42), Johnson (45), Waldron (76), Zigler, Hodgen, and Stevenson (85), and Zigler and Kanzer (86). Black and Thomas (9) found that mongoloid children responded better to token than to social reinforcement in discrimination learning tasks. Johnson (45) concluded from his research that institutionalized moderate retardates were more responsive to tokens than to verbal or symbolic reinforcement. However, Waldron (76) found no such differences with a similar group of subjects. Gewirtz and Baer (28) discovered that social reinforcement was more effective with socially-deprived than socially-satiated mentally retarded subjects. Thus, the results of these studies were in certain instances contradictory, and few definitive conclusions have been drawn concerning the variables which cause different responses to social and concrete (token) reinforcers with mentally retarded subjects.

Zifferblatt (84) examined the relative effectiveness of token, social and unmanaged reinforcements, along with various schedules of reinforcement, on the work and social behavior of twelve male psychiatric patients in occupational therapy. Subjects were randomly assigned to a mode of reinforcement--social (SR), token (TR), or unmanaged (UR). Each group was treated in cycles of baseline, reinforcement application, reinforcement withdrawal, and reinforcement reinstatement. The TR group received a poker chip immediately
upon performance of a contingency. The SR group was given a short statement of approval, praise, smile, or touch, contingent upon required behavior. The UR group received no systematic and contingent reinforcement. Rates of work on a "Paint-by-Numbers" task and social behavior were the dependent variables. Changes in rates of both behaviors were significant for both the TR and SR groups following application of systematic reinforcement. Both groups revealed rate reversals during reinforcement withdrawal stages. Rates of UR subjects did not change significantly from baserates. The experimenters found that much higher rates of behavior were obtained for token reinforcement at all ratio schedules, "indicating the greater strength of tokens as reinforcers for this group of subjects" (84, p. 576).

In a study cited earlier which was designed to determine the effectiveness of tangible and intangible reinforcement in increasing attendance behavior of disadvantaged clients at Atlanta Employment Evaluation and Service Center, Couch (20) used with one group of subjects tokens which could be exchanged for items in a Token Exchange Store. Another group of subjects received tokens, accompanied upon administration by generous social reinforcement (staff attention and praise), which could be exchanged for access to a "time out room" containing leisure and recreational facilities. A control group received no contingent reinforcement. Clients in the two reinforcement groups were given a token as soon
as they clocked in for work at the center. Those in the tangible reinforcement group could exchange their tokens immediately for desired items. Clients in the intangible reinforcement group were given praise and attention by staff persons as they received their tokens, and they could exchange the tokens for admittance to the time out room. After a week of perfect attendance, these clients could also take time off from work.

Couch’s results revealed a significant difference in group attendance rates between the reinforced and non-reinforced groups. The tangibly reinforced group had a significantly greater group attendance rate than the intangibly reinforced group (p. < .05). Follow-up thirty days after completion of treatment procedures showed that the attendance rates for all groups dropped, with the tangibly reinforced group dropping below its baseline level. In his discussion, however, Couch stated that recognition and attention appeared to serve as a more potent reinforcer for many disadvantaged subjects than other types of tangible reinforcers, such as rest or a time out room; but Couch’s study was an investigation only of token reinforcement backed by tangible and intangible reinforcers, the latter category happening to include social reinforcement. No research was uncovered in which the overall efficacy of token reinforcement was measured against that of strictly social reinforcement in a sheltered workshop setting.
Additionally, it seemed important to determine the extent to which social reinforcers incidental to token reinforcement systems, such as the one used in Couch's study, contribute to the overall effectiveness of the token procedures. How effective would a token reinforcement system be if it were administered without accompanying social reinforcers? Would such a system prove as effective as using only social reinforcement alone, eliminating the more complicated token procedures? These are questions which have not yet been answered by controlled investigation.

Synthesis

Operant conditioning methods have been used successfully to modify individual behaviors in a variety of populations and treatment settings (2, 10, 11, 13, 23, 26, 29, 39, 44, 59, 80, 81). The techniques have demonstrated success in working with rehabilitation clients (14, 20, 21, 31, 40, 56, 65, 67, 83, 88, 89). Different modes of positive reinforcement have been used to facilitate behavior change in rehabilitation settings, including token reinforcement (18, 20, 89), social reinforcement (20, 84), and behavioral charting (43). To provide for more extensive application of positive reinforcement in rehabilitation settings, there exists a need for a clearer definition of the specific modes of reinforcement which most effectively motivate behavior change in rehabilitation clients (20, 31, 61).
Research on the relative effectiveness of social and token reinforcers with mentally retarded subjects, a group which represents a large portion of the client population in many work-oriented rehabilitation facilities, have produced contradictory findings. Some studies obtained better results with social reinforcement (28, 76), while others achieved better results using token reinforcement (9, 45). One study was found which investigated the comparative effects of social versus token reinforcement with subjects who were psychiatric patients in occupational therapy. In this research (84), it was found that token reinforcers effected higher production and social response rates among these clients than did social reinforcement. A recent study (20), which did not compare social with token reinforcement per se, nevertheless obtained results which suggested that social reinforcement can serve as a very potent reinforcer for disadvantaged rehabilitation clients. The issue of the relative effectiveness of social versus token reinforcement with rehabilitation clients has not been researched, and an unanswered question involves how much of the reinforcement value of token systems employed with rehabilitation clients was contributed by social reinforcers incidental to the delivery and exchange of the tokens.

Few studies of operant techniques in sheltered workshop settings have incorporated behavioral charting as a reinforcement procedure. Although informational feedback to subjects
in the form of charts or graphs of behavioral frequencies has been shown to be an effective reinforcer in itself (19, 22, 34, 44), and the potential reinforcing value of behavioral charts in rehabilitation settings has been noted (61, 78, 88), only one study was found which specifically investigated the reinforcement effects of charting procedures alone (43). It appears that behavioral charting can act as a positive reinforcer to facilitate behavior changes in rehabilitation clients, but the use of charting has been most often included only as an incidental part of an overall operant conditioning program (18, 88), without its specific effects as a separate variable providing reinforcing cognitive or informational feedback to clients being studied. It seems necessary, then, to repeat with sheltered workshop subjects the previous study (43) on behavioral charting as a single mode of reinforcement.

In general, there appears a need for further research on the differential action of behavioral charting, token reinforcement, and social reinforcement with sheltered workshop clients, and particularly with the token and social reinforcement factors segregated. The possibility that the effectiveness of token and social reinforcement might be enhanced when each is combined with behavioral charting, as has been suggested by Walls (78) and by the work of Lindsley and others (19, 44, 46) also needs further investigation within a rehabilitation setting. Thus, this review of the
literature on behavioral charting, token reinforcement and social reinforcement resulted in the definition of several specific points of confusion or uncertainty regarding the effects of these modes of reinforcement upon the behavior of rehabilitation subjects. These specific points have been consolidated and are expressed in the following five research questions, around which this investigation is developed:

1. Would behavioral charting be an effective form of reinforcement for sheltered workshop clients?

2. Would combining behavioral charting with either token or social reinforcement be an effective reinforcement procedure for sheltered workshop clients?

3. Would a reinforcement procedure which combined behavioral charting with either token or social reinforcement be more effective in increasing client productivity than applying behavioral charting, token reinforcement, or social reinforcement singly?

4. How would behavioral charting compare with token and social reinforcement in improving the production behavior of sheltered workshop clients?

5. Would sheltered workshop clients respond better to token or to social reinforcers?
CHAPTER BIBLIOGRAPHY


CHAPTER III

METHODS AND PROCEDURES

This chapter presents in detail (a) the selection and description of subjects under study, (b) the experimental procedures, (c) the collection and processing of data, and (d) the analysis of data.

Selection of Subjects

Sixteen subjects were available for participation in the study. These subjects were trainees and employees working at Goodwill Industries of Fort Worth during the fall of 1973. Trainees at this Goodwill are sponsored clients of various rehabilitation agencies, primarily Texas Rehabilitation Commission. They represent a wide variety of disabilities, including mental retardation, mental illness, blindness, epilepsy, cerebral palsey, delinquency, cultural deprivation, speech and hearing impairments. Goodwill employees are those persons who are regularly employed, hourly-paid production and clerical workers. They present the same wide variety of disabilities as do the trainees.

Selection Criteria

Subject selection was based on the following criteria:

1. relatively regular job attendance,
2. absence of physical limitations for doing manual tasks,
3. at least six weeks remaining in subject's training or employment period,
4. subject's availability to leave his work station daily for participation in the study.

**Description of Subjects**

The two treatment groups, originally consisting of eight subjects each, were reduced to five subjects each after subject drop-outs and eliminations for statistical purposes. There were six females and four males in the sample. Most had multiple handicaps, such as mental retardation plus speech impairment. Seven of the ten subjects were classified as mentally retarded. Subjects ranged in age from eighteen to forty-six years. These clients had been at Goodwill, either in training or employment, ranging from five months to six years. Table I provides a summary of the descriptive data on the ten subjects in the final sample.

**Procedure**

**Preliminary Procedures**

In preparation for the actual research procedures, certain preliminary activities were carried out during a two-week period just prior to the initiation of the experimental program. Table II shows the order of these preliminary procedures, all of which were completed before the baseline stage of the study began.
TABLE I
DESCRIPTION OF CLIENTS WHO SERVED AS SUBJECTS

<table>
<thead>
<tr>
<th>Group</th>
<th>Client</th>
<th>Age</th>
<th>Sex</th>
<th>Months in Training</th>
<th>Months in Employment</th>
<th>Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>27</td>
<td>M</td>
<td>17</td>
<td>..</td>
<td>.. X ..</td>
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<tr>
<td></td>
<td>2</td>
<td>23</td>
<td>M</td>
<td>8</td>
<td>21</td>
<td>.. .. X</td>
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<td>7</td>
<td>18</td>
<td>F</td>
<td>13</td>
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<td>X ..</td>
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<td>..</td>
<td>X ..</td>
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<td>75</td>
<td>X ..</td>
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<tr>
<td></td>
<td>10</td>
<td>19</td>
<td>F</td>
<td>..</td>
<td>10</td>
<td>X ..</td>
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<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 4 1 1 1</td>
</tr>
</tbody>
</table>

\[ \bar{x} = 25 \quad \text{S.D.} = 8 \]

*Code: MR=mental retardation, Emot.=emotional, Neur.=neurological, Vis.=visual, Aud.=auditory, Orth.=orthopedic, Soc.=socially deprived

**Multiple neurofibromas

***\( \bar{x} \)=mean, S.D.=standard deviation
TABLE II
ORDER OF PRELIMINARY PERIOD PROCEDURES

<table>
<thead>
<tr>
<th>Week</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 . . .</td>
<td>Selection and introduction (token priming) of reinforcers</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Token priming continued</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Selection and training of supervisors</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Arrangement of experimental work areas</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Instructions to subjects</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Gathering of preliminary production data (subjects divided into two preliminary groups)</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Assignment of subjects to treatment groups</td>
</tr>
<tr>
<td>2 . . .</td>
<td>Assignment of treatment groups to supervisors</td>
</tr>
</tbody>
</table>

Selection and introduction of reinforcers.--Because of the ease in handling and the assumed generalized reinforcing value to the subjects in this study, money in the amount of ten cents per token, exchanged weekly, was selected as the back-up reinforcer for tokens given to subjects in the TR group. The average salary paid by Goodwill of Fort Worth to all subjects was approximately forty-three cents per hour, with most of the subjects who were trainees rather than employees, making only twenty-five cents per hour. Since these subjects made relatively little money on their jobs, it was assumed that ten cents for one-half hour's work, which was paid in addition to their regular hourly salary, would seem to these clients to be a sufficient amount of money to warrant their working toward the production criteria required to earn a token each day. Money had been used as a reinforcer with rehabilitation clients by Baldrate and Clements (2), Booraem and Seacat (3), and by Burgess (4).
Money had been named frequently as a desirable reinforcer by Goodwill clients who completed an inventory of available reinforcers. (See Appendix B for a copy of this inventory.) During the preliminary, token-priming period of this study, subjects' verbal and behavioral expressions of eagerness to obtain tokens, which were exchanged at that time for a penny each, suggested that tokens exchanged in this manner had accrued reinforcing value to these clients.

The token-priming process took place during the two weeks prior to the initiation of the first (baseline) stage of the experimental phase of the study. Subjects who were to participate in the study were given tokens on a noncontingent basis, without being systematically administered to follow any specified behavior. This was done in order to establish the tokens as reinforcing to these subjects before treatment utilizing the tokens began (1). Tokens were given daily to subjects and exchanged for one cent per token at the end of each week. In order to disguise the experimental purpose of the tokens, clients other than those to be used in the study were also given tokens to exchange during this pre-experimental period.

Selection of supervisors.--Treatment procedures were carried out primarily by two regular workshop supervisors, both of whom were selected on the basis of daily availability to administer experimental procedures, past demonstration of interest and cooperativeness in trying out new training
methods, and records of good supervisory relationships with clients. Two female supervisors, one black, one white, were chosen. The black supervisor headed the Sorting and Wares Department at Goodwill and had six years experience as a Goodwill supervisor and training instructor. She was eventually assigned to the TR group. The SR group was assigned to the supervisor of the Laundry and Dry Cleaning Department. This supervisor had served in her position at Goodwill for three and one-half years.

Two alternate supervisors were selected to administer experimental procedures in the absence of the regular supervisors. For the SR group, the assistant supervisor of the Laundry and Dry Cleaning Department, a female, served as an alternate supervisor; and a male who headed the Electrical Department of Goodwill acted as an alternate supervisor for the TR group. Alternates were trained in the same manner as the regular supervisors for each group. The alternate supervisor carried out treatment procedures for the SR group on occasion throughout the research program, but the services of the TR group alternate supervisor were never required. All of the supervisors and alternate supervisors were in the age bracket of forty to sixty years.

Training of supervisors.—A few months before this research was initiated, the supervisors who took part in this investigation, along with all the workshop supervisors at Goodwill, completed a six-week in-service training course
conducted by the experimenter and covering the basic principles and techniques of behavior modification. Three days prior to the beginning of the research, and again preceding each subsequent stage of the study, the experimenter trained both supervisors, plus the alternate supervisors, in the treatment procedures to be administered to subjects and in the methods of collecting production and reliability data.

Training consisted of the experimenter's demonstrating the manner in which reinforcement, if applicable, was to be given to subjects in each supervisor's group and the way daily production counts and reliability checks were to be performed and recorded. Training was considered adequate when each supervisor and alternate supervisor demonstrated, in a role-playing situation using a "dummy" subject, the correct treatment and data recording procedures.

Arrangement of experimental work areas.--Two separate production stations were organized, with the work area for each experimental group on a different floor of the Goodwill plant. These work stations were established within regular plant production centers, and each was arranged within an area of the production departments normally directed by the two supervisors who participated in the study.

A work table seating eight subjects was provided in a corner of the Sorting and Wares Department, and another work table was similarly arranged in the Laundry and Dry Cleaning Department. Eight folding chairs were set around each work
table. Beside each chair was a cardboard box, attached to which was a white card with a subject's name printed on it. Every subject in each group had an assigned chair at his work table and a box with his name on it where bags he completed during each work session could be stored. Each subject's daily production of bags was thus maintained separately to assure that daily production totals were correctly counted and credited to individual clients.

Instructions to subjects.--On the first day of the second week of the preliminary period, subjects were asked to report to one of the two work areas set up for the study. Upon arrival at the assigned work areas, subjects met in groups with the supervisor in charge of each group. Each supervisor explained to the subjects in her group that Goodwill had received a special contract to package plastic forks in bags for sale in grocery stores. Subjects were told that not much time was available to work on this contract, so work would take place on the project for only one-half hour each morning until it was completed. Each supervisor then explained and demonstrated the way the forks were to be packaged, counting out twenty-four plastic forks and bagging them. (Bags were not sealed as part of this process, but were left open at one end.) Subjects were instructed not to begin work until told to do so by the supervisor and to stop or finish filling the bag they were working on when a small kitchen timer, placed near
their work table, sounded. They were shown how to place completed bags in their own cardboard boxes. Subjects were then asked to begin work on the packaging task. They were watched closely during this first and the next few days and, if necessary, helped to perform the task correctly. At the end of the first work session subjects were instructed to count the number of filled bags they had in their boxes and to inform the supervisor of their production total for that day. The supervisor and/or the experimenter checked a few of the completed bags in each subject's box to ascertain that exactly twenty-four forks had been placed in each bag, and then also double-checked the subject's count of his total production of bags before permitting him to return to his regular work station. Subjects were told that they would be summoned at the same time each morning over the public address system to report to their assigned area for work on this contract.

Assignment of subjects to treatment groups.--During the week prior to the beginning of experimental procedures, subjects worked on the fork-packaging task. No systematic reinforcement was administered. Production totals for each subject during this second week of the preliminary period were used to divide subjects into categories of "high," "medium," and "low" producers. Clients in each of these categories were then assigned randomly to one of the two treatment groups. The objective of this assignment procedure
was to establish two experimental groups which were initially comparable in production rates.

**Assignment of groups to supervisors.**—After the composition of the treatment groups was completed, each group was randomly assigned to one of the two supervisors who had conducted the preliminary procedures. Subjects who were moved as a result of the treatment group assignment from the area in which they had worked during the preliminary period to the other work area were simply asked to report to the other station for the remainder of the contract work.

**Experimental Procedures**

**Dependent variable.**—Rates of production (number of bags completed) served as the dependent measure and were counted and recorded at the end of the daily half-hour work sessions.

**Treatment variables.**—Four modes of reinforcement were applied to each treatment group: behavioral charting, behavioral charting plus token or social reinforcement, token or social reinforcement only, and an unmanaged reinforcement condition.

**Design.**—The design utilized in this research was, excepting of the absence of a complete reversal-to-baseline stage, an extension of the own-control replication paradigm, or functional design, developed by Skinner (6). The clients
were treated as a group with respect to the introduction of each experimental condition, but each subject served as his own control, being reinforced on the basis of his own recent work history.

The study was conducted in six experimental stages which succeeded the preliminary period. Table III provides a diagram of the experimental conditions. The experimental procedure was designed to provide for (a) at least one administration of each reinforcement condition, (b) the alternate removal of one component at a time of the combination reinforcement modes, and (c) the replication of the least researched modes involved in this study, behavioral charting and the combinations of behavioral charting with token or social reinforcement.

Stage 1 of the study provided baseline for both groups as well as serving as an unmanaged reinforcement period.

**TABLE III**

ORDER OF EXPERIMENTAL CONDITIONS

<table>
<thead>
<tr>
<th>Group</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
<th>Stage 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UR*</td>
<td>C</td>
<td>C + TR</td>
<td>C</td>
<td>TR</td>
<td>C + TR</td>
</tr>
<tr>
<td>2</td>
<td>UR</td>
<td>C</td>
<td>C + SR</td>
<td>C</td>
<td>SR</td>
<td>C + SR</td>
</tr>
</tbody>
</table>

*Code: UR--unmanaged reinforcement  
C--Charting  
TR--token reinforcement  
SR--social reinforcement
During Stage 2, only behavioral charting was administered, with both groups. In Stage 3, token reinforcement was combined with the behavioral charting in Group 1—the TR group, and social reinforcement accompanied behavioral charting in Group 2—the SR group. Withdrawal of the token reinforcement and the social reinforcement, leaving charting only, took place in Stage 4, for both groups. In Stage 5, charting was withdrawn and token and social reinforcement reinstated in their respective groups. Stage 6 was a repetition of the combination treatment conditions, charting plus TR in Group 1 and charting plus SR in Group 2.

Horizontal comparisons across stages for each group permitted investigation of the separate effects of each independent variable (charting, charting plus TR, charting plus SR, TR only and SR only). Vertical comparisons across groups for Stages 3, 5, and 6 permitted investigation of differences in subject responsiveness to token and social reinforcers. Stages 4 and 5 allowed study of the effect upon rates exerted by the charting procedure alone and by the token and social reinforcement procedures alone. Stage 6 was a replication of the combination charting plus token and charting plus social reinforcement conditions.

Treatment conditions.—Each stage of the six-stage experimental program lasted for one five-working-day week. The entire research project, including the two-week preliminary period, covered a period of eight weeks, beginning
September 10, 1973, and ending October 26, 1973. Subjects in both groups worked on the same fork-packaging task. Production totals were counted daily by subjects and their counts checked for accuracy by the supervisors and/or experimenter. Production counts were recorded on graph paper, which also served as the behavioral charts shown to subjects during the treatment phases which employed behavioral charting.

Stage 1: unmanaged reinforcement and baseline.—Initially, both groups worked with no charts or systematic reinforcement being applied. This first stage served to establish a baserate of daily production for each subject. This data was gathered in addition to initial production data acquired in the preliminary week for the matching of groups. Production rates were counted and recorded, but were not charted for subjects during this stage.

Stage 2: charting.—Behavioral charts were introduced in the second, or charting only, stage of the study. Identical treatment procedures were applied to both groups. Clients in each of the groups counted their daily production at the end of each work session. Then the supervisors or alternate supervisor checked the counts and recorded each client's daily production on his individual behavioral chart in the client's presence. Each subject saw his own chart but could not see the charts of other subjects. Also, care was taken during the charting only stages (Stages 2 and 4)
to exclude any kind of social or tangible reinforcement for production, other than the charting procedure.

**Stage 3: charting plus token reinforcement and charting plus social reinforcement.**—In the third stage of the study, charting was combined with token reinforcers for Group 1 and with social reinforcement for Group 2. Tokens consisted of round plastic discs which clients could exchange weekly for money, each token being worth a dime. Tokens earned each day by individual subjects were stored until the fifth day of the period (a Friday) in a token bank placed near the group's work table. This bank was a shallow box hung on the wall, containing horizontal slots which held the tokens in separate rows. A label with each subject's name appeared at the top of each individual slot in the bank, and a clear plexiglass door covered the front of the bank so that subjects could see how many tokens they were accumulating. At the end of the work session on Friday, tokens were removed by the supervisor from the locked token bank and exchanged with the clients for ten cents each. The money could then be pocketed by the subjects collecting it, spent in the Goodwill cafeteria for food and snacks, or used to buy items in one of the Goodwill retail stores where all clients received a discount. A TR group subject was given a token by the supervisor each time his daily production exceeded that which he obtained on the previous day of production.
For the purposes of this study the supervisor using the TR method was instructed to minimize the amount of socially-reinforcing contact she provided to clients while administering tokens to them. Most of the supervisor's verbal statements and physical gestures under all treatment conditions utilizing token reinforcement (Stages 3, 5, and 6) involved acknowledgement that the client had exceeded his previous day's production level and had earned a token. Tokens were handed to clients with a minimum of facial and other physical expressions of approval. Also during Stage 3, daily production rates were plotted on each subject's behavioral chart while the subject looked on. This charting procedure was carried out for each subject in both reinforcement groups and was performed for each subject whether or not he also earned a token or social reinforcer combined with it.

Social reinforcement was given to a subject in the SR group when he exceeded his previous day's production, as shown on his chart. The manner in which the social reinforcement was administered consisted of statements from the supervisor or alternate supervisor such as, "That's good; you did better today," "You're improving," "This looks better than yesterday; very good work," and gestures such as smiling at the subject, patting him on the back, and so forth. In the C + SR condition of Stage 3, the social reinforcement procedure was administered along with the recording
and displaying of daily production totals on behavioral charts. All subjects were given the charting contingency, but only those meeting production criteria were administered the social reinforcement.

Stage 4: charting.--The procedure for this stage was identical to that carried out in Stage 2. Token and social reinforcement were withdrawn from their respective groups in order to measure production rates in both groups after these variables were removed.

Stage 5: token reinforcement and social reinforcement.--Charts were maintained on subjects' production rates during this week, but these graphs were not shown to subjects, thus removing the charting variable as a reinforcement procedure under the Stage 5 condition. Token reinforcement, without charting, was carried out with Group 1 in the manner described for Stage 3. Similarly, social reinforcement was administered in the same way as performed in Stage 3, but without combining it with display of the behavioral charts to subjects. Clients in the TR group were given tokens under the same production-contingent conditions as previously described. The contingency for delivering social reinforcement to SR group subjects during Stage 3 was maintained during this fifth period.

Stage 6: charting plus token reinforcement and charting plus social reinforcement.--During the final stage, the
combination of charting and token or social reinforcers was reinstated for each group in order to provide a replication of this treatment condition. Procedures for each group were carried out in the same manner as they were in Stage 3.

Collection of Data

Daily production counts of the number of bags completed by each subject were maintained and recorded by the supervisors or alternate supervisor, with occasional assistance from the experimenter. During the experimental periods, daily production totals were plotted on quadrille graph paper by either the supervisors or alternate supervisor. A copy of the form used for these graphs appears in Appendix A.

Reliability

Reliability checks on production counts were made daily by the supervisors or the experimenter. This procedure was performed by double-checking subjects' counts of the bags they completed. If a subject's count conflicted with the count made by the supervisor or experimenter, a third count was made to determine the actual total. A subject was informed if his count was found to be in error. The corrected count was then recorded and placed during experimental phases on the subject's chart. This reliability check on production counts was made at the end of every work session throughout the preliminary and experimental periods. It was especially important to make this reliability check during
reinforcement stages of the study to insure that reinforcement was administered only when subjects had actually reached criteria production levels.

In addition, to assure that treatment and data collection procedures were properly administered by supervisors and alternate supervisors, direct observations of experimental sessions were made almost daily by the experimenter during preliminary and experimental periods. The experimenter, who prior to and at the time of the study was employed at Goodwill of Fort Worth, was seen customarily in production areas of the workshop.

Analysis of Data

Reduction of Size of Sample

Four subjects, for various reasons unconnected with this research, terminated their training before the experiment was completed, leaving twelve subjects remaining at the end of the treatment period. In order to balance the size of the two groups for the simplification of the statistical computation of the data, two of the remaining twelve subjects, both from the TR group, were randomly selected by drawing of names and excluded from the final data analysis. Thus, the size of the final sample included in the analysis of results was ten.

Several subjects had rather high absentee rates during the time of the experimental program, but data was retained
for the final statistical analysis for any subject who attended at least three days of each five-day stage of the experimental portion of the study.

Statistical Procedures

In order to establish the comparability of the initial production rates of the two treatment groups resulting after the reductions in the size of the original sample of clients, a t-test (5) was performed using the preliminary phase production data for the ten subjects who were retained in the final sample. The assumption of homogeneity of variance of the two groups on the criterion measure was tested using an Fmax-test (7).

A 2 X 6 factorial analysis of variance for repeated measures (8) was performed to establish the extent to which the combined effects of all treatment conditions under investigation modified the production rates of both groups of subjects, testing for the significance of differences between the within group production means for all treatment conditions. In addition, this statistical test was used to determine the significance of the difference between the production means of Group 1 (TR) and Group 2 (SR) as well as to establish the significance of any interaction between the groups and treatment factors.

In order to make the specific statistical tests necessary to examine the tenability of the eleven hypotheses under study, tests of the significance of the differences
between all pairs of treatment means were made using the Tukey (b) method (8). Of the multiple comparisons obtained in this manner, twenty-seven individual comparisons of pairs of means relevant to the hypotheses were examined.

Statistical computations involved in the analysis of variance and the individual comparisons of treatment means were performed at the North Texas State University Computer Center using their standard statistical formula for the analysis of variance and using the formula suggested by Winer (8, p. 81) for employing the studentized range statistic in making individual comparisons. The .05 confidence level was selected as the level of significance required for rejection of all hypotheses.

**Non-Statistical Procedures**

Additional treatment of the data included inspection of the production records of individual subjects and of the group performance profiles derived by plotting graphically the group production means. In this manner, changes in production means could be considered which did not attain statistically significant levels.
CHAPTER BIBLIOGRAPHY


CHAPTER IV

ANALYSIS OF RESULTS AND DISCUSSION

Analysis of Data

The purpose of this chapter is to present and analyze the statistical and non-statistical results based on the data collected in this study. The investigation was concerned with the effects of the following five modes of reinforcement on the productivity of sheltered workshop clients: behavioral charting, token reinforcement, social reinforcement, behavioral charting combined with token reinforcement, and behavioral charting combined with social reinforcement. Differential effects of these reinforcement methods were investigated by arranging for the application of each reinforcement mode in a sheltered workshop setting and comparing the mean production rates achieved by two groups of sheltered workshop clients under each reinforcement condition. Each of six treatment stages involved a variation in the reinforcement mode, beginning with an unmanaged reinforcement condition which served as a control phase.

After four subjects dropped out of training during the course of the study and two other subjects were randomly eliminated to facilitate the statistical computation of data, the final sample used in the statistical analysis

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consisted of ten subjects, five in Group 1 (TR) and five in Group 2 (SR). Table IV shows the resulting group compositions, with the preliminary period production mean for each subject and for each group. Subject number one was not available to take part in work sessions during the preliminary week; therefore, for statistical purposes his preliminary production mean was recorded as being the same number he obtained during the first week (baseline) of the experimental period. He was classified as a low producer for the purpose of assignment to a treatment group, as his production rate was known to be very low.

**TABLE IV**

PRELIMINARY PRODUCTION MEANS FOR EACH SUBJECT AND EACH GROUP

<table>
<thead>
<tr>
<th>Group</th>
<th>Subject</th>
<th>Mean</th>
<th>Group Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>15</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td>18</td>
<td>14.4</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>5*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>

*Estimated from later performance. Subject not available during preliminary period.*
The assumption of homogeneity of variance of initial production rates for the two groups was tested using an \( F_{\text{max}} \)-test (6). The production means used in performing this test were those recorded for each subject during the preliminary period of the study (Table IV). The results of the \( F_{\text{max}} \)-test are presented in Table V.

**Table V**

**VARIANCE OF PRELIMINARY GROUP PRODUCTION MEANS**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Variance</th>
<th>df</th>
<th>( F_{\text{max}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.40</td>
<td>33.00</td>
<td>4</td>
<td>1.31</td>
</tr>
<tr>
<td>2</td>
<td>14.40</td>
<td>43.44</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Since the observed value of 1.31 for the \( F_{\text{max}} \) statistic was less than the critical value, \( F_{\text{max},0.95}^{(2,4)}=9.60 \), the assumption of homogeneity of variance of the initial group production means was satisfied.

In order to determine whether or not the groups used in the analysis of results were comparable in their initial production rates, a \( t \)-test (4) was performed using the preliminary phase production data. Table VI summarizes the results of the \( t \)-test.

An obtained \( t \)-ratio of 0.69 was not significant at the .05 level of confidence. A ratio of 2.31 with 8 degrees of
TABLE VI
DIFFERENCE IN PRELIMINARY GROUP PRODUCTION MEANS

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11.40</td>
<td>8</td>
<td>0.69</td>
</tr>
<tr>
<td>2</td>
<td>14.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

freedom would have been necessary to attain significance at the .05 level. Therefore, on the criterion measure of production rate, the two groups did not differ significantly prior to the initiation of treatment procedures.

Overall Treatment Effects

Production rate data was collected from subjects in both treatment groups at the end of each of the thirty half-hour work sessions composing the six five-day treatment stages. Table VII presents the results obtained over the entire experimental period in terms of the mean daily productivity (units/half hour) for each of the ten subjects under each of the six reinforcement conditions.

Utilizing the weekly group production means presented in Table VII, a 2 X 6 factorial analysis of variance for repeated measures (8) was used to examine the overall effects of treatment procedures. Table VIII summarizes the results of the analysis of variance.
### TABLE VII

**MEAN DAILY PRODUCTIVITY OF SUBJECTS BY GROUPS UNDER EACH EXPERIMENTAL CONDITION**

<table>
<thead>
<tr>
<th>Group</th>
<th>Subject</th>
<th>UR</th>
<th>C₁</th>
<th>(C + R)₁</th>
<th>C₂</th>
<th>R</th>
<th>(C + R)₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>18</td>
<td>21</td>
<td>26</td>
<td>27</td>
<td>29</td>
<td>30</td>
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<td></td>
<td>2</td>
<td>10</td>
<td>13</td>
<td>14</td>
<td>12</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>11</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>24</td>
<td>23</td>
<td>23</td>
<td>25</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
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<tr>
<td></td>
<td>Total</td>
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<td>15.60</td>
<td>17.00</td>
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<td></td>
<td>Total</td>
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<td>16.20</td>
<td>18.20</td>
<td>24.00</td>
<td>24.00</td>
</tr>
<tr>
<td>Both</td>
<td>15.0</td>
<td>16.9</td>
<td>20.5</td>
<td>20.7</td>
<td>21.3</td>
<td>21.9</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE VIII

**ANALYSIS OF VARIANCE OF GROUP 1 AND GROUP 2 SUBJECT MEAN PRODUCTION RATES UNDER THE SIX TREATMENT CONDITIONS**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>d.f.</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TR,SR groups</td>
<td>9</td>
<td>5869.35</td>
<td>651.02</td>
<td>0.71</td>
</tr>
<tr>
<td>Subjects within groups</td>
<td>8</td>
<td>5393.33</td>
<td>674.17</td>
<td></td>
</tr>
<tr>
<td>(error)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment conditions</td>
<td>50</td>
<td>874.83</td>
<td>17.47</td>
<td>7.47*</td>
</tr>
<tr>
<td>Treatments X groups</td>
<td>5</td>
<td>383.68</td>
<td>76.74</td>
<td>1.57</td>
</tr>
<tr>
<td>Treatment X subjects</td>
<td>40</td>
<td>410.67</td>
<td>10.27</td>
<td></td>
</tr>
<tr>
<td>within groups (error)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at less than .05 level.
Apart from the Treatments sum of squares, all other sources of variation fell short of significance. These results indicated that there was no significant difference in overall treatment effects between the social and token reinforcement groups. The Treatments X Groups Interaction also failed to show significance at the .05 level. However, the analysis revealed that the treatment conditions had very significant effects (p. < .00005) on clients' production rates. This result was a consequence of the fact that, as Table VII shows, the majority of subjects in both groups contributed to the overall changes in group production rates.

**Differential Treatment Effects**

In order to test the specific hypotheses posed for this study, which were concerned with the differential effects of the reinforcement modes applied, comparisons were made of individual pairs of treatment means using the Tukey (b) method suggested by Winer (8, p. 81). This method utilizes the studentized range statistic and is considered to be a moderately conservative test in terms of keeping the Type I error small (4, 8). Computations for this analysis using the studentized range statistic were simplified by arranging for the use of data on an equal number of subjects in each group.

Of the multiple comparisons obtained using this procedure, the following individual comparisons relevant to the eleven hypotheses were examined.
Hypothesis I: The application of a behavioral charting procedure will produce significantly greater mean production rates among sheltered workshop clients than will an unmanaged reinforcement procedure.

Comparisons of (a) Group 1 mean production rates under Stage 1 (UR) and Stage 2 (C_1), (b) Group 1 mean production rates under Stage 1 (UR) and Stage 4 (C_2), (c) Group 2 mean production rates under Stage 1 (UR) and Stage 2 (C_1), and (d) Group 2 mean production rates under Stage 1 (UR) and Stage 4 (C_2)

Hypothesis II: The application of token reinforcement combined with behavioral charting will produce significantly greater mean production rates among sheltered workshop clients than will an unmanaged reinforcement procedure.

Comparisons of (a) Group 1 mean production rates under Stage 1 (UR) and Stage 3 (C + TR)_1 and (b) Group 1 mean production rates under Stage 1 (UR) and Stage 6 (C + TR)_2

Hypothesis III: The application of social reinforcement combined with behavioral charting will produce significantly greater mean production rates among sheltered workshop clients than will the application of an unmanaged reinforcement procedure.

Comparisons of (a) Group 2 mean production rates under Stage 1 (UR) and Stage 3 (C + SR)_1 and (b) Group 2 mean production rates under Stage 1 (UR) and Stage 6 (C + SR)_2
Hypothesis IV: The application of behavioral charting combined with token reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of a behavioral charting procedure alone.

Comparisons of (a) Group 1 mean production rates under Stage 2 \( (C_1) \) and Stage 3 \( (C + TR)_1 \), (b) Group 1 mean production rates under Stage 3 \( (C + TR)_1 \) and Stage 4 \( (C_2) \), (c) Group 1 mean production rates under Stage 2 \( (C_1) \) and Stage 6 \( (C + TR)_2 \) and (d) Group 1 mean production rates under Stage 4 \( (C_2) \) and Stage 6 \( (C + TR)_2 \)

Hypothesis V: The application of behavioral charting combined with social reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of a behavioral charting procedure alone.

Comparisons of (a) Group 2 mean production rates under Stage 2 \( (C_1) \) and Stage 3 \( (C + SR)_1 \), (b) Group 2 mean production rates under Stage 3 \( (C + SR)_1 \) and Stage 4 \( (C_2) \), (c) Group 2 mean production rates under Stage 2 \( (C_1) \) and Stage 6 \( (C + SR)_2 \) and (d) Group 2 mean production rates under Stage 4 \( (C_2) \) and Stage 6 \( (C + SR)_2 \)

Hypothesis VI: The application of behavioral charting combined with token reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of token reinforcement alone.
Comparisons of (a) Group 1 mean production rates under Stage 3 \((C + TR)_1\) and Stage 5 \((TR)\) and (b) Group 1 mean production rates under Stage 5 \((TR)\) and Stage 6 \((C + TR)_2\)

Hypothesis VII: The application of behavioral charting combined with social reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of social reinforcement alone.

Comparisons of (a) Group 2 mean production rates under Stage 3 \((C + SR)_1\) and Stage 5 \((SR)\) and (b) Group 2 mean production rates under Stage 5 \((SR)\) and Stage 6 \((C + SR)_2\)

Hypothesis VIII: The application of token reinforcement alone will produce significantly greater mean production rates among sheltered workshop clients than will the application of behavioral charting procedures alone.

Comparisons of (a) Group 1 mean production rates under Stage 2 \((C_1)\) and Stage 5 \((TR)\) and (b) Group 1 mean production rates under Stage 4 \((C_2)\) and Stage 5 \((TR)\)

Hypothesis IX: The application of social reinforcement alone will produce significantly greater mean production rates among sheltered workshop clients than will the application of behavioral charting procedures alone.

Comparisons of (a) Group 2 mean production rates under Stage 2 \((C_1)\) and Stage 5 \((SR)\) and (b) Group 2 mean production rates under Stage 4 \((C_2)\) and Stage 5 \((SR)\).
Hypothesis X: There will be no significant difference between the mean production rates of sheltered workshop clients receiving token reinforcement and those receiving social reinforcement, in the absence of behavioral charting procedures.

Comparison of (a) Group 1 mean production rates under Stage 5 (TR) and Group 2 mean production rates under Stage 5 (SR)

Hypothesis XI: There will be no significant difference between mean production rates of sheltered workshop clients receiving token reinforcement in combination with behavioral charting and those receiving social reinforcement in combination with behavioral charting.

Comparisons of (a) Group 1 mean production rates under Stage 3 (C + TR)₁ and Group 2 mean production rates under Stage 3 (C + SR)₁ and (b) Group 1 mean production rates under Stage 6 (C + TR)₂ and Group 2 mean production rates under Stage 6 (C + SR)₂

A summary of the results of these individual comparisons appears in Appendix C. Each individual comparison made on a pair of means is numbered separately in the table and each comparison is grouped with the hypothesis it tested. The range values given for each comparison are the critical values required for a .05 level test. The range values were used in computing the range products. If the difference between any two means being compared exceeded the range
product value, the means were significantly different. Significant results are marked with an asterisk for each test. The statistical data appearing in Tables IX through XIX, in the following presentation of the results of the individual comparisons, are extracted from Appendix C.

Hypothesis I.--Hypothesis I stated that daily charting of the production counts obtained by sheltered workshop clients would lead to significantly higher mean production rates than would using no form of systematic reinforcement. Behavioral charting was applied as the only form of contingent reinforcement for both groups of subjects during Stages 2 and 4 of the study. Comparisons of the production means obtained for both groups under the charting conditions are presented in Table IX below.

**TABLE IX**

**COMPARISONS OF GROUP 1 AND GROUP 2 MEANS UNDER UR AND C CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>13.80 15.60</td>
<td>1.80</td>
<td>5.30</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>13.80 17.40</td>
<td>3.60</td>
<td>6.02</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>16.20 18.20</td>
<td>2.00</td>
<td>5.30</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>16.20 24.00</td>
<td>7.80</td>
<td>6.02*</td>
</tr>
</tbody>
</table>

*Significant at less than .05 level.
The statistical analysis of data relevant to Hypothesis I revealed nonsignificant differences for both comparisons of means for the TR group and for the SR group at the first charting stage. Only the difference between the UR and C\textsubscript{2} conditions for Group 2 was significant (p.<.025). Therefore, Hypothesis I was rejected.

Although the hypothesis was rejected on the basis of the statistical analysis, an examination of the mean daily production rates of each group (Table VII) showed that both the individual SR and TR group means as well as the mean for both groups taken as a whole were higher under the first charting condition (Stage 2) than under the UR condition (Stage 1). A graphic representation of the experimental data for both groups of subjects (Figure 1) shows the changes in group productivity as a function of variations in reinforcement procedures. In Figure 1, which appears below, the mean weekly productivity of each subject in the two groups is arrayed around the production mean for the group. These group means are connected by solid lines. The dotted line connects the points representing the mean obtained by the two groups combined.

Production means were higher under C\textsubscript{1} than under UR for seven of the ten subjects in both groups and for nine of the ten subjects under the C\textsubscript{2} condition. The increases were greater for both groups between the UR and C\textsubscript{2} conditions than between the UR and C\textsubscript{1} stages. Therefore, the general
Fig. 1--Group production mean ranks as a function of the experimental conditions. Points vertically arrayed around each group point represent the mean production rates of subjects within that group. ● TR group; ○ SR group; △△△△ both groups
trend in rates observed in the response curves of both groups at each of the charting stages suggested that Hypothesis I may remain tenable, although it was not supported by the statistical analysis.

**Hypothesis II.**--Hypothesis II predicted that combining behavioral charting with token reinforcement and applying this combination procedure in a systematic manner contingent upon clients' production progress would lead to significantly greater mean production rates than would result when reinforcement contingencies were unmanaged. The hypothesis was tested by comparing the mean production rates obtained by subjects in Group 1 under the first stage of the study, unmanaged reinforcement (UR), with the rates the group achieved under each of the two periods in which charting and token reinforcement were combined, Stage 3 \((C + TR)_1\) and Stage 6 \((C + TR)_2\). The results of these statistical comparisons are shown in Table X.

**TABLE X**

**COMPARISONS OF GROUP 1 MEANS UNDER UR AND C + TR CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1</td>
<td>13.80 17.00</td>
<td>3.20</td>
<td>5.75</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>13.80 17.59</td>
<td>3.79</td>
<td>6.21</td>
</tr>
</tbody>
</table>
Neither of the mean differences obtained in testing Hypothesis II exceeded the corresponding range product values, and the differences were therefore not significant at the .05 level. The statistical data resulting from these tests led to rejection of the hypothesis.

An examination of the mean daily production rates for the group (see Table VII, p. 76, and Figure 1, p. 84) showed that the group productivity was higher under both C + TR conditions than at the UR or baseline level. The means of all but a single subject increased between the UR and (C + TR)$_1$ stages and between the UR and (C + TR)$_2$ conditions. The total group mean increased by 3.20 between the UR and (C + TR)$_1$ stages and increased by 3.79 between the UR and (C + TR)$_2$ conditions. Therefore, although the differences were not statistically significant, the production rates for four of the five subjects in Group 1 were higher under both C + TR experimental phases than under the UR condition.

**Hypothesis III.**—The third hypothesis of this study stated: The application of social reinforcement combined with behavioral charting will produce significantly greater mean production rates among sheltered workshop clients than will an unmanaged reinforcement condition. In order to test the tenability of this hypothesis, the production means of Group 2 at the UR and (C + SR) stages were compared. The results of these comparisons appear below.
Both of these comparisons resulted in mean differences which were significant at the .025 level of confidence. Hypothesis III was accepted.

Referring to the data in Table VII (p. 76) and to the Group 2 performance curves pictured in Figure 1 (p. 84), it can be seen that rates under contingent charting plus social reinforcement were clearly higher than under the baseline (UR) condition. Every subject in the SR group displayed an increase in mean production between the UR stage and each of the two C + SR stages. The group mean of 16.20 under the UR condition increased to 24.00 under the first C + SR stage and to 26.20 when this condition was reinstated in Stage 6. Thus, the prediction of Hypothesis III that the combination of charting and social reinforcement would produce significantly greater mean production rates than would an unmanaged reinforcement procedure was supported by both the statistical and nonstatistical analyses of the data.
**Hypothesis IV.**--Hypothesis IV stated that combining behavioral charting with token reinforcement would promote higher production rates among sheltered workshop clients than would the use of behavioral charting alone. The hypothesis was tested by comparing the production means obtained by Group 1 under the conditions in which the supervisor administered charting combined with token reinforcement (Stages 3 and 6) with the means resulting when charting was used singly (Stages 2 and 4). Results of the four comparisons of means are presented in Table XII below.

**TABLE XII**

**COMPARISONS OF GROUP 1 MEANS UNDER C AND C + TR CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1</td>
<td>15.60 17.00</td>
<td>1.40</td>
<td>5.30</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>17.40 17.00</td>
<td>0.40</td>
<td>5.30</td>
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<tr>
<td>11</td>
<td>1</td>
<td>15.60 17.59</td>
<td>1.99</td>
<td>6.02</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>17.40 17.59</td>
<td>0.19</td>
<td>5.30</td>
</tr>
</tbody>
</table>

None of the mean differences obtained in this group of comparisons exceeded their corresponding range product values, and therefore all differences failed to reach significance at the .05 level of confidence. Hypothesis IV was rejected on the basis of the statistical tests.

However, observation of the response rates (Table VII, p. 76, and Figure 1, p. 84) of this group of subjects
showed that between the $C_1$ and $(C + TR)_1$ conditions and between the $C_1$ and $(C + TR)_2$ conditions, the production means for three of the five subjects in the group increased. Between the $C_2$ and $(C + TR)_2$ conditions there was an increase in rates again for three of these five subjects. However, for a consistent trend demonstrating higher group productivity under the $C + TR$ mode than under the charting only method, it would have been necessary that there be an overall decrease in the group's rate between Stages 3 and 4, where the $(C + TR)_1$ condition was changed to charting only. Such a decrease did not occur. The group's rate continued to rise between Stages 3 and 4, although the rate of increase (0.40) was less than the average increase of 1.50 which had taken place previously between successive stages.

Thus, although none of the four comparisons of means testing Hypothesis IV resulted in significant differences, productivity was higher for the majority of Group 1 subjects under the combination reinforcement procedure than under the charting only mode, with the exception of one instance in which the group's $C + TR$ rate was less than its $C$ rate.

**Hypothesis V.--**Hypothesis V predicted that combining behavioral charting with social reinforcement would produce higher production rates among sheltered workshop clients than would the use of behavioral charting procedures alone. The hypothesis was tested by comparing the mean rates of production for Group 1 (SR) under the charting plus social
reinforcement conditions (Stages 2 and 4). The statistical results of these multiple comparisons are presented below in Table XIII.

**TABLE XIII**

**COMPARISON OF GROUP 2 MEANS UNDER C AND C + SR CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>2</td>
<td>18.20 24.00</td>
<td>5.80</td>
<td>5.30*</td>
</tr>
<tr>
<td>14</td>
<td>2</td>
<td>24.00 24.00</td>
<td>0.00</td>
<td>5.30</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>18.20 26.20</td>
<td>8.00</td>
<td>6.21*</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>24.00 26.20</td>
<td>2.20</td>
<td>5.75</td>
</tr>
</tbody>
</table>

*Significant at less than .05 level.

When the mean for the first charting stage (C₁) was compared with the two C + SR conditions, the differences were significant (p.<.025). However, when the means for the second charting stage (C₂) were compared with the two C + SR means, differences did not attain significance. Therefore, Hypothesis V was rejected.

The mean production level remained the same for this group between Stages 3 and 4, after social reinforcement was deleted in Stage 4 from the combination C + SR procedure used in Stage 3. The exclusion of social reinforcement while retaining charting, then, had the effect of altering the previously accelerating slope of the response curve of the group. (See Figure 1, p. 84.) In addition, only two
subjects of the five showed rate increases between Stages 3 and 4; and these increases averaged only 2.00 units. Between these two stages of the experimental period appeared the largest number of subject production decreases, and the entire group failed to show an increase in mean production rate. The comparison between the means of the \( C_2 \) condition and the \((C + SR)_2\) condition of Stage 6 resulted in a larger, although statistically nonsignificant, mean difference than that obtained between the \((C + SR)_1\) and \( C_2 \) conditions.

Three of the five subjects increased in production between Stages 4 and 6, and the overall group mean rose from 24.00 to 26.20.

Thus, the data obtained in testing Hypothesis V resulted in two significant and two nonsignificant mean differences. Close examination of the individual performance records for the group revealed that although two comparisons did not attain significance at .05, when the \( C + SR \) mode was changed to a \( C \) procedure, the previously accelerating rate of productivity established by the group was clearly altered. Although Hypothesis V was rejected on the basis of the statistical tests, much of the data obtained in this study appears to support the prediction of the hypothesis that clients would attain higher production rates when they received charting combined with social reinforcement than when they received charting only.
Hypothesis VI.--Hypothesis VI stated: The application of behavioral charting combined with token reinforcement will produce significantly greater mean production rates among sheltered workshop clients than will the application of token reinforcement alone. This hypothesis was tested by comparing the mean production rates attained by subjects in Group 1 (TR) under the C + TR conditions (Stages 3 and 6) with those obtained when the charting procedure was withheld and only token reinforcement was administered (Stage 5--TR). The statistical results of comparing these means with one another are shown in Table XIV.

### TABLE XIV

**COMPARISONS OF GROUP 1 MEANS UNDER C + TR AND TR CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>1</td>
<td>17.00 18.00</td>
<td>1.00</td>
<td>6.02</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>18.00 17.59</td>
<td>0.40</td>
<td>5.30</td>
</tr>
</tbody>
</table>

Since neither mean difference in these comparisons attained significance at the .05 level, Hypothesis VI was rejected.

An examination of Table VII (p. 76), shows that the group production mean was higher under the TR stage ($\bar{X}=18.00$) than under either the $(C + TR)_1$ ($\bar{X}=17.00$) or the $(C + TR)_2$
condition ($\bar{x}=17.59$). Rates were higher under TR than under the (C + TR)$_1$ condition for three of the five subjects, while three subjects failed to increase in productivity between Stages 5 (TR) and 6 (C + TR)$_2$. This latter drop in rates was the only time in the course of the study that the TR group production mean declined rather than increased between successive experimental stages. The results of these comparisons were the opposite of those hypothesized. The experimental data obtained under C + TR and TR conditions led to rejection of Hypothesis VI.

**Hypothesis VII.**—Hypothesis VII predicted that applying a combination of behavioral charting and social reinforcement would lead to higher mean productivity among sheltered workshop clients than would the use of social reinforcement alone. The hypothesis was tested by comparing the production means obtained by Group 2 subjects under each of the two C + SR conditions (Stages 3 and 6) with their mean for the SR condition (Stage 5). Table XV presents a summary of the statistical results of these mean comparisons.

Both comparisons testing Hypothesis VII resulted in nonsignificant mean differences. Hypothesis VII was rejected.

Although production means were higher under the (C + SR)$_2$ condition than under the SR condition, the (C + SR)$_1$ phase, which preceded the SR condition in the sequence of the experimental periods, did not produce higher rates than the SR procedure. Instead, the group's rates rose over these
successive stages as they had throughout most of the earlier phases of the experimental program. The smaller mean difference occurred when charting was dropped from the reinforcement procedure and social reinforcement was administered singly. The increase between Stage 3 (C + SR) and Stage 5 (SR) was only 0.60, while the group rate increased by 1.60 between Stages 5 and 6 when charting was added to social reinforcement to repeat the C + SR condition at Stage 6. The trend set in prior stages of an average increase in rates of over 2.00 units between successive periods of the study was altered by the SR, as well as by the C, condition; but when the C + SR condition was reinstated in Stage 6, the 1.60 rise approximated the earlier pattern.

Hence, an analysis of the data obtained under the C + SR and SR phases of the study revealed that differences in the means obtained under these treatment modes were statistically nonsignificant; but a nonstatistical analysis of the results showed that there were slight directional trends

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Produce</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>2</td>
<td>24.00 24.60</td>
<td>0.60</td>
<td>5.75</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>24.60 26.20</td>
<td>1.60</td>
<td>5.30</td>
</tr>
</tbody>
</table>
in the responses of subjects suggesting that the C + SR procedure may have influenced group production somewhat more positively than did the SR condition. However, Hypothesis VII was rejected on the basis of the statistical findings.

**Hypothesis VIII.**—Hypothesis VIII stated that the application of token reinforcement would produce significantly greater mean production rates among sheltered workshop clients than would the use of behavioral charting. The hypothesis was tested by comparing the production means obtained by the TR group when behavioral charting was the mode of reinforcement (Stages 2 and 4) with the mean achieved under the token reinforcement procedure (Stage 5). The statistical results of these comparisons appear below.

**TABLE XVI**
COMPARISONS OF GROUP 1 MEANS UNDER TR AND C CONDITIONS

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>1</td>
<td>15.60 18.00</td>
<td>2.40</td>
<td>6.21</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>17.40 18.00</td>
<td>0.60</td>
<td>5.75</td>
</tr>
</tbody>
</table>

Neither of the mean differences testing Hypothesis VIII attained significance at the .05 level of confidence, and the hypothesis was rejected.
The group's productivity under the TR condition exceeded what they produced under both of the charting stages, and the higher rates under TR were demonstrated by the majority of the subjects in the group. In fact, the mean of 18.00 attained at the TR stage was the highest treatment mean recorded for Group 1 during the study. The outcome data therefore reflected a trend in the direction predicted by Hypothesis VIII, although the hypothesis was rejected on the basis of the statistical tests.

Hypothesis IX.--Hypothesis IX stated that the use of social reinforcement with sheltered workshop clients would promote significantly higher mean production rates than would the use of a behavioral charting procedure. To test the hypothesis, comparisons were made of the production means obtained by subjects in Group 1 under the social reinforcement (Stage 5) and charting (Stages 2 and 4) conditions. The statistical results of these comparisons are summarized in Table XVII.

The difference in means between the SR and C₁ conditions was found to be significant at the .025 level; while the difference between the SR and C₂ means was slight and nonsignificant. Since only one of the two comparisons resulted in a significant difference, Hypotheses IX was rejected.

Reference to Table VII (p. 76) and to Figure 1 (p. 84) shows that productivity for all five subjects in the group
TABLE XVII
COMPARISONS OF GROUP 2 MEANS UNDER SR AND C CONDITIONS

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>2</td>
<td>18.20 24.60</td>
<td>6.40</td>
<td>6.02*</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>24.00 24.60</td>
<td>0.60</td>
<td>5.30</td>
</tr>
</tbody>
</table>

*Significant at less than .05 level.

was higher under the SR than under the C₁ condition, and this increase recurred for all but one of the subjects under the C₂ condition. Thus, virtually all subjects in the group achieved higher production rates under the social reinforcement than under either charting condition. The nonstatistical analysis therefore provided some evidence supporting the prediction of Hypothesis IX, although the hypothesis was rejected on the basis of the statistical findings.

Hypothesis X.--Hypothesis X, stated in the null form, asserted that there would be no significant difference between the mean production rates of sheltered workshop clients receiving token reinforcement and those receiving social reinforcement. The hypothesis was tested by comparing the production means achieved by Group 1 when it was administered token reinforcement and by Group 2 receiving social
reinforcement (Stage 5). These individual comparisons were made in spite of the fact that it was determined from the analysis of variance that the overall F value corresponding to the between-group sums of squares was not significant. Regarding the performance of these individual comparisons, Winer has stated that, "specific comparisons which are built into the design or suggested by the theoretical basis for the experiment can and should be made individually, regardless of the outcome of the corresponding over-all F test" (8, p. 208). Table XVIII summarizes the statistical results of the comparison of these two production means.

**TABLE XVIII**

**COMPARISON OF GROUP 1 AND GROUP 2 MEANS UNDER R ONLY CONDITION**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>1 &amp; 2</td>
<td>18.00</td>
<td>24.60</td>
<td>6.60</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

The statistical findings suggested that, in this study, the use of social reinforcement promoted higher productivity than did the use of token reinforcement. However, this interpretation of results must be made cautiously considering the nonsignificant overall F value obtained in the analysis of variance. The hypothesis of no difference between the
means of the two groups when Group 1 received token reinforcement and Group 2 social reinforcement was rejected on the basis of the results of the individual comparison of the two means.

**Hypothesis XI.**—The prediction of Hypothesis XI, stated in the null form, was that there would be no significant difference between the mean production rates of sheltered workshop clients receiving token reinforcement in combination with behavioral charting and those receiving social reinforcement in combination with behavioral charting. The hypothesis was tested by comparing the mean production rates obtained by subjects in Group 1 under the two C + TR conditions (Stages 3 and 6) with those attained by subjects in Group 2 under the two C + SR conditions (Stages 3 and 6). The results of the comparison of the means of Group 1 and Group 2 under the two C + R conditions appear below.

**TABLE XIX**

**COMPARISONS OF GROUP 1 AND GROUP 2 MEANS UNDER C + R CONDITIONS**

<table>
<thead>
<tr>
<th>Comparison Number</th>
<th>Group</th>
<th>Means Compared</th>
<th>Mean Difference</th>
<th>Range Product</th>
</tr>
</thead>
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<tr>
<td>26</td>
<td>1 &amp; 2</td>
<td>17.00</td>
<td>24.00</td>
<td>6.24*</td>
</tr>
<tr>
<td>27</td>
<td>1 &amp; 2</td>
<td>17.59</td>
<td>26.20</td>
<td>6.24*</td>
</tr>
</tbody>
</table>

*Significant at .05 level.
Both differences were found to be significant for a .05 level test. Since the experimental data indicated that there was a significant difference between groups when one group received charting plus token reinforcement and the other group received charting plus social reinforcement, Hypothesis XI was rejected. This disposition of the hypothesis was made with the qualification that the differences found to be significant when the group means were compared individually followed an analysis of variance which resulted in a nonsignificant F ratio for the corresponding between-groups variation.

Discussion of Results

The data resulting from the statistical procedures of computing an analysis of variance and then multiple comparisons of individual pairs of means led to acceptance of Hypothesis III. Hypothesis VI was rejected, and null Hypotheses X and XI also were rejected. Although Hypotheses I, II, IV, V, VII, VIII, and IX were rejected on the basis of the statistical analysis, inspection of the response rates obtained from subjects under the treatment conditions relevant to these hypotheses revealed directional trends in favor of the experimental procedures.

Before any conclusions can be drawn concerning the significance of the findings of this research, several aspects of the results must be considered. First, it was noted that the productivity of both groups of subjects increased steadily
over the course of the experimental periods, except for a slight drop in the rate of Group 1 during the final stage. Positively accelerating group response curves were obtained which were not in accord with the more irregular group performance patterns which had been predicted. With the exception of the differences found between the token and social reinforcement groups, few statistically significant differences resulted when the means for the five reinforcement conditions were compared. Therefore, although reinforcement affected subject productivity in a gross and highly significant way (p.<.00005), the experimental procedures failed to derive discrete differential effects from the various reinforcement modes administered. Instead, the group response rates showed a progressive overall rise which suggested that a general, undifferentiated reinforcement effect may have been operating to increase production rates. That is, subjects apparently reacted with steadily improving productivity as long as some form of contingent reinforcement was being applied. Also, the short period of time (five days) allowed for each treatment condition may not have been long enough for the specific reinforcement effects of each individual mode to elicit separate and distinct response patterns from subjects, and to create sufficient variation in responses with treatment modes to be detected in the analysis of variance and multiple comparison procedures.
However, further inspection of the outcome data revealed evidence that additional extraneous variables also may have affected the dependent measure. Production data recorded during the five-day preliminary period, when no contingent reinforcement was administered in a systematic manner, and during the UR or baseline phase of Stage 1 of the experimental period, showed that productivity increased for both groups at a rate very close to that obtained under contingent reinforcement conditions. The production mean for Group 1 rose from 11.40 during the preliminary stage to 13.80 the following week, the UR period. The production mean for Group 2 rose from 14.40 to 16.20 during these same two weeks. For the subjects in Group 1, the preliminary and baseline stages actually constituted a noncontingent reinforcement period since these clients received tokens on a noncontingent basis during this week as part of the token-priming process. Their group production rate increased during the two periods even though reinforcement was not administered on the basis of production progress.

This increase in rates observed during the first two weeks that subjects worked on the packaging task may have been the result of gaining proficiency in the new task. Such practice effects doubtless influenced client production, at least during the early stages of this study. In addition, the rise in rates which occurred under the preliminary and baseline, noncontingent reinforcement conditions
could have been produced by a Hawthorne effect. In spite of precautions taken to insure that subjects who took part in this research would view the experimental work situations as part of their normal workshop routine, it was very possible that subjects were aware that they were taking part in an experiment. However, after the preliminary period, the extra attention given to subjects by their supervisor, which would have been the primary source of any Hawthorne effects, would have become part of the positive reinforcement methods being researched and thus would have merged with the experimental procedures.

Certain of the findings of this investigation provide information relevant to the research questions posed for the study in spite of the possible interference from uncontrolled variables in the overall results. Had the design of this experiment included a return-to-baseline condition and/or a noncontingent reinforcement group, the decision as to whether the rise in production rates was due to specific effects produced by the experimental reinforcement procedures, to an undifferentiated reinforcement effect, or to practice effects may have been made more easily.

In the following sections the major findings of the study will be discussed and interpreted in the light of the qualifying data. Each of the major research questions will be considered, and the results of previous research will be related to the findings of the present study.
Behavioral Charting as a Reinforcement Mode

The results obtained using behavioral charting as a single mode of reinforcement were generally in agreement with the findings of Jens and Shores (5). The production means for both groups of subjects exceeded those at baseline (Stage 1) when behavioral charting was administered in Stages 2 and 4, although only one mean difference attained significance. In addition, subjects in the present study were shown their charts only at the end of each work session, thereby minimizing the possibility, encountered by Jens and Shores, that a goal incentive condition rather than reinforcement provided the source of motivation.

For this group of subjects, the use of behavioral charting tended to promote higher, although not statistically significant, production rates than unmanaged reinforcement, assuming that the higher rates were the result of the charting procedures rather than a practice effect, or in the case of the C2 condition, an undifferentiated reinforcement effect accumulated over the course of the second and third reinforcement stages.

Combining Behavioral Charting with Token and Social Reinforcement

Combining behavioral charting with social reinforcement proved to significantly increase over baseline level the production rates of subjects in Group 2. Although the mean difference did not attain significance at the .05 level, the
majority of subjects in Group 1 had higher production rates under the C + TR conditions than under the baseline or UR condition. The findings of this study may indicate that using a reinforcement method which combines behavioral charting with token or social reinforcement tends to promote better productivity in sheltered workshop clients than does unmanaged reinforcement, if the improvement in production was in fact a function of the reinforcement modes rather than the possible effect of uncontrolled variables.

**Effects of Behavioral Charting Combined with Token or Social Reinforcement Versus Behavioral Charting, Token, and Social Reinforcement Alone**

The highest production mean obtained by either group during the course of the study was 26.20 attained by the SR group under the second C + SR condition (Stage 6). This mean was significantly higher than the UR and C1 means for Group 2 (p.<.025), and the C + SR condition tended to affect productivity more positively than the C2 or SR conditions. C + SR was the last reinforcement condition presented, and therefore it could have had the advantage of possible accumulated reinforcement effects from the previous stages. However, this particular finding gains validity from the fact that the design of the study established a partial, although not complete, return to baseline condition for the C + SR and C + TR modes. The C + TR procedure was administered to Group 1 and the C + SR procedure to Group 2 for the
first time at Stage 3 of the experimental period. During the two successive stages of the study, one or the other of the dual elements comprising these combination methods were eliminated and the remaining elements were administered singly, charting only at Stage 4 and TR or SR at Stage 5. The combination reinforcement modes were then reinstated for the respective groups at Stage 6. The production rate of Group 2 made its sharpest rise, to a mean of 24.00, at Stage 3 (see Figure 1, p. 84) when the C + SR condition was first applied. This group mean leveled off, to 24.00 and 24.60, when the C + SR condition was modified at Stages 4 and 5. The mean peaked at Stage 6 when the C + SR condition was reinstated. The group mean did not drop back to baseline level, as might be expected, because reinforcement continued to be administered at Stages 4 and 5. However, the group's responses failed to accelerate at the rate demonstrated in the first three experimental periods. The break occurring in the previously accelerating rate of response when the C + SR condition was altered and the renewed rise in response level when the C + SR mode was reinstated suggest that the C + SR method did in fact exert a more powerful influence on the production rates of subjects in Group 2 than did the C and SR procedures when these were administered singly.

The highest mean obtained by Group 1, however, occurred when token reinforcement was applied singly. This group's
second highest performance occurred under the C + TR modes. The reason for the drop observed in the overall rate of the TR group at Stage 6, after a steadily rising group mean through Stage 5, is not known. There was little evidence, therefore, that the C + TR mode had a stronger effect on the rates of subjects in Group 1 than either the C or TR methods applied singly.

Comparison of the Effects of Behavioral Charting, Token Reinforcement and Social Reinforcement

Although behavioral charting used alone produced higher rates than unmanaged reinforcement, the charting method did not produce rates higher than those obtained under the token reinforcement and social reinforcement modes. This study showed that subjects tended to perform better when token or social reinforcement was administered than when behavioral charting was used as the reinforcer; although the differences in means did not attain statistically significant levels. The possibility must be noted that the higher productivity for both groups under token and social reinforcement could have been an artifact of the sequence in which the reinforcement modes were presented in the course of the experiment.

Token Reinforcement Versus Social Reinforcement

The comparison of Group 1 and Group 2 means at Stages 3, 5, and 6, the only stages where the two groups were treated
differently, revealed a significant difference in the productivity of the two groups (p.<.05). This variation due to the use of token reinforcement with Group 1 and social reinforcement with Group 2 was not detected by the analysis of variance, probably because the two groups were treated with identical procedures during the other half of the experimental stages. The greater responsiveness of this sample of rehabilitation clients to social than to token reinforcers was contradictory to the findings of Zifferblatt (9).

Several factors may account for the variation shown in the response of this sample of subjects to the token and social reinforcement methods. First, it has been suggested by previous researchers that the reinforcing effect of the social agents who dispense tokens may contribute greatly to the reinforcement value of the tokens (1, 3). Efforts were made in the present experiment to partially control for the factor of social reinforcement in the dispensing of tokens to clients. Therefore, this factor was absent from the particular token reinforcement methods used in this study. The absence of accompanying social reinforcement from this token system may have weakened significantly the motivational power of the tokens.

The back-up system of the token reinforcement procedure used in this study may have had additional deficiencies. Baldrate and Clements (2), in an unpublished study, noted
that their failure to significantly alter the attendance rates of a group of rehabilitation trainees, using a behavioral contracting system, may have resulted from their use of reinforcers which were insufficient to motivate changes in client behaviors and their utilizing a weekly rather than daily pay-off schedule. The amount of ten cents per token, exchanged weekly, in the present study could have been insufficiently motivating to significantly alter subjects' production rates, especially in the absence of social reinforcement in the token delivery and exchange.

It was shown in this study that subjects who received social reinforcement performed significantly better than those who were given tokens and that the SR group's production increased significantly over its baseline level both when these subjects were given social reinforcement alone and when they received social reinforcement combined with behavioral charting. Therefore, it can be stated that this investigation showed that social reinforcement, when applied both alone and in combination with behavioral charting, promoted significant increases in production rates for this small group of sheltered workshop clients who were performing a routine, repetitive task. The findings of this study also revealed that, with this sample of clients, social reinforcement proved to be more effective in improving productivity than did the particular form of token reinforcement which was used. In addition it may be concluded that these findings may provide evidence supporting the supposition that the
factor of social reinforcement which normally accompanies the delivery and exchange of tokens in most token reinforcement procedures may in fact constitute a vital part of the reinforcing value of such token systems. However, since an alternative explanation has been presented for the superior performance of the SR group over the TR group, this interpretation is presented tentatively and needs to be confirmed by further research.

Summary

The analysis of experimental data and statistical findings were presented and discussed in this chapter. The cumulative effect of reinforcement on client productivity was found to be highly significant (p.< .00005), but few significant differences were detected between the various reinforcement modes applied. The combination of behavioral charting and social reinforcement produced the highest production level of the five contingent reinforcement modes compared. The C + SR method motivated significantly better rates in Group 2 than an unmanaged reinforcement procedure, but only slightly better rates than those obtained by using behavioral charting or social reinforcement alone. However, token reinforcement, used alone, produced somewhat better rates in Group 1 than did the procedure which combined charting with token reinforcers. None of the reinforcement conditions applied to the TR group resulted in statistically significant differences in group production means.
Several factors in the back-up system for the tokens were discussed to explain the poorer performance of the TR group. However, it was suggested that the findings of the present study may be interpreted as evidence supporting the view that much of the reinforcing value of tokens derives from the element of social reinforcement which may be supplied by the agents who deliver and exchange tokens with clients.

Both the token and the social reinforcement modes, applied singly, proved slightly more effective in motivating production progress with these subjects than did the use of behavioral charting; but the charting method produced higher rates in both groups than unmanaged reinforcement. This latter finding was consistent with results of previous research using charting with rehabilitation clients. Group productivity under all modes of contingent reinforcement which were compared in this investigation was higher than it was under the condition of unmanaged reinforcement.

Several factors involved in the design of the experiment were presented as possible causes of the failure of the study to derive clearly distinct differential effects from most of the reinforcement modes compared. There was discussion of uncontrolled factors which may have influenced subjects' production rates in addition to the specific reinforcement effects. Findings relevant to the first nine hypotheses were interpreted in the light of these qualifying data.
Hence, statistical analysis of the experimental data led to acceptance of Hypothesis III and to rejection of Hypothesis VI. Null Hypotheses X and XI were rejected. Although Hypotheses I, II, IV, V, VII, VIII, and IX were rejected on the basis of the statistical tests, evidence derived from a nonstatistical analysis of the data lent some support to the predictions of these hypotheses.
CHAPTER BIBLIOGRAPHY


CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS
AND RECOMMENDATIONS

Summary

This research was undertaken to investigate the differential effects of five modes of reinforcement on the production rates of sheltered workshop clients. The reinforcement methods studied were behavioral charting, token reinforcement, social reinforcement, behavioral charting combined with token reinforcement, and behavioral charting combined with social reinforcement. A review of the literature related to the application of these reinforcement methods resulted in the formulation of five specific research questions which provided the focus of the present investigation. These questions were as follows:

1. Would behavioral charting be an effective form of reinforcement for sheltered workshop clients?

2. Would combining behavioral charting with either token or social reinforcement be an effective reinforcement procedure for sheltered workshop clients?

3. Would a reinforcement procedure which combined behavioral charting with either token or social reinforcement be more effective in increasing client productivity
than applying behavioral charting, token reinforcement, or social reinforcement singly?

4. How would behavioral charting compare with token and social reinforcement in improving the production behavior of sheltered workshop clients?

5. Would sheltered workshop clients respond better to token or to social reinforcers?

Eleven hypotheses were developed predicting the outcome of comparing the effects of these five reinforcement modes with one another and with an unmanaged reinforcement procedure. Investigation of the effects of the reinforcement modes was carried out by arranging for the systematic application of each mode contingent upon increased client productivity in a sheltered workshop setting, collecting the daily production data, and analyzing the differences in the mean group production rates resulting from the changes in reinforcement procedures. In the present study the element of social reinforcement was minimized in all token reinforcement procedures, so that analysis of the differences in the effects of token and social reinforcement was limited to comparing social reinforcement with the simple administration of plastic tokens which were exchangeable for money. Virtually no social reinforcers accompanied the delivery and exchange of tokens with clients.

A sample of sixteen subjects, which was reduced to ten subjects over the course of the study, was selected from a
population of sheltered workshop employees and trainees at Goodwill Industries of Fort Worth, Texas, during the fall of 1973. Subjects were randomly assigned to one of two treatment groups from three production-level categories established prior to initiation of the treatment procedures. Each group and each of the social and token reinforcement conditions were randomly assigned to a regular Goodwill workshop supervisor who had been trained to administer treatment procedures. Production areas were set up within these supervisors' regular departments in the Goodwill plant. Experimental sessions, lasting one-half hour daily, took place at the same time each day for both groups. The experimental period, including the baseline condition, consisted of six stages of five days each. The total research project, including the two-week preliminary phase, took eight weeks to complete.

The production task involved subjects' counting out and packaging plastic forks into plastic bags. Production counts and reliability checks were maintained daily on all subjects. The number of bags completed by each subject during each daily half-hour session served as the dependent variable.

During the two weeks prior to initiation of experimental procedures, tokens were given to a large group of clients, including all subjects who had been chosen for the study, in order to make the tokens as reinforcing to subjects as
possible before the treatment program began. Initial production rates were established for all subjects on the same packaging task used later in treatment sessions. These initial production rates were used both to categorize subjects into production-level classes for random assignment to treatment groups and to match the two groups on initial productivity. A $t$-test performed on initial group means determined that there was no significant difference between the two groups on the criterion measure prior to the application of treatment procedures ($t=0.69$, $p.<.05$).

In each of the six experimental stages of the study, the procedures for reinforcing subjects for their work were varied. The first phase was a baseline condition in which no contingent reinforcement was administered to subjects. This was termed an "unmanaged reinforcement" period, and it served as the control phase of the study. In Stage 2, the supervisor for each group gave each subject in her group daily informational feedback on his production by charting his daily production total for him on a behavioral graph. No other contingent reinforcement was administered during this stage. In Stage 3, subjects in both groups were again given daily feedback through behavioral charting, but subjects in Group 1 were given, in addition to the charting mode of reinforcement, one token on each day that their production total exceeded what they obtained on the previous day of work. Subjects could exchange their tokens at the
end of the week for ten cents per token. During the week, accumulated tokens were stored separately for each subject in a special token bank which was designed so that each subject could see how many tokens he was acquiring. A minimal amount of social reinforcement accompanied the supervisor's delivery of tokens to subjects during this period. Subjects in Group 2 were given praise, smiles, pats on the back, et cetera, from the supervisor during Stage 3. The social reinforcement for Group 2 was made contingent upon subjects' having exceeded their previous day's production level. In Stage 4 the token and social reinforcement were withdrawn, and all subjects in both groups again received charting only. In Stage 5, the charts were not shown to subjects, thereby withdrawing them as a source of reinforcement; but Group 1 subjects received tokens contingent upon production and Group 2 subjects received social reinforcement contingent upon production, as in Stage 3. In the final stage of the study, the treatment procedure of combining token reinforcement with behavioral charting for Group 1 and social reinforcement with behavioral charting for Group 2 was repeated exactly as done in Stage 3.

The level of significance established for the rejection of hypotheses was .05. An $F_{\text{max}}$-test, carried out on the initial production means of subjects who remained in the final sample, revealed that the assumption of homogeneity of variance of the initial production rates of the two groups
was satisfied ($F_{\text{max}}=1.31$, $df=4$, $p.<.05$). An analysis of variance was performed to determine the overall effects of all treatment modes. This analysis resulted in non-significant $F$ ratios for all sources of variation except that for Treatments, for which the $F$ value was 7.47 ($df=5,40$; $p.<.00005$). The $F$ value for the Between-Groups variation was 0.71 ($df=1,8$; $p.> .05$), and the $F$ value associated with the Treatment X Groups Interaction was 1.57 ($df=5,40$; $p.>.05$).

Hypothesis I predicted that the use of behavioral charting (C) would lead to significantly higher production rates among sheltered workshop clients than would the use of unmanaged reinforcement (UR). Clients in both groups performed better when work sessions were followed by behavioral charting of individual production totals than when no systematic form of reinforcement was given, although only one of four treatment mean comparisons resulted in a statistically significant difference.

Hypothesis II predicted that behavioral charting combined with token reinforcement (C + TR) would produce significantly greater client production rates than would an unmanaged reinforcement procedure (UR). Although neither of the comparisons of means testing the hypothesis resulted in a significant difference, the nonstatistical analysis of the data provided some evidence in favor of the hypothesis.

Hypothesis III predicted that the combination of charting and social reinforcement would produce significantly
higher mean production rates than would unmanaged reinforcement. Both mean comparisons performed resulted in statistically significant differences \( p < .025 \). Clients in Group 2 performed better when they received a combination of behavioral charting and social reinforcement than when they were given no systematic reinforcement. Hypothesis III was accepted.

Hypothesis IV stated that charting combined with token reinforcement would produce significantly higher production rates than would charting only. None of the four comparisons of means relevant to Hypothesis IV attained statistical significance, and analysis of the individual response rates of subjects in Group 1 failed to reveal a distinct trend in the predicted direction. Therefore, Hypothesis IV was rejected. Subjects in this study did not respond better when reinforced with a combination of behavioral charting and token reinforcement than to behavioral charting alone.

Hypothesis V predicted that behavioral charting plus social reinforcement would produce significantly higher productivity than would charting procedures alone. Since only two of the four mean differences relevant to Hypothesis V were significant, the hypothesis was rejected. However, the evidence provided by the nonstatistical analysis of data supported the hypothesis. This study resulted in some evidence that for the subjects used and for the particular manner in which token and social reinforcers were applied in
this investigation, the addition of social reinforcement to behavioral charting procedures appeared to enhance the reinforcement value of the charting method.

Hypothesis VI predicted that combining charting with token reinforcement would produce significantly greater production rates than token reinforcement alone. This hypothesis was rejected since neither of the two relevant mean differences was statistically significant and no directional trend was observed in the individual response rates. The effect of token reinforcement was not enhanced with this group of clients by combining it with behavioral charting.

The prediction of Hypothesis VII, that charting plus social reinforcement would lead to significantly higher production rates than social reinforcement only was also rejected when both mean differences relevant to the hypothesis failed to attain statistical significance. Evidence of a possible trend in the predicted direction was observed in the individual response rates of subjects in Group 2, and although the evidence was not conclusive, the results suggested that the incentive value of social reinforcers may have been slightly enhanced by combining them with behavioral charting.

Hypothesis VIII stated that token reinforcement would promote significantly higher client production than would behavioral charting. The hypothesis was rejected when neither of the comparisons performed resulted in differences
significant at the .05 level. However, production rates were higher under the TR mode than under the C conditions for the majority of subjects in Group 1, thus establishing a trend in favor of the hypothesis.

Hypothesis IX predicted that social reinforcement would produce significantly greater production than would behavioral charting. The hypothesis was rejected when only one of the two mean comparisons performed was found to be statistically significant. However, the nonstatistical analysis of the data provided evidence supporting the hypothesis. Subjects in Group 2 appeared to perform better under social reinforcement than under behavioral charting.

The final two hypotheses dealt with the question of whether sheltered workshop clients would respond better to token or to social reinforcers. Hypothesis X stated that there would be no significant difference between the productivity of clients receiving token reinforcement and those receiving social reinforcement. Hypothesis XI stated that there would be no significant difference between the production rates of sheltered workshop clients receiving behavioral charting combined with token reinforcement and those receiving behavioral charting combined with social reinforcement. Both null hypotheses were rejected since all of the comparisons testing them resulted in significant mean differences. Subjects who received social reinforcement, either singly or in combination with behavioral charting,
performed significantly better on the production task than subjects who were given token reinforcement either alone or in combination with behavioral charting. It is not known whether the lower rates demonstrated by the token reinforcement group were caused by the absence of social reinforcers in the token delivery and exchange or by other factors peculiar to the token reinforcement system employed in this study. The highest production level attained by either group during the course of the experiment was achieved by Group 2 when behavioral charting was combined with social reinforcement.

Thus, in this investigation of the effects of behavioral charting, token reinforcement, social reinforcement, behavioral charting combined with token reinforcement and behavioral charting combined with social reinforcement, it was found that the cumulative effect of reinforcement on the production of a group of sheltered workshop clients was positive and highly significant (p.< .00005). However, the study failed to derive clearly distinct differential effects from most of the specific reinforcement modes applied. The results obtained indicated that clients who received social reinforcement, applied both alone and in combination with behavioral charting, obtained significantly greater production rates than did clients who received token reinforcement applied singly and in combination with charting. Statistically significant differences in client productivity were not
found when behavioral charting and token reinforcement were given to subjects in Group 1; nor were statistically significant differences in client production rates obtained when behavioral charting, social reinforcement and a combination of behavioral charting and social reinforcement were administered to subjects in Group 2. The best production level was produced by the C + SR mode. This method was more effective than SR or C alone, but the C + TR method used in this study did not appear to be an improvement over using TR or C alone. TR and SR were both somewhat more effective than C. Analysis of the outcome data revealed evidence of possible interference in the experimental results from uncontrolled variables, such as practice effects and undifferentiated reinforcement effects. These factors were discussed, and all experimental results which may have been affected by them were carefully interpreted.

Findings

This study resulted in the following findings:

1. Both groups of sheltered workshop clients performed somewhat, but not significantly, better at a production task when they were given behavioral charting as a contingent reinforcer than when they received no form of systematic reinforcement.

2. Subjects in Group 1 performed somewhat, but not significantly, better at a production task when they received contingent reinforcement in the form of behavioral
charting combined with token reinforcers than when they received no form of systematic reinforcement.

3. Subjects in Group 2 performed significantly better at the production task when receiving behavioral charting combined with social reinforcers than when they received no form of systematic reinforcement.

4. Subjects in Group 1 did not perform better when receiving behavioral charting combined with token reinforcement than when they were given only behavioral charting.

5. Subjects in Group 2 performed somewhat, but not significantly, better on the production task when they were given behavioral charting combined with social reinforcers than when they received only behavioral charting.

6. Subjects in Group 1 did not perform better on the production task when they were given behavioral charting combined with token reinforcers than when they received only token reinforcement.

7. Subjects in Group 2 tended to perform better on the production task when they received behavioral charting combined with social reinforcement than when they received social reinforcement only.

8. Subjects in Group 1 performed somewhat, but not significantly, better on the production task when they received token reinforcement than when they were given behavioral charting.
9. Subjects in Group 2 performed somewhat, but not significantly, better on the production task when they received social reinforcement than when they received behavioral charting.

10. Subjects who received social reinforcement performed significantly better on the production task than subjects who received token reinforcement.

11. Subjects who received behavioral charting combined with social reinforcement performed significantly better on the production task than subjects who received behavioral charting combined with token reinforcement.

12. The highest group production rate attained in this study was achieved by subjects in Group 2 under the condition combining behavioral charting with social reinforcement.

13. The cumulative effect on client production of all reinforcement procedures applied in this study was positive and highly significant.

The possibility must be noted that the first nine of the findings presented above may have been influenced by uncontrolled factors in the experimental procedure.

Conclusions

Several conclusions can be drawn from the findings of the present study. These conclusions are as follows:

1. The cumulative effects of positive reinforcement can significantly increase the productivity of sheltered workshop clients.
2. Social reinforcement, when applied both alone and in combination with behavioral charting, appears to be a very effective mode of reinforcement for sheltered workshop clients.

3. Based on the limited sample used in this study, it appears that many sheltered workshop clients respond better to social reinforcers than to token reinforcers, when the token reinforcement program lacks provision for social reinforcement in the back-up system.

Implications

Although not based on statistically significant findings, several implications were derived from observation of subject responses and from inspection of the nonstatistical data resulting from this study. These implications are as follows:

1. Behavioral charting appears to be an effective mode of reinforcement for sheltered workshop clients.

2. Token and social reinforcement may be more effective than behavioral charting as modes of reinforcement for sheltered workshop clients.

3. Effects obtained by using behavioral charting alone and social reinforcement alone may be improved when the two methods are applied in combination.

4. Of the five reinforcement modes compared in this investigation, behavioral charting combined with social reinforcement appeared to be the most effective reinforcement
procedure for improving the productivity of this group of sheltered workshop clients.

5. The application of token reinforcers without accompanying social reinforcement may impair the reinforcement value of the tokens.

6. Social reinforcement which may accompany the administration and exchange of tokens to sheltered workshop clients may contribute to the reinforcement value and effectiveness of the token reinforcement system employed.

Recommendations

In view of the findings of the present study, several recommendations are offered, both for future research of the problems dealt with in this study and for the practical application of the present findings to the rehabilitation and training of sheltered workshop clients.

For Future Research

1. In the case of a replication of the present study,
   a. a provision for a multiple baseline experimental design (3) and/or a noncontingent reinforcement group would offer a better means of establishing that changes observed in client response rates were in fact a function of changes in experimental (reinforcement) procedures.
   b. great care should be taken to disguise the experimental nature of the production task from subjects
involved in the study, to avoid the problem of confounding Hawthorne effects.

c. more clearly distinct differential reinforcement effects might be obtained if each reinforcement mode being investigated were administered for a period lasting ten days or longer. Such a procedure could minimize the possibility that changes in subjects' performances could be caused by an overall, undifferentiated reinforcement effect.

d. the reinforcement value of tokens which may be used perhaps could be improved by allowing clients to exchange their tokens daily for items and activities for which they have demonstrated or expressed a desire. Money, in amounts up to one dollar, may not be sufficiently reinforcing to many rehabilitation clients to motivate them to make significant behavioral changes (1, 2).

e. a larger sample of sheltered workshop clients might be used.

2. Results of the present study suggest that the following areas of research might be investigated further:

a. the extent to which social reinforcers incidental to token reinforcement programs enhance the reinforcement value of these token systems.

b. the effects of token versus social reinforcers on the behavior of sheltered workshop clients when the token reinforcement program employed contains an effective back-up system of reinforcement.
The results of this study suggest that persons utilizing reinforcement techniques with sheltered workshop clients might

1. attend carefully to the systematic development and programming of social reinforcers in client training procedures.

2. make greater use of the many highly manipulable elements of social reinforcement which can be provided by staff persons, especially since this form of reinforcement may, with some clients, be as effective or even more effective than more protracted and costly modes of reinforcement, such as token reinforcement systems.

3. take care that token reinforcement systems which may be employed provide for the inclusion of social reinforcement in the administration and exchange of tokens to enhance their reinforcement value.

4. make greater use of behavioral charting as a systematic reinforcement mode to record client behaviors and to provide reinforcing instructional feedback to clients on their daily progress.

5. combine behavioral charting with other forms of reinforcement, especially social reinforcement, which may perhaps produce the best reinforcement effects with many sheltered workshop clients.
CHAPTER BIBLIOGRAPHY


APPENDIX A

Example of behavioral chart (production rate graph) form:

DAILY PRODUCTION RECORD

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Production task:
APPENDIX B

REINFORCEMENT MENU

Name ____________________________

Date ____________________________

1. The best reward anybody can give me is ____________________
2. The thing I like to do best is _____________________________
3. I feel good when ______________________________________
4. When I have money, I like to _____________________________
5. Something I really want is ______________________________
6. I don't like to _________________________________________
7. The worst punishment for me is __________________________
8. I will do almost anything to get __________________________
9. The person I most like to please is _______________________
10. I don't like to _________________________________________
11. It makes me mad when I can't ____________________________
12. The only person I will take advice from is ________________
13. When I can do whatever I like, I _________________________
14. The staff person I like most at Goodwill is _____________
15. My favorite co-worker at Goodwill is ___________________
16. The staff person I feel I can talk to best is _____________
17. If I could work anywhere I wanted, it would be in ______
18. When at work, the time I like most is __________________
19. The person I prefer to work close to on the job is ________
20. It would make me feel really good if __________ praised
   my work.
21. When I do a good job, I prefer to be rewarded by:

(check one or more)

____ a. being told I've done a good job by my supervisor

____ b. being given a bonus on my pay check

____ c. getting to take an extra 10 minute coffee break

____ d. getting to talk for 15 minutes to one of the staff persons or supervisors (name of person __________)

____ e. getting to take a field trip to a place I want to go

____ f. getting to purchase something I want at one of the Goodwill stores

____ g. other. Describe:
APPENDIX C

SUMMARY OF INDIVIDUAL COMPARISONS OF GROUP PRODUCTION MEANS

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<tr>
<th>Comparison Number</th>
<th>Hypothesis Tested</th>
<th>Means Compared</th>
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*Significant at .025 level.

**Significant at .05 level.
BIBLIOGRAPHY

Books


Articles


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