

A Comparison of Two Self-Management Strategies for Improving  
Work Productivity of Mildly and Moderately Mentally Disabled  
Persons

by

Heather J. Mullen

A thesis  
presented to the University of Manitoba  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy  
in  
Department of Psychology

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## ABSTRACT

A series of studies by Martin and his associates (Hanel & Martin, 1980; Jackson & Martin, 1983; SriKameswaran & Martin, 1984) demonstrated the effectiveness of self-management strategies for increasing work productivity of mildly and moderately mentally handicapped persons in sheltered workshops. However, in this series of studies, the experimental conditions did not approximate typical workshop conditions. Didenko and Martin (1986) were unsuccessful in extending this line of research to typical workshop conditions with severely retarded workers. The current study extended the previous findings by applying self-management procedures over a regular workshop day with eight mildly and moderately mentally handicapped clients. In addition, it compared the effects of two self-management strategies for increasing worker productivity. The first strategy incorporated self-monitoring, goal-setting, and social contingencies to back-up the self-management procedures (SMG). The second strategy incorporated self-monitoring, goal-setting and social and monetary contingencies to back-up the self-management procedures (M-SRP). During each working day in Experiment 1, four clients worked under the SMG condition for half of this time, and under the baseline conditions for the other half

of the working day. For three clients, there was a clear experimental effect of the SMG condition. The other four clients worked under the M-SRP condition during half of each workday and under the baseline conditions for the other half day. All clients showed a clear experimental effect of the M-SRP. Experiment 2 directly compared the SMG condition to the M-SRP condition within all eight clients. Neither of the self-management strategies was demonstrated to be more effective. The current research was discussed in light of the previous research on the SRP and the M-SRP.

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## INTRODUCTION

Behavior modification is an approach in psychology that has achieved remarkable growth and success during the past 25 years (Kazdin, 1978). A population that has been the focus of considerable attention within the behavior modification field is that of the developmentally disabled (Baine, 1982; Das & Baine, 1978; Matson & McCartney, 1981; Whitman, Scibak, & Reid, 1983). An area of behavior modification that has received considerable attention has been referred to as self-control or self-management (Karoly & Kanfer, 1982). The current research was directed at both of these areas, i.e., it investigated self-management procedures with the developmentally disabled. Specifically, this research examined two self-management strategies for improving work productivity of moderately and mildly mentally handicapped clients in a sheltered workshop. Before reviewing research conducted within this specific area, some definitional issues within the general area of self-control will be discussed.

### Definitional Issues Within the General Area of Self-Control

The first important behavioral analysis of the area of self-control was provided by Skinner in his book, Science

and Human Behavior (Skinner, 1953). However, it was not until approximately 20 years later that interest in the topic became widespread. In the early 1970's, several books were published (e.g., Watson & Tharp, 1972; Mahoney & Thoresen, 1974; Thoresen & Mahoney, 1974), and self-control received a great deal of attention in the behavior modification journals. As often happens when areas of research and application expand rapidly, the development of the self-control area has been accompanied by some terminological difficulties. Three of these difficulties are described below.

One difficulty is that some writers have used the terms self-control, self-management, and self-regulation interchangeably while others have argued that such terms should be used to denote separate processes. Baer (1984), for example, has argued that self-control might best be interpreted to mean those instances in which an individual a) acknowledged their own problems, b) translated these problems into behaviors, c) either found natural contingencies to support behavior change, or developed contrived contingencies, d) re-arranged their environments to support, either directly or indirectly, the behavior changes, and e) recorded the entire process (Baer, 1984, pp. 211-213). He does note, however, that this is not what is meant by self-control in the literature. In particular, Baer contends that in the literature, a clinician/researcher



a) translates a client's presenting problems, or complaints about a client's behavior, into behaviors to be changed, b) contrives some contingencies to support the behavior change with delayed contingencies that require mediation, c) the researcher teaches the client self-monitoring or self-evaluation so the targeted behaviors can serve as mediators in order to overcome the inadequate contingencies, and, d) the researcher records the entire process, but probably only teaches the client to record the self-monitoring (Baer, 1984, pp. 214-215). Baer maintains that this is not self-control, and that our literature should reflect this by calling the latter process self-management. While Baer's definition is only one of several definitions which could be adopted (e.g., see Browder & Shapiro, 1985), his distinction does provide a clear procedural description of self-management. Consequently Baer's terminology has been adopted and will be used throughout the remainder of this study.

A second terminological difficulty is that different terms have been used to refer to the various components of self-management programs. For example, some writers have distinguished between self-observation, self-monitoring, and self-recording (e.g., Jackson & Boag, 1981), while others refer to all three processes simply as self-monitoring (e.g., Srikameswaran & Martin, 1984). As well some researchers distinguish between self-evaluation,

self-assessment, self-determination of consequences, and self-administration of consequences (e.g., Jackson & Boag, 1981), while others include all of these under self-administration of consequences (e.g., Hanel & Martin, 1980). An overview of common terms and definitions that appear in the self-management literature was recently provided by Browder and Shapiro (1985), and that overview is reproduced in Appendix A. For the purposes of the present research, the terms goal-setting, self-monitoring, and self-administration of consequences will be specifically operationalized in the Methods section.

A third terminological difficulty is that some researchers write about self-management in a way that implies that self-management behaviors are autonomous. That is, they describe behavioral improvements that a person might show as a function of engaging in self-management practices, but they neglect to identify back-up contingencies that support the specific self-management behaviors. A classic case in point is the concept of self-reinforcement. Self-reinforcement has been used to refer to a procedure in which an individual performs some behavior and then consumes a reinforcing stimulus that was readily available (Mahoney & Thoresen, 1974). If the behavior of that person increases in frequency, the increase is attributed to positive reinforcement (Mahoney & Thoresen, 1974). However, as argued by Catania (1975, 1976),

Goldiamond (1976), and Brigham (1980), it is misleading in such a situation to attribute the increase in behavior to positive reinforcement. The problem is that this implies that the observed increases in behavior are due to positive reinforcement as conceptualized theoretically in basic and applied research. However, as argued by Martin and Pear (1983), the increase in behavior is due, at least in part, to contingencies that prevented the individual from consuming the reinforcer without engaging in the behavior. Considered more broadly, self-management procedures are usually applied in situations where back-up contingencies make following the self-management procedures immediately worthwhile, independent of any long-term benefits from the behavior that is being managed. Rarely, however, are the back-up contingencies clearly identified. Not identifying back-up contingencies is a limitation in the literature. If the back-up contingencies are not identified, others attempting to either replicate the research or use the procedures in an applied setting, may fail to achieve the expected results. In the current research, the back-up contingencies that were used to reinforce the clients for engaging in the specific self-management procedures were clearly identified.

## Self-Management and the Developmentally Disabled

In 1981, three reviews of self-management procedures with the mentally retarded examined approximately 30 studies (Dennis & Mueller, 1981; Jackson & Boag, 1981; Shapiro, 1981). The reviewers concluded that, first, the developmentally disabled could learn self-management strategies, and that, second, these strategies could be used to modify a number of behaviors (one example being work productivity, e.g., Hanel & Martin, 1980; Zohn & Bornstein, 1980). However, both Jackson and Boag (1981) and Dennis and Mueller (1981) suggested that intermittent praise, demand characteristics, and other unspecified contingencies may have contributed to the success of the procedures. Again, this implies that the procedures, as written, may not be sufficient to successfully replicate the research or to successfully use the procedures in an applied setting.

In 1984, Fowler, in introducing a special issue on self-management with the developmentally disabled in Analysis and Intervention in Developmental Disabilities, characterized the majority of articles in that issue as dealing with the pragmatic issues of self-management. Indeed, most of the articles published in this field deal with pragmatics, with a few notable exceptions (e.g., Baer, 1984; Malott, 1984). As Fowler (1984) has said:

the development of effective, reliable, and practical self-management procedures can enhance the participation of the developmentally disabled in community activities now, whether or not theory

ultimately is served. That immediate outcome is too valuable to let this opportunity for its development pass untried (pg. 89).

The current research also addresses a practical concern; namely, can self-management procedures be used to increase work productivity of developmentally disabled persons in sheltered work settings.

Self-Management of Work Productivity. A few studies have examined self-management techniques as a means of increasing productivity of developmentally disabled persons in sheltered workshops. In general, the findings suggest that worker productivity can be increased. However, there are several limitations. For example, the experimental sessions are usually short, for example, 30 minutes. In addition, the sessions are usually conducted by researchers. This does not approximate what sheltered work settings are like, where staff members supervise workers over a 5 to 6 hour work day. Helland, Paluck and Klein, (1976) compared self-reinforcement to external reinforcement for increasing the productivity of 12 mildly retarded workers on a paper collating task. Self-reinforcement consisted of short, verbal self-phrases such as "Very good", delivered along with self-administered money or candy on an Fixed Ratio (FR) 10 schedule. In the external reinforcement condition, the experimenter administered the praise and the material rewards on the same schedule. There was one 30-minute session each day for 13 days. Both self-reinforcement and

external reinforcement significantly improved production rates, and there were no significant differences between the self-reinforcement and external reinforcement conditions.

Horner, Lahren, Schwartz, O'Neill, and Hunter (1977) compared the effectiveness of self-delivered tokens to staff-delivered tokens for increasing the production rate of one severely retarded worker. After assembling a 10-part adapter, the unit was inspected by staff. If the assembly was correct, the client was praised and given a token. In the self-delivery condition, the client was taught to perform a quality control check of the adapter by shaking it. If it did not rattle, the client self-delivered a token by pushing a wooden lever which deposited a token on the table. Tokens were cashed in for edibles at the end of each 90-minute work period. The client's production rate improved approximately 50% during self-delivered token phases as compared to staff-delivered token phases.

Wehman, Schutz, Bates, Renzaglia, and Karan (1978) described three case studies in which they examined reinforcement, self-administered reinforcement, and self-determined reinforcement for increasing the production rates of three mentally retarded workers. For a profoundly retarded client, both staff-administered and self-administered reinforcement increased production by over 400% above baseline, and non-contingent reinforcement increased production 100% over baseline. For a severely

retarded client, production rate increased over baseline when staff praised the client for correctly self-reinforcing. This increase in production rate was maintained when the staff withdrew praise for correct self-reinforcement. However, the greatest increase in production occurred when the client determined and delivered his own reinforcement. For a mildly retarded worker, self-administered reinforcement of a nickel for every two units produced increased production over baseline. Production increased slightly more when the client was able to self-administer on the same schedule of reinforcement as the staff, and increased again when the client was able to self-determine the reinforcement schedule. One client was in the workshop 6 hours each day, and the other two were in the workshop 2 3/4 hours per day. Money was exchanged for edible reinforcers at least twice a day.

Zohn and Bornstein (1980) were the first to investigate the use of a self-monitoring procedure to increase productivity. The main component of the self-monitoring phase consisted of four moderately retarded clients self-recording the number of hospital kits they assembled. Although clients only self-monitored work productivity, data were collected by observers on work quality and on-task behavior as well. Two clients showed statistically significant changes in work productivity during self-monitoring and three showed statistically significant

changes in work quality. Data were presented for only two clients for on-task behavior, and these were both significant. Work periods were 15 minutes long, and clients worked for 2 hours per day on assembling hospital kits.

McNally, Norusis, Gentz, and McConathy (1983) examined self-delivered reinforcement alone and in conjunction with a group-contingency for increasing the productivity of 10 severely retarded workers. Clients self-delivered reinforcement for every 10 products completed by removing a token from a stack of tokens placed in front of them. White tokens were on top and the clients worked their way down the stack. Red tokens were placed in the stack at the clients individual baseline rate of production. Thus, if they matched, or exceeded their baseline production rates, they self-administered red tokens. If at least one red token was earned, clients received 30 minutes of spare time at the end of the workday. Backup reinforcers such as edibles and music were available. Those who did not earn a red token had to continue to work. In the self-delivered reinforcement plus group-contingency phase, the 10 clients were divided into teams matched on productivity. The team with the most red tokens received the time off and the other team had to continue working. Both treatments raised productivity above baseline levels, with the self-delivered reinforcement plus group-contingency being the most effective.



Ackerman and Shapiro (1984) examined whether self-monitoring would maintain productivity that had been increased with praise and prompting, and whether self-monitoring would generalize to other production situations. There were five moderately retarded clients employed in this study. Data was collected in 30-minute sessions. Results indicated that self-monitoring maintained the increased productivity obtained by praise and prompting. In the absence of the self-monitoring device, generalization of productivity did not occur. However, it did occur when the self-monitoring devices were available. This implies that generalization would be facilitated by providing self-monitoring devices.

McNally, Kompik, and Sherman (1984) examined a self-management treatment package on the productivity of 13 mentally retarded workers (mean IQ 48) in a sheltered workshop. The self-management package consisted of self-monitoring, self-administered reinforcement, and performance feedback. Although only one client approached normative production rates, all clients showed a significant increase in their production rates.

Investigations of a Self-Management Package. In a series of four studies, Martin and his colleagues have examined a self-management package for improving work rates of mentally handicapped clients in sheltered workshops. Hanel and Martin (1980) investigated the effects of a package which

they called a self-regulation package (SRP). This package incorporated self-monitoring, goal-setting, and self-administration of reinforcement on the productivity of eight retarded workers. Training in the SRP was conducted in groups and lasted eight 20-minute sessions. Goals were set by the experimenter and were fixed throughout the study. A bonus was given for exceeding the goal. Clients self-monitored by pressing a lever on a marble-dispensing tube. The client would move the marble and place it in a tube beside a goal-setting tube. The marbles were pre-programmed on a Variable Ratio 3 (VR) schedule (range: 1 to 5) with a different semi-random sequence for the VR3 for each session. Orange token marbles were interspersed with blue self-monitoring marbles. Token marbles were cashed in at the end of each session. Self-monitoring accuracy was checked each session. There were six 20-minute sessions conducted three days of the week, and the study was conducted over three months. During the remainder of the time, supervision was conducted by regular workshop staff. The SRP was effective in increasing the productivity of the workers by an average 43% over baseline conditions (baseline conditions being a standardized model of the supervision being used in the workshop at that time). In a social validity preference test, clients usually preferred working under the SRP conditions. While there were no specific contingencies for correct production, the rates of correct production increased from an average of 70% under baseline conditions to an average of 73% under SRP conditions.

Jackson and Martin (1983) extended the SRP by examining the additive effects of each of the components. They compared the components of self-monitoring vs self-monitoring plus goal-setting vs self-monitoring plus goal-setting plus self-administration of tokens for increasing productivity of retarded workers in a sheltered workshop. Three workers, one mildly retarded and two moderately retarded, were involved. The clients were individually taught the SRP components. Goals, which were individually set for each client for each session, were selected by the client in conjunction with prompts from the experimenter. The self-monitoring was conducted by having the client self-assess that a piece of work was complete, then self-record the completion of the product on a sheet of paper. The clients self-administered tokens for attaining and exceeding their goals which were marked as a red zone on the self-monitoring forms. Tokens were exchanged for quarters at the end of the day. Accuracy of workers self-monitoring was assessed daily. There were five, 30-minute sessions Monday through Friday and this study was conducted over six weeks. Between sessions, supervision duties reverted to a regular workshop staff member. Self-monitoring plus goal-setting was effective with the moderately retarded workers, while the SRP conditions were effective with all three workers as well as the most effective overall. Staff felt that the self-management techniques used were an acceptable procedure for increasing

productivity, a goal that they felt was important. Error rates were not significantly affected by the treatment conditions.

Srikameswaran and Martin (1984) conducted a component analysis of the SRP with three moderately retarded clients and one mildly retarded client. The effect of the SRP or its components were not as clear-cut as in the Hanel and Martin (1980) or the Jackson and Martin (1983) studies. Components of the SRP were individually taught. Self-monitoring was accomplished by placing X's on a sheet of paper which also contained a goal marked in red. Individual client goals for each session were set in conjunction with prompts from the experimenter. Tokens were self-administered by the clients for attaining and exceeding the goals set. Quarters were used as back-up reinforcement for the tokens, and for two clients, other back-up reinforcers, such as edibles, were utilized. Tokens were cashed in daily. Srikameswaran and Martin (1984) conducted seven 30-minute sessions per day, 3 1/2 days per week over a period of 6 months. While not in sessions, workers were supervised by regular workshop staff. The mildly retarded client did not appear to respond to the SRP, and productivity decreased. For the three remaining moderately retarded workers in Srikameswaran and Martin's (1984) study, one worker demonstrated a slight increase in productivity during the SRP. For the other two, one clearly showed the

effects of the SRP, with a drop in production as each component of the SRP was removed. The other showed an additive effect as each component was added. Two clients preferred baseline conditions and the other two clients preferred the SRP conditions. Workshop staff found the increased productivity to be satisfactory. One of the two staff members polled indicated that they felt the SRP required too much staff-management, particularly in terms of having to check the client's self-monitoring accuracy on a continual basis (S.M. Srikameswaran, personal communication, April, 1984). Error rates were comparable across all phases.

The results of the first three studies by Martin and his associates suggest that the SRP is an effective self-management procedure for most retarded workers in a sheltered workshop setting. The SRP increased mean productivity for 13 out of 14 clients. Moreover, moderate to large effects were produced by the SRP for 11 of those clients.

In order to more closely approximate typical workshop conditions, the fourth study (Didenko & Martin, 1986) in this series extended the previous three studies in several ways. First, work goals were set with clients once each half-day rather than at the beginning of each half-hour. Second, tokens earned by clients under the SRP condition were exchanged for back-up reinforcers once per week rather

than once per day. Third, all of the clients studied were diagnosed as severely mentally handicapped whereas only two of the fourteen clients studied previously were in the severely mentally handicapped range. In the Didenko and Martin study (1986), the experimental task was packaging golf tees. Following each completed package, a client took a metal ring from one dowel and placed it on a self-monitoring dowel. The height of the rings on the self-monitoring dowel provided visual feedback for productivity and progress towards goals. Goals were set by placing an arrow at an appropriate level on the self-monitoring dowel. After the goal was surpassed, different coloured rings were used as self-monitoring tokens. These latter rings could be exchanged for back-up reinforcers at the institution canteen at the end of each work week. The results of this study were quite different from the three previous studies in the series. Specifically, six out of seven clients were unaffected by the SRP, with the seventh client showing a moderate increase in productivity.

From these studies, what can be concluded? Increased productivity was obtained when experimental sessions were half-hour periods, when token reinforcement and minimally delayed praise were given at the end of each half-hour session, when tokens were exchanged at the end of a half-day, and when the studies were conducted by research

assistants. No changes in productivity were obtained when the study was extended to approximate a field test, that is, operating under the self-management procedures during a more typical workshop day, dispensing token reinforcement and delayed praise each half-day, exchanging tokens at the end of the week, and using a research assistant modeling the supervision style of a regular workshop staff member. Can we conclude from this that self-management procedures will increase productivity under short experimental sessions closely controlled by a researcher, but that under more typical workshop conditions that self-management procedures will not increase productivity? At first blush, the above conclusion appears warranted. However, all clients who participated in the approximation of a field test were diagnosed as severely retarded (Didenko & Martin, 1986), whereas only two out of fourteen clients were diagnosed as severely retarded in the short experimental studies (Hanel & Martin, 1980; Jackson & Martin, 1983; and Srikameswaran & Martin, 1984). While Didenko and Martin (1986) are to be commended for attempting to both approximate a field test of the SRP, and to extend this research to a severely retarded population, it may be that too many variables were manipulated at once. Was the failure to increase productivity due to a lack of robustness of the self-management procedures over a more typical workshop day, or due to the inability of clients diagnosed as severely retarded to be affected by self-management procedures? To

attempt to answer this question, a retrenchment is necessary. Given that the experimental studies were successful in increasing productivity with clients who were mainly diagnosed as moderately and mildly retarded, it appears that the logical retrenchment is to attempt a field study with a population of clients diagnosed as moderately and mildly retarded. In addition, the Didenko and Martin (1986) study approximated a field test by using a research assistant who based her supervision on a workshop staff member's supervision style. However, the assistant had no previous experience supervising, and was not free to vary her interactions once the baseline of interactions was established. A closer approximation of a field test would be to utilize a regular workshop staff member who would continue to perform other supervision and workshop duties.

The present study was similar to the Didenko and Martin (1986) study in that both studies examined the procedures under more typical workshop conditions, i.e., a full working day. Both studies delivered praise and/or feedback and tokens at the end of each half-work day with tokens exchanged for money at the end of the work week. Both studies specified the feedback to be given to clients at the end of work-periods, and both studies compared a self-regulation package consisting of self-monitoring plus goal-setting plus social and monetary contingencies, and a self-monitoring package consisting of self-monitoring plus



goal-setting plus social contingencies. However, the present study was different from the Didenko and Martin (1986) study in the population studied, the production tasks, the workshop setting, the persons who carried out the experimental procedures, the self-monitoring device, the experimental design, the goal-setting technique, the clients prior experience with money, and the back-up social contingencies to the self-management procedures.

### The Purpose of This Study

In order for self-management strategies to be practical, viable alternatives to staff-managed contingencies in sheltered workshops, they must maintain or increase productivity, keep error rates to a minimum, be acceptable to both clients and staff, and be easily managed over a regular workshop day under normal workshop conditions by regular workshop staff. This study examined these issues with moderately and mildly retarded clients.

In typical sheltered workshops, a staff member is likely to supervise at least twelve clients and to have a great deal to attend to throughout the working day. While supervising clients, they must perform a variety of other related workshop duties. If self-management systems are likely to be adopted by sheltered workshop staff, they must be demonstrated to be practical, efficient, and effective in typical workshop environments. The present research was conducted with this in mind.

First, this research was conducted in a typical sheltered workshop during regular working hours. Second, the training and supervision was conducted by a regular workshop staff member who continued to perform her other supervision and workshop duties. Third, the social contingencies backing-up the self-monitoring, goal-setting, and self-administration of tokens were clearly identified. Fourth, back-up contingencies to support the self-management behaviors were streamlined by checking the accuracy of self-monitoring as the boxes of production were removed, and by taking a maximum of one-minute per client at the beginning and end of the morning and afternoon work periods to set goals and give feedback.

In addition, this study compared the effects of two self-management strategies. One consisted of self-monitoring plus goal-setting plus back-up social contingencies for engaging in these activities (SMG). The other was a modified-SRP (M-SRP) which consisted of self-monitoring plus goal-setting plus back-up social and monetary contingencies.

## METHOD

### Subjects

The clients were eight mentally handicapped persons residing at the Manitoba Developmental Centre, Portage la Prairie, Manitoba. They were selected from clients attending Northgrove #1, one of the sheltered workshops of the Manitoba Developmental Centre. There were approximately 40 clients attending the workshop, with four staff people to provide supervision.

The clients were chosen on the basis of three considerations: they would likely be available during the time of the study; they typically did not present behavior problems in the workshop; and they had previous experience with the experimental tasks, or were readily able to learn new tasks. This latter requirement was necessary as production tasks changed during the study and this study examined production variables, not training variables. Clients ranged from 20 to 48 years of age and had a mean IQ of 54. Client characteristics are summarized in Table 1.

A regular workshop staff member volunteered to participate in this study by providing the supervision and training required by the clients during the baseline and

TABLE 1  
Client Characteristics

| Client  | Age | Test | Test Results | Institutional<br>Diagnosis                          |
|---------|-----|------|--------------|---|
| Terry   | 25  | WISC | FS IQ 47     | Phenylketomurea:<br>Moderate<br>retardation         |
| Bert    | 34  | WAIS | FS IQ 53     | Encephalitis:<br>Moderate<br>retardation            |
| Dennis  | 44  | WAIS | FS IQ 58     | Tuberous Sclerosis:<br>Mild<br>retardation          |
| Derrick | 20  | WISC | FS IQ 57     | Chemical Substance<br>Abuse:<br>Mild retardation    |
| Leigh   | 37  | WAIS | FS IQ 52     | Birth Injury:<br>Moderate<br>retardation            |
| Robert  | 22  | WAIS | FS IQ 68     | Environmental<br>Influences:<br>Mild<br>retardation |
| Wayne   | 32  | WAIS | FS IQ 40     | Unknown Etiology:<br>Moderate<br>retardation        |
| Bobby   | 48  | WAIS | FS IQ 55     | Unknown Etiology:<br>Mild<br>retardation            |

experimental phases. This staff member had worked with retarded persons for 19 years in various capacities. She had been in the workshops at the Manitoba Developmental Centre for the past four years, with the last two years spent in Northgrove #1. In addition to supervising the research clients, she attended to her regular duties and supervised other workshop clients. Her duties included such things as taking attendance, doing the payroll sheets, quality-control checking of completed products, packing finished products, and switching clients from one contract to another contract. At times, the experimenter or a research assistant, following the same supervision procedures also supervised the research clients. This occurred because of staff absences.

### Setting

The workshop was a 6.1 m by 15.2 m room. A smaller adjoining room was used to store raw materials and completed products. Administrative duties were conducted at one end of the workshop where a desk, filing cabinet, and chairs were located. Throughout the room there were nine tables at which clients worked as well as several additional tables used for checking and packing completed products. Barrels and boxes of raw materials and completed products were spread throughout the workshop. An air-conditioner and a fan were generally in use, and music was usually played. In

general, the workshop was a very busy, noisy, and crowded environment.

The research clients were seated at a production table, four to a side. This table measured 1.2 m, and was divided in half, length-wise, by raw material bins. Each client had a receiver tray into which he placed completed products. The receiver tray was located on the table in front of the raw material bins.

### Apparatus

A self-monitoring sheet of paper, and a pencil, were placed in front of each client. The self-monitoring form was a 14 cm by 21.5 cm piece of paper and was divided into 10 rows with 18 squares per row (see Figure 1). This form is similar to the one used by Jackson and Martin (1983) and Srikameswaran and Martin (1984). For the SMG condition the form was on pink paper with the goals marked on the form by filling in a square with a red pencil. For the M-SRP condition the form was on white paper with the goals marked on the form by putting a green dollar sign in a square.

Figure 1. A Sample of the Self-Monitoring Form





### Experimental Tasks

In the workshop where this research was conducted, there was typically a fast turn around of contracts. Consequently, there were three experimental tasks worked on during the course of this study. The first task was stripping tent peg cards. The cards came in large sheets, and the clients had to punch the cards out and strip away any excess cardboard. The cards were then stacked in front of the clients. In terms of the number of behaviors required to complete the task, this was the least complex task.

The second task was powdering F-caps. This task required the client to cover the end of a Q-tip with powder, and then to run the powdered Q-tip around the inside of a gasketed F-cap until the gasket was sufficiently powdered. The client was to reject any caps which were doubled-gasketed. In terms of the number of behaviors required to complete the task, this was the second most complex task.

The third task was assembling 3-gang battery caps. This task required the client to snap three plastic bubbles onto a plastic bar. The client was to reject any defective bubbles or bars. A considerable amount of pressure was required to snap the bubble onto the bar, and some of the clients required the use of special tools to push the bubble on. In terms of the number of behaviors required to complete the task, this was the most complex task.

### Controlled Variables

As Billingsley, White, and Munson (1980) have noted, there is difficulty in claiming control when procedural reliability is not assessed during the baseline phase of an experiment. Prebaseline and baseline observations were conducted on the frequency and type of interactions that occurred between the workshop staff member and the clients. Observations were conducted in 30-minute observation periods once per day for five out of fifteen working days during the prebaseline and baseline phases. During experimental phases, the staff member and the person replacing her when she was not available to supervise were also monitored in 30-minute observation periods once per day for eight out of twenty-nine working days. The staff member incorporated her regular supervision style during the experimental phases. Specifically, she gave general work prompts and provided praise for on-task behavior and good work performance. In addition to feedback, she gave error correction, responded to client requests, and dealt with problem behaviors. The overall frequency and nature of her interactions with the research clients was monitored to ensure that they remained approximately equal across all phases.

Five types of interactions were monitored: general work-related questions or instructions, e.g., "Fred, what's in that barrel?" or "O.K., guys, start working.", or "Joe, you staple, let the other guys bag."; social interactions,

e.g., "How are you today?", or "O.K., time for coffee."; positive interactions concerning work, e.g., "Bob, you are really working hard today." or "Fred, you've got the hang of putting these tent pegs in the bag, keep up the good work"; error correction, e.g., "Nancy, you've put all these gaskets on upside down. Take them off, and put them on correctly." or "Sam, no, the label is on crooked, it has to be straight."; and negative interactions, e.g., "Jim, sit down in your seat." or "Mark, stop kicking Fred or you'll have to go back to the ward." The frequency and type of interactions remained relatively constant across all conditions. This frequency was supplemented, during the self-management phases, by back-up social contingencies that supported self-management.

Another controlled variable was the standard workshop pay system, which was based on production rates. The workshop staff based the clients' pay rate on daily casual observations of productivity, work-related behavior, and occasionally on formally conducted time-sampled production observations. Based on this information, a client was assigned a daily rate of pay ranging from \$1.00 to \$2.15 per day. Thus, the maximum that a client could make during one week was \$10.75. Clients received their pay slips at the end of the week on Friday. Client pay rates remained constant throughout this study.

### Dependent Variables

Production rate. Clients worked according to the regular workshop hours. In the morning, work began approximately at 8:00 a.m., and ended at 11:30 a.m. In the afternoon, work began approximately at 1:00 p.m. and ended at 4:00 p.m. There was a 20-minute coffee break during each morning and each afternoon. Total working time per day per client was approximately 6 hours.

Production was monitored for each client individually. The clients were asked to put their production in their receiver trays. When the trays were full, they were removed and the client was given another receiver tray. The number of minutes worked each day for each client were timed. Out-of-seat durations were included, with the exception of times that the client left the workshop. The hourly production rate was obtained by dividing the number of products completed by the number of minutes worked and multiplying this figure by 60 to provide hourly data.

Percentage of correct production. All items produced by a client were checked against a standard for correctly assembled tasks established by the workshop supervisor. If the task did not meet the standard, it was judged to be an error in production. The number of correctly assembled units were divided by the total number of units produced during the session and multiplied by 100 for conversion to a percentage.

### Reliability Assessments

The author was the primary observer. The secondary observer was either a volunteer undergraduate behavior modification student, or, at times, a regular workshop staff member. Observations were conducted such that neither observer could determine what the other person had recorded. IORs were taken on the following components.

Production. As the box of production for the client being monitored was completed, an observer took the box and counted the production. This number was recorded. The second observer then independently counted and recorded the production. The IORs for production were then calculated by dividing the smaller number by the larger number and multiplying by 100. IORs on production rates were taken on 25% of the sessions and yielded a mean of 99% with a range of 93% to 100%.

Errors. After counting the production, the observer examined the units of production for errors. The units were placed back in the box, and the second observer independently checked the box for errors. Errors were defined for each contract by workshop staff in order to pass a quality-control inspection. The IORs for errors were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. IORs on error rates were taken on 25% of the sessions and yielded a mean of 98% with a range of 89% to 100%.

Total session time. An observer timed, with a watch, all aspects of the study that required time checks, for example, the morning and afternoon work periods, coffee breaks, and out-of-workshop durations. A second observer independently monitored these times following the same procedures. Both watches were synchronized before beginning time IOR checks. Total session time was then calculated and the IORs were computed by dividing the smaller number by the larger number and multiplying by 100. IORs on total session time were taken on 25% of the sessions and yielded a mean of 95% with a range of 80% to 100%.

Staff-supervision conditions during self management phases. During the initial goal-setting and social contingencies phases, the staff member was periodically monitored by both observers to ascertain which of the self-monitoring supervision procedures were being used. If the staff member was not using all of the procedures, she was prompted to correct her performance. In addition, she was also asked why she was deleting some component. For example, "Is it too time-consuming or cumbersome?" In this way, information on practical suggestions for improvements were obtained. The IORs on supervision conditions were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. IORs on supervision conditions were taken on 24% of the self-management sessions sampled and yielded a mean of 97% with a range of 93% to 100%.

Staff supervision interactions. During baseline and experimental phases, the staff member was periodically monitored by both observers for the frequency and type of interactions that occurred between her and the clients. The IORs on supervision interactions during all phases were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. IORs on supervision interactions were taken on 40% of the occasions sampled and yielded a mean of 95% with a range of 90% to 100%.

Accuracy of self-monitoring. The staff member checked the accuracy of self-monitoring by initialing the self-monitoring form and comparing it to the clients production. Periodically, an observer also recorded accuracy of self-monitoring by checking the number of boxes produced by the client against the number of boxes the client had recorded. The observer independently recorded this information. The IORs on accuracy of self-monitoring were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. IORs for accuracy of self-monitoring were taken on 15% of the sessions and were 100% on all occasions.

### Social Validation

The importance of socially validating behavioral procedures is now widely accepted (Kazdin, 1977; Wolf, 1978). This study examined social validity from both the workshop staff's and the client's perspectives. The staff were questioned regarding the acceptability of the procedures, the significance of any production rate changes, and the supervision system that they preferred.

The client's choice of supervision procedure was examined in a preference test. In this study the preference testing was among baseline conditions (which was the typical staff supervision procedure), SMG conditions, and M-SRP conditions. The preference tests were conducted at the end of Experiment 2. Each client was tested individually by the experimenter. The testing was conducted in a room other than the workshop. Three tables were set up with each representing a different supervision condition. A chair was positioned in the middle of each table. For baseline conditions, there were the raw materials and a receiver tray. For the SMG condition, there were the raw materials, a receiver tray, a pink self-monitoring sheet with the goal marked in red, and a pencil. For the M-SRP condition, there were the raw materials, a receiver tray, a self-monitoring sheet with the goal marked in with the green dollar sign, and a pencil.



At the beginning of each preference test, the client was brought into the room by the experimenter. Standing behind the middle table, the experimenter, who stood on the client's right, asked the client, " (client's name), you can work here (pointing to the table in the middle), or you can work here (pointing to the table on the right), or you can work here (pointing to the table on the left). Please sit down where you want to work and start working." After the client had chosen a table, he worked for approximately 15 minutes. The task and the goals were chosen such that the client was likely able to complete enough units to meet the goal if they were working at rates comparable to their experimental rates. If they chose one of the experimental conditions, and met their goals in the allotted time, they received the contingencies appropriate to that condition. This type of preference test has been used with retarded persons to assess vocational task preferences (Mithaug & Hanawalt, 1978), workshop supervision preferences (Martin, Pallotta-Cornick, Johnstone, & Goyos, 1980; Pallotta-Cornick & Martin, 1983), and self vs staff managed production conditions (Hanel & Martin, 1980; Jackson & Martin, 1983; SriKameswaran & Martin, 1984).

Preference tests were conducted for each client and each condition appeared on each table only once. If, on the first two preference tests, the client chose the same condition, they were not tested again. However, if the

client chose two different conditions on the first two preference tests, they were given a third preference test. Again, each condition appeared on each table only once.

During the preference tests, two observers recorded the client's choices. The IORs on preference choices were calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. IORs were taken on all preference tests and were 100%.

## EXPERIMENT 1

In this experiment subjects experienced typical staff supervisory conditions during half-of each working day and a self-management package during the other half of each working day. For four subjects, Group 1, the self-management package was self-monitoring plus goal-setting plus social contingencies (SMG). For the other four subjects, Group 2, the self-management package was self-monitoring plus goal-setting plus social and monetary contingencies (M-SRP).

### Experimental Conditions

Baseline. The clients who were selected for this study were initially located throughout the workshop. Since this research required all clients to be located at the same table, it was necessary to move the clients. Consequently, there were three weeks of prebaseline adaptation to the new working environment. This adaptation phase gave both the clients and the staff time to adjust to the new seating arrangements.

As described previously under the subsection, Controlled Variables, during prebaseline and baseline phases, the supervisory technique that the staff member was currently

employing with the clients was monitored. She was informed that the experimenter would be observing her current techniques and quantifying the interactions that she had with the research clients so that the frequency and nature of interactions might be kept approximately the same across all phases. She was asked to use her standard supervision technique and was encouraged to be as natural as possible.

In addition to the research clients, the staff member also supervised six other workshop clients, and performed other related workshop activities. This staff/client ratio of approximately 1/14 closely approximates the staff/client ratios found in many sheltered work settings with moderately and mildly retarded clients.

Self-monitoring plus goal-setting plus social contingencies (SMG). The four clients under specific experimental conditions (either SMG or M-SRP) were trained as a group at a separate table near the staff desk. During training the other four clients continued to work at other tasks in the workshop. The training procedures, described below, are similar to those used successfully by Martin and his associates to teach self-management skills to the retarded (Hanel & Martin, 1980; Jackson & Martin, 1983; Srikaneswaran & Martin, 1984). Salend and Ehrlich (1983) suggested that explaining the choice of target behaviors and the intervention strategies enhances the effectiveness of behavioral interventions. Therefore, in this study, the

staff member provided the clients with an explanation and rationale for the procedures. For example, she might say, "O.K., guys, you are going to learn some self-management skills. That means you are going to learn to keep track of your own work so that you can make more boxes. Also, I'm going to help you set goals for yourself, to decide how many boxes you can make in a morning or afternoon. First, you will be part of a research project. I told you about that when I moved you to your new seats. Second, it's important to be able to set goals and meet those goals in the workshop. Remember, the best workers work hard, make lots of boxes of production, and they don't make lots of mistakes. So, it's important to learn how to keep track of your own work, set work goals for yourself, make few errors, and to work without my having to tell you to work." SMG consisted of self-monitoring, goal-setting, and back-up social contingencies. While training of these components is described sequentially below, they were implemented as a package all at the same time.

**Self-monitoring:** The staff member first ascertained that each client knew how to make a mark, for example, a checkmark or an X, so that they could use these marks to monitor production. The staff member then instructed the clients in self-monitoring and modelled the procedure for them. She asked them to record their own production on the self-monitoring sheet. As each client completed his first

box of production, the staff member prompted him to put one mark on his form. She praised them for self-monitoring accurately and stressed that it was important to self-monitor only what they really made. Prompts were faded until each client had correctly self-monitored four consecutive boxes of production. The clients were then considered trained in self-monitoring.

When self-monitoring during work sessions, each time that a receiver tray was filled, the client put a checkmark or an X in the first box in the first row of the self-monitoring form. As each receiver tray was completed, the client continued to record production by putting consecutive marks on the column of squares. In this way the client had a visual representation of the amount of work completed (see Figure 1). The self-monitoring form had sufficient spaces so that the client had a visual representation of his on-going production rate over two weeks. When the production task changed, a new self-monitoring form was provided.

The client received the self-monitoring sheet at the beginning of every work phase that required a self-monitoring form, and this sheet was handed in at the end of each morning and afternoon work period. Each time that production was removed, the staff member checked to see if the client had monitored correctly. If the client had monitored correctly, the staff member placed her initials by

the self-monitoring mark. If accuracy fell below 85%, the client was retrained in self-monitoring.

Goal-setting: Clients were initially trained using the red goal-setting square. During a training session, this square was filled in with red by the staff member while the client watched. The staff member then instructed the clients in setting reasonable goals. For example, the staff member might say, "Fred, you made eight boxes yesterday morning, that's this high on the self-monitoring form. That was good. How many boxes, or how high on the form do you think you can go this morning?" If Fred indicated he would like to set his goal at 9 or 10 boxes, the staff member said, "Good, that's a reasonable goal, just one or two boxes more than yesterday morning. I think that you can do that. Now, I'll fill in the goal in red on your self-monitoring form. As soon as you get your marks up to that red square you'll know you've met your goal. You want to reach your goal and go above it if you can. But remember, good workers only mark down what they actually produce." If the client wanted to go below his previous baseline rate, or wanted to set goals that were much too high, the staff member explained why those goals were not realistic. She explained that only reasonable goals should be set and she prompted them towards a more realistic and reasonable goal. Each client individually set a goal with the staff member and then self-monitored his production. When he reached his

goal, the staff member praised him for reaching his goals and for self-monitoring. After a goal-setting training session, clients were considered ready for production.

During work sessions, goal-setting occurred at the beginning of the morning and afternoon work periods and took approximately one-minute for each client. When each client arrived at the workshop he received his self-monitoring sheet from the staff member. In conjunction with the staff member, each client set a production goal. The criteria for goal-setting was that the goal meet or exceed the client's baseline rate of production, and that the goal be deemed attainable by both the client and the staff member. However, the staff member would adjust this criteria if a client came to the workshop late or had to leave the workshop early. In addition, she occasionally would lower the criteria for clients she felt were having a "bad" day. Specifically, on three occasions for one client, and on one occasion for a second client, she set goals that were below their baseline rates of production. The staff member then encouraged the client to meet or beat his goal. The goal was noted on the self-monitoring form in red by filling in the square that corresponded to the goal that had been set. As soon as the client's recorded production reached that square, then the goal had been met and each square above the red square was production that had exceeded the goal.



Social contingencies: The staff member continued to supervise the clients using her standard format and interactional style. In addition, she provided the following social contingencies for the clients regarding their self-management procedures. Specifically, at the end of each half day, she provided a maximum of one-minute of feedback to each client concerning their self-monitoring and goal attainment. If a client had attained or exceeded his goal, she provided praise for this and included a rationale, e.g., "Great, Jay, you've met your goal for this morning. Good workers set reasonable goals and then try to meet them. Keep up the good work." If a client had not met his goal, she provided feedback and a rationale, e.g., "John, you didn't make your goal today. Maybe we set the goal too high. You know, good workers reach their goals, and get a chance to do more kinds of things. Next time, let's really try to reach the goal." She also provided feedback on accuracy. If the client was 85% or more accurate, she provided praise for this. If the client was less than 85% accurate, she informed him of this and retrained him at the beginning of the next self-management session. She stressed the need for accurate self-monitoring of production, as this would be a step towards having greater freedom in the workshop, and would help him to be employed in other areas. Data were taken on production rates during SMG sessions only after the clients were trained in all SMG components.

Self-monitoring plus goal-setting plus social and monetary contingencies - A modified self-regulation package (M-SRP). As indicated previously, the four clients trained in M-SRP were initially trained as a group at a different table. Also, although the self-management components are described sequentially below, they were implemented as a package following training.

Self-monitoring: Self-monitoring was conducted as it was under the SMG condition.

Goal-setting: The goal-setting procedure was conducted as it was under the SMG condition. However, instead of marking the goal square in red, the goal was marked on the self-monitoring form in the form of a green dollar sign. As soon as the client's recorded production reached that square, the goal was met. Each square above the start of the dollar sign was production that exceeded the goal.

Social and monetary contingencies: During the M-SRP phase, after learning self-monitoring and goal-setting with the red squares, clients were trained in goal-setting with the green dollar sign. The staff member explained that with the dollar sign they were now working for bonus money which would be added onto their regular workshop pay. They could earn up to a dollar more per day by meeting or beating their goals. The goal was marked on their self-monitoring forms in the shape of a green dollar sign to remind them that when they reached the sign, every mark they made thereafter gave

them part of a dollar, e.g., 10 cents to 25 cents for each mark depending on the contract. The exact details of the bonus system depended on the contract and were arranged in consultation with the workshop supervisor and the vocational training department supervisor.

During training, the goal was marked with the dollar sign and when they reached their goal, they were praised if they self-monitored accurately, and they received a quarter immediately. Subsequently, the clients were reminded that when they were in their regular chairs in the workshop they would receive all their earned bonus money with their usual pay on Friday.

During work sessions, the feedback procedure involving social contingencies was conducted as it was under the SMG condition. In addition, feedback was provided on back-up money earned for the tokens. At the end of the work period, they turned their forms in to the staff member, and the marks were counted. If the client had exceeded his goal, the staff member praised him for beating his goal, marked the amount of extra money earned on the client's self-monitoring form, and reminded him that he would receive the bonus on Friday, the regular workshop payday. If the client did not meet his goal, she provided feedback, and indicated that, for that day, he had not earned a bonus, but he would receive his regular workshop pay. The client received the bonus money at the regular workshop pay period.

Receiving the bonus money with the regular workshop pay was used because it closely approximated the normal pay system. The workshop staff felt this system would not interfere with the on-going workshop routine; however, they felt that cashing in tokens every day would be disruptive and would not approximate pay contingencies in community work placements. Data were taken on production rates during M-SRP work sessions only after clients were trained on all M-SRP components.

### Experimental Design

The design was a within-groups, multi-element design with partial counterbalancing of supervision conditions across two groups of four clients each (for descriptions of this design see Kazdin & Hartman, 1978; Martin & Pear, 1983). Each group of four clients was supervised under either of the experimental conditions and baseline in the morning and afternoon work periods. The arrangement of supervision conditions can be seen in Table 2.

TABLE 2

The Arrangement of Experimental Conditions in Experiment 1

|         |      |           |          |
|---------|------|-----------|----------|
| Group 1 | A.M. | SMG***    | Baseline |
|         | P.M. | Baseline* | SMG      |
| Group 2 | A.M. | Baseline  | M-SRP    |
|         | P.M. | M-SRP***  | Baseline |

15 work days      5 work days

Approximate Length of Phases

\*Baseline - Current staff supervision.

\*\*SMG - Self-monitoring plus goal-setting plus social contingencies.

\*\*\*M-SRP - Self-monitoring plus goal-setting plus social and monetary contingencies - A modified self-regulation package.

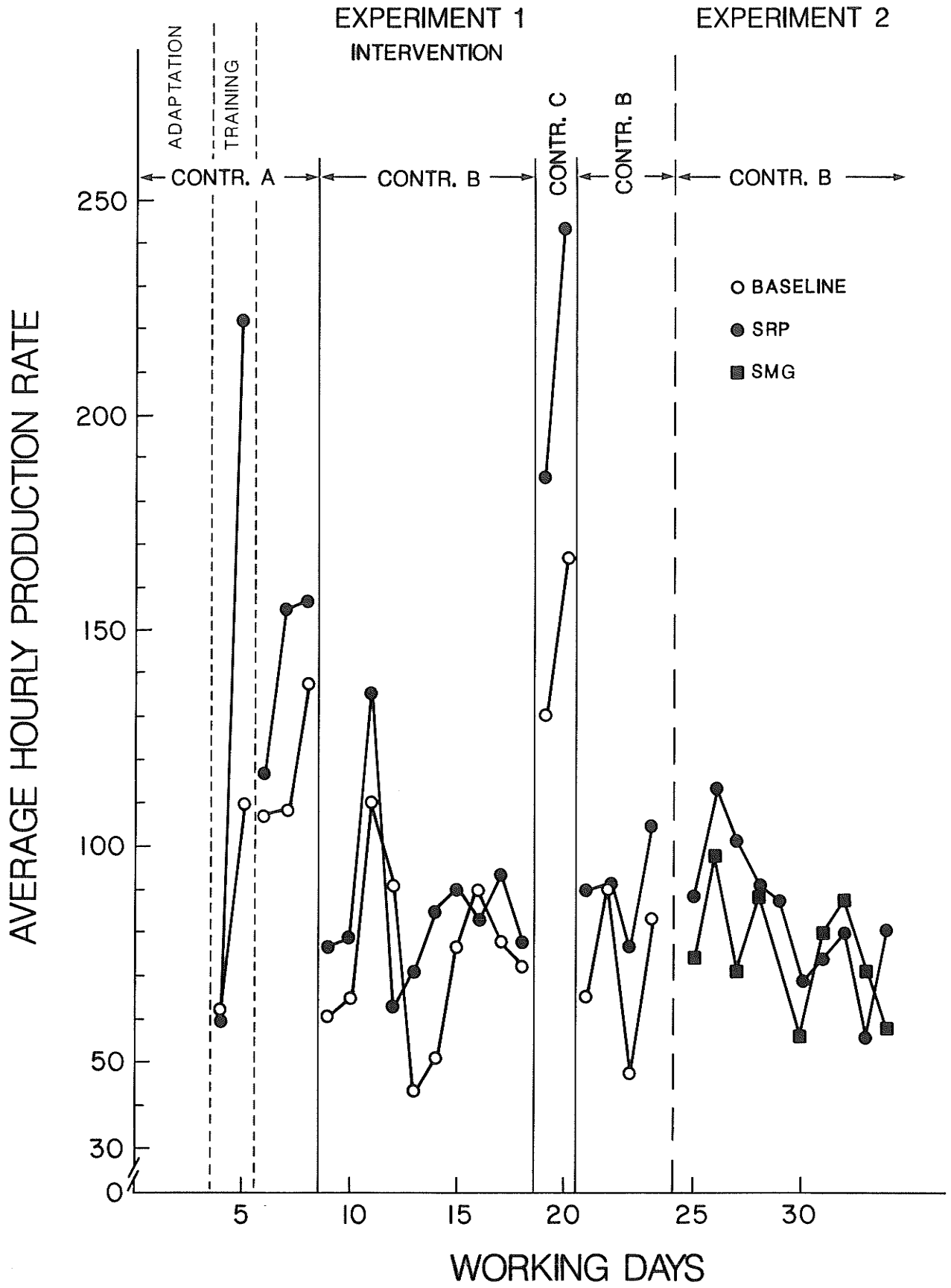
+ During this last week, the baseline and SMG or M-SRP conditions alternated A.M. and P.M. across days.

## Results and Discussion

As mentioned previously, the workshop in which this research was conducted typically had a fast turn around of contracts. Three contract tasks were worked on during the course of this experiment, with one of the contracts being worked on twice. The contracts were worked on in the following order: powdering F-caps, assembling 3-gang battery caps, stripping tent peg cards, and finally, again assembling 3-gang battery caps. Between the baseline and the experimental phases, the clients response rates varied from 40 to over 400 production units per hour, according to the contract. In spite of this considerable variation in response rates, the contingencies demonstrated experimental control even though effects were small in some cases.

Daily production rates are shown for one client in Figure 2. For that client, looking just at Experiment 1, and excluding the training data, there were 19 data points across all contracts for both baseline and M-SRP conditions. Experimental control was demonstrated in that 17 of these data points favored the M-SRP. However, the large variance in production rates per contract for most of the subjects made it difficult to see the experimental effects when the data were graphed as in Figure 2. For this reason, the results are described in bar graphs in terms of mean percent change scores in SMG and M-SRP from baseline for individual contracts for individual subjects.

Figure 2. An individual client's average hourly production rate across Experiments 1 and 2. For this client, Robert, Experiment 1 was a comparison between baseline and M-SRP. Experiment 2 was a comparison between M-SRP and SMG.



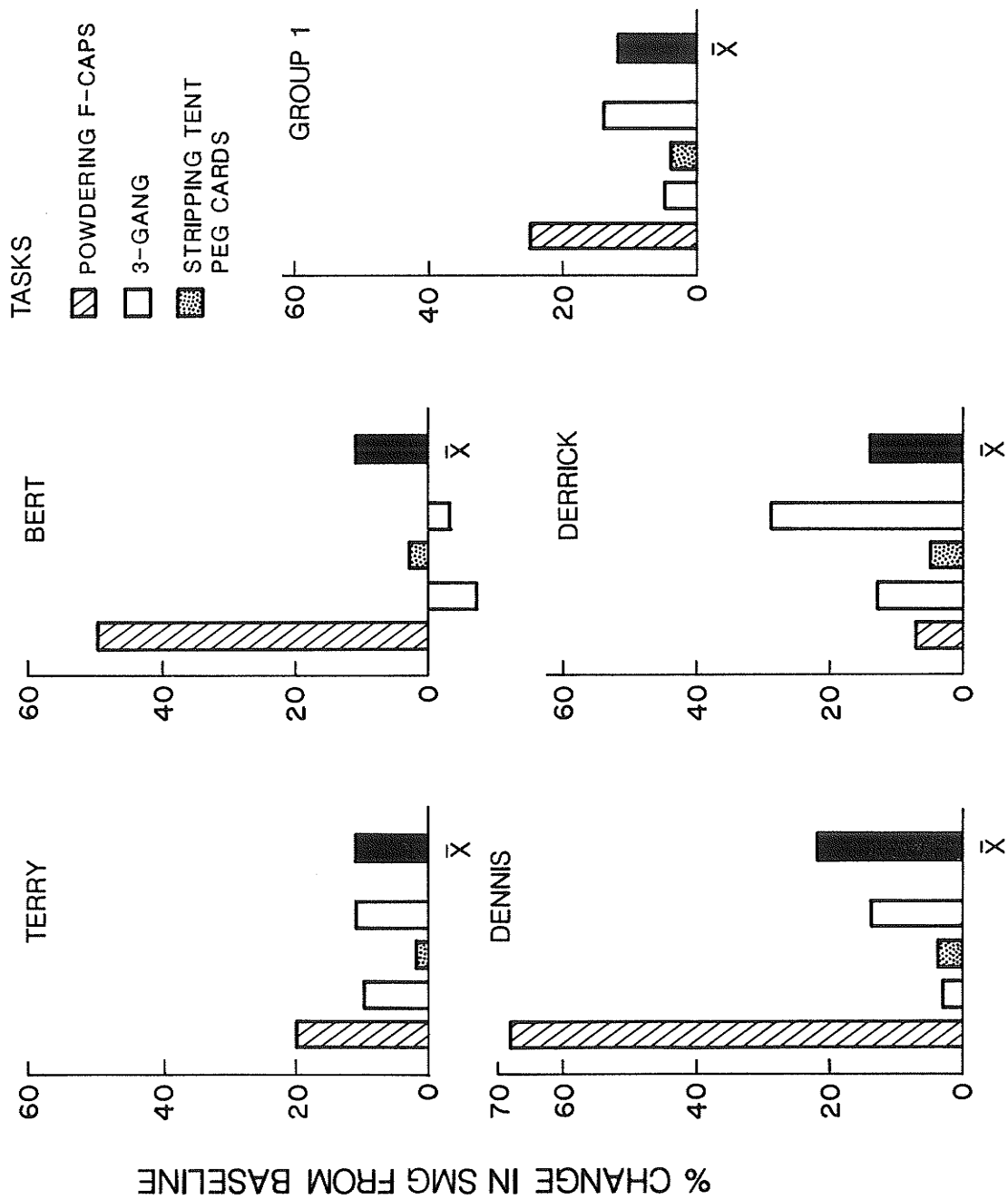


Results with SMG. As can be seen in Figure 3, three of the four clients under SMG showed an increase in production rate on all contracts when compared to baseline. The fourth client showed an increase in production on two of the three contracts under SMG (powdering F-caps and stripping tent peg cards), and showed a decrease in production both times he worked on assembling 3-gang battery caps. All clients showed a substantial increase under SMG, with the exception of Derrick, when the task was powdering F-caps. As described previously under the section Experimental Tasks, this was a simple task, and the group mean productivity per hour was 176 under baseline conditions, and 220 under SMG conditions.

All clients showed a small increase in production under SMG when the task was stripping tent peg cards. As described previously, this was the simplest task. The group mean productivity per hour was 235 under baseline conditions, and 244 under SMG conditions. It appears that there may have been a ceiling effect for this task.

All clients, with the exception of Bert, showed an increase in productivity under SMG when the task was 3-gang battery caps. This task was the most complex task, requiring the clients to both snap 3-plastic bubbles onto a bar and to reject any defective bubbles or bars. The group mean productivity per hour was 90 and 96 under baseline conditions, and 103 and 101 under SMG conditions. It

Figure 3. Percent change in SMG from baseline for Experiment 1. Bar graphs show mean performance of individual subjects on specific tasks, mean performance of individual subjects across tasks, and mean performance across subjects.



appears that the greater difficulty of the task not only accounted for its much lower baseline productivity rate but also did not lend itself to large increases in productivity. One client, Bert, showed a decrease in productivity for this task. He had a spastic condition which did not lend itself well to this task and his production rate of approximately 40 per hour was the lowest in the group. The demands of the 3-gang task, and his low productivity may have made it impossible for this client to show an effect of the treatment condition.

Each day the clients received one session (a half day) on baseline and another session (a half day) on SMG. A day-by-day comparison of the number of data points favoring SMG over baseline is shown in Table 3. These daily comparisons clearly favored SMG for three of the four clients.

Results with M-SRP. As can be seen in Figure 4, all four clients under M-SRP showed an increase in production rate on all contracts when compared to baseline. When the task was powdering F-caps, all clients showed a substantial increase in production under M-SRP, with the exception of Wayne. The group mean productivity per hour was 117 under baseline conditions, and 177 under M-SRP conditions. When the task was stripping tent peg cards, all clients showed an increase in productivity per hour under M-SRP. The group mean productivity per hour was 214 under baseline conditions and

TABLE 3

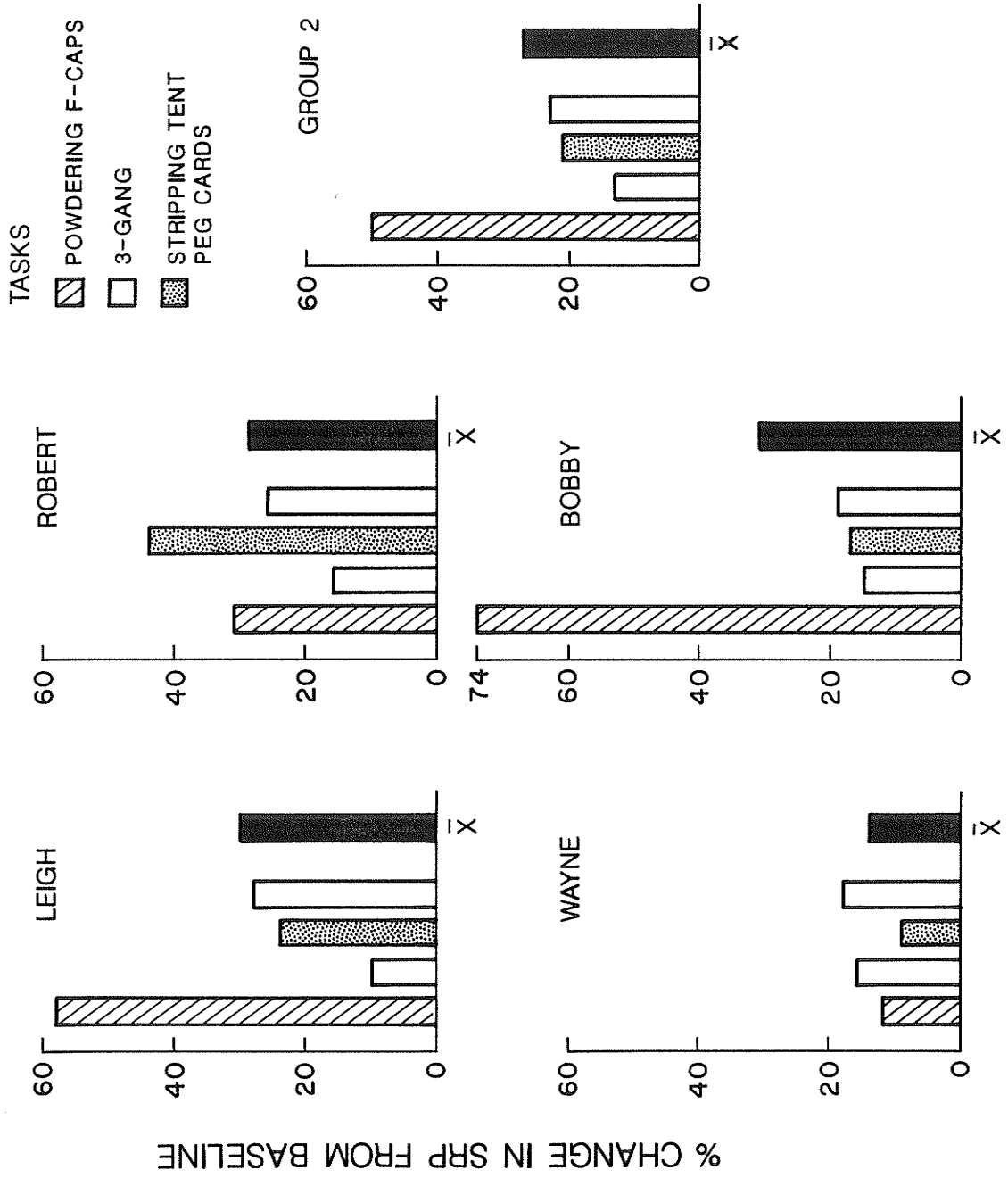
Number of experimental production rate data points above  
baseline production rate data points for all clients

| Client | Number of<br>data points | Number of data points<br>favoring SMG |
|--------|--------------------------|---------------------------------------|
| Terry  | 18                       | 15                                    |
| Bert   | 15                       | 7                                     |
| Dennis | 16                       | 11                                    |
| Derrik | 17                       | 13                                    |

| Client | Number of<br>data points | Number of data points<br>favoring M-SRP |
|--------|--------------------------|---|
| Leigh  | 18                       | 15                                      |
| Robert | 19                       | 17                                      |
| Wayne  | 18                       | 16                                      |
| Bobby  | 19                       | 15                                      |

Figure 4. Percent change in M-SRP from baseline for Experiment 1. Bar graphs show mean performance of individual subjects on specific tasks, mean performance of individual subjects across tasks, and mean performance across subjects.



260 under M-SRP conditions. When the task was 3-gang battery caps, all clients showed an increase in productivity per hour under M-SRP. The group mean productivity per hour was 79 and 95 under baseline conditions and 97 and 96 under M-SRP conditions. A day-by-day comparison of the number of data points favoring M-SRP over Baseline is shown in Table 3. These daily comparisons clearly favored M-SRP for all four clients.

Both SMG and M-SRP in Experiment 1 had a positive impact on productivity, with the exception of Bert on 3-gang battery caps. The M-SRP appeared to have a larger impact. However, as each subject served as his own control, it cannot be concluded from this experiment that the M-SRP condition is a more effective strategy for increasing productivity than the SMG strategy. Thus Experiment 2 was conducted to provide a direct within-subject comparison of the effects of the SMG and the M-SRP conditions.



## EXPERIMENT 2

The subjects and conditions were the same for Experiment 2 as they were in Experiment 1 except that subjects experienced both experimental conditions (one during each half day) rather than an experimental condition and baseline.

### Experimental Design

Each group of clients were supervised under either of the experimental conditions, SMG or M-SRP, in the morning and afternoon work periods. As indicated in Table 4 the arrangement of supervision conditions were counterbalanced across groups.

TABLE 4

The Arrangement of Experimental Conditions in Experiment 2

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|         |      |     |
|---------|------|-----|
| Group 1 | A.M. | SMG |
|         | P.M. | SRP |

---

|         |      |     |
|---------|------|-----|
| Group 2 | A.M. | SRP |
|         | P.M. | SMG |

---

10 working days

Length of Experiment

The experimental conditions were counterbalanced across groups and days.

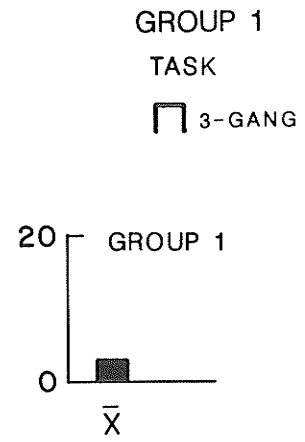
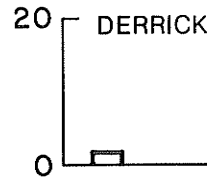
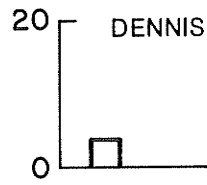
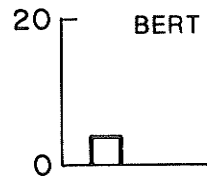
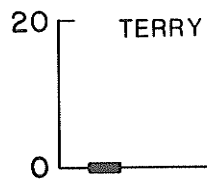
## Results and Discussion

Figure 5 shows the percent change in productivity under the SMG condition relative to the M-SRP condition. In Group 1, three of the four clients showed a slight increase in productivity under the SMG condition and one client, Terry, showed no change. In Group 2, two clients, Wayne and Bobby, showed an increase in the SMG condition over the M-SRP, and two clients, Leigh and Robert, showed an increase under the M-SRP condition over the SMG condition. In this within-subject comparison, Group 1, which had first been exposed to the SMG condition, continued to produce better under that condition. On the other hand, Group 2, which had initially been exposed to the M-SRP condition, was split, with two clients being more productive under the original M-SRP condition and two clients being more productive under the SMG condition.

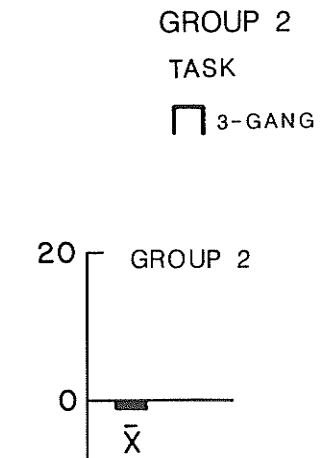
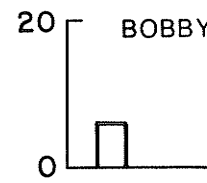
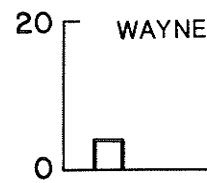
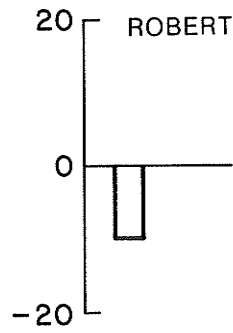
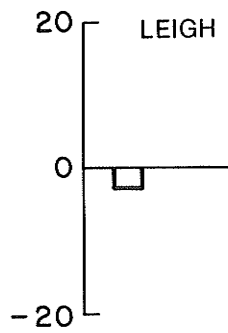
It might be postulated that the social approval associated with both conditions, particularly given the lack of social approval in the standard supervision condition, was a more salient feature for these clients than additional money. This seems a plausible explanation given that the two clients who showed an improvement under the M-SRP condition were two clients for whom money was particularly important; Leigh because he smoked and Robert because he had just received a tape deck and wanted to purchase tapes.

Figure 5. Percent change in SMG from M-SRP for individual subjects and group means for Groups 1 and 2 in Experiment 2.

% CHANGE IN SMG FROM SRP



% CHANGE IN SMG FROM SRP



ADDITIONAL RESULTS ACROSS BOTH EXPERIMENT 1 AND  
2

The quality of production was determined for all phases. The group mean percent correct production for Group 1 was 98.9% under baseline conditions and 98% under SMG conditions for F-caps; 97% under baseline conditions and 97% under SMG conditions for stripping tent peg cards; and 99.1% under baseline conditions, 99.7% under SMG conditions and 99.1% under M-SRP conditions for 3-gang battery caps. The group mean percent correct production for Group 2 was 99.9% under baseline conditions and 99.9% under M-SRP conditions for F-caps; 97.9% under baseline conditions and 96.7% under M-SRP conditions for stripping tent peg cards; and 99.9% under baseline conditions, 99.9% under M-SRP conditions, and 99.8% under SMG conditions, for 3-gang battery caps. Thus the quality of production was maintained at a high level under all conditions.

Mean accuracy of self-monitoring was maintained above 85 percent for all subjects under the M-SRP conditions. Mean accuracy of self-monitoring was maintained above 85 percent for three of the four subjects under the SMG condition. For one client, Derrick, mean accuracy under the SMG condition fell to 75 percent, and he required one booster session.

Other than the social contingencies related to SMG and M-SRP, the overall frequency and type of client-staff interaction remained relatively constant across all conditions. Under each half day of Baseline, or SMG, or M-SRP, instances of general work-related interactions averaged 3.8, 3.0, and 3.8 respectively; instances of general social interaction averaged 2.8, 3.0, and 2.8 respectively; instances of positive interactions concerning work averaged .8, 1.0, and .8 respectively; instances of error correction averaged .2, .3, and .3 respectively; and instances of negative interactions averaged .6, 1.0, and .8 respectively. Thus, the majority of interactions were either general work-related questions or instructions and social interactions.

The social validity questionnaire was completed by the staff member who participated in this study and by the workshop supervisor. They both felt that it was important to find ways of increasing worker productivity. The staff member felt that the differences in productivity between the SMG and M-SRP conditions did not warrant choosing one condition over the other. The staff member also felt that there were not substantial enough differences to warrant the use of either package over the standard supervision. The workshop supervisor felt that for 5 out of 8 clients, the increase in productivity was sufficient to warrant use of one of the self-management conditions. Both felt the

self-management strategies were beneficial for the clients in that they provided feedback, an individualized program, and encouraged the clients to see their work as important. The staff member did not feel that the self-management procedures, in their present format, were suitable in that workshop. She felt this was too active a workshop, and would recommend its use with only less productive workers. The workshop supervisor, however, felt either strategy could be implemented in the workshop.

Six clients were given two preference tests each. On both preference tests they chose the same condition, and so were not asked to indicate their preference a third time. Two clients chose the M-SRP condition, two clients chose the SMG condition, and two clients chose baseline conditions. The two remaining clients each chose a different condition on the first two preference tests, and so they were asked to indicate their preference a third time. For both clients, the M-SRP condition was chosen twice, and the SMG condition was chosen once. Thus the majority of clients preferred to work under one of the experimental conditions, and they indicated a slightly greater preference for the M-SRP condition.



## GENERAL DISCUSSION

The results indicate that both the SMG condition (with the exception of one client on one contract), and the M-SRP condition increased the productivity of moderately and mildly handicapped workers. When compared to baseline, the mean overall increase for all clients over all contracts was 12% under the SMG condition, and 27% under the M-SRP condition. Although this might have suggested that the M-SRP was a more effective strategy for increasing productivity, the design did not allow for such an interpretation. When a direct within-subject comparison was made between the two conditions, there was little to recommend one condition over the other.

Why was the M-SRP, which used an additional monetary contingency, not clearly superior to the SMG? One explanation has been provided by a recent study which examined "self-reinforcement" effects (Hayes, Rosenfarb, Wulfert, Munt, Korn, & Zettle, 1985). In the first experiment of this study, it was found that self-reinforcement procedures were effective when public (i.e. that is others knew the goals or contingencies), but were not effective when the self-reinforcement procedures were private. Self-delivery of consequences did not add to

the effectiveness of the procedure. The authors postulated that it was the public goal-setting which was the critical variable, and their second experiment supported this hypothesis. In the current study, both the SMG and the M-SRP conditions involved public goal-setting and both conditions were effective in increasing productivity. However, when the conditions were compared, the additional monetary contingency did not appear to add to the effectiveness of the procedures, just as it did not add to the effectiveness of the procedures in the Hayes et al. (1985) study. Sohn and Lamal (1982), after reviewing the literature on self-reinforcement procedures, argued that the efficacy of procedures often called self-reinforcement or self-administration of consequences is negligible.

In the current research, both the workshop supervisor and the staff member who participated in this study indicated that they felt it was important to find ways to increase worker productivity. While the SMG and the M-SRP both increased worker productivity, only the workshop supervisor indicated that the changes were large enough to warrant using the procedures, and that he would be prepared to implement them in the workshop. The staff member who implemented the procedures, however, felt that the increase in productivity was not large enough to warrant use of the procedures in that workshop. A possible explanation of this difference of opinion can be found in her answers to the

social validity questions in which she responded, "Not in this workshop", and that she would use these strategies only with "slower workers". In her position as an on-line staff member, the faster the clients produced, the faster she had to work to keep up with them. For example, there were more products to examine for errors, more shipping boxes to prepare and weigh, and more raw materials to supply. Thus, the increased productivity of the research clients under SMG or M-SRP required a hard-working employee to work even harder. The workshop supervisor, however, likely had a different perspective on the situation. First, this workshop was identified as the "production" workshop of the Manitoba Developmental Centre. The faster that contracts could be completed, the more likely it was that the Centre Workshops would continue to receive work opportunities. In addition, this workshop subsidized the training workshops that had lower functioning clients. Thus, increased productivity was valued by the workshop supervisor even if it meant the staff had to work harder. Second, the supervisor also recognized that increased productivity would make it easier for certain clients to transfer to community workshops. Third, the workshop supervisor felt that the self-management strategies with their back-up contingencies was one way to ensure staff/client contact vis-a-vis goal-setting and feedback, two features he identified as being "important to maintaining good job performance".

As mentioned previously, a series of studies has examined self-management strategies for improving the productivity of mentally handicapped workers (Didenko & Martin, 1986; Hanel & Martin, 1980; Jackson & Martin, 1983; Srikameswaran & Martin, 1984). Of these studies, only the Didenko and Martin (1986) study failed to find positive results from the self-management procedures.

The current study, which did show an experimental effect, was similar to the Didenko and Martin (1986) study in several ways. First, both studies examined the procedures under more typical workshop conditions, i.e., a full working day, rather than 30-minute sessions. Second, both studies delivered praise and/or feedback and tokens at the end of each half-work day with tokens exchanged for money at the end of the work-week, rather than at the end of the experimental sessions. Third, both studies specified the feedback to be given to clients at the end of the work-periods, rather than leaving this feedback unspecified. Fourth, both studies examined two self-management packages, one being a self-regulation package consisting of self-monitoring plus goal-setting plus social and monetary contingencies, and the second being a self-monitoring package consisting of self-monitoring plus goal-setting plus social contingencies.

What then are the differences between this study and the Didenko and Martin (1986) study that may have contributed to

the differences in results? The question posed in the Introduction regarding the robustness of the self-management procedures over a typical workshop day appears to have been answered. With moderately and mildly retarded persons self-management packages can be used to increase productivity over a typical workshop day under typical working conditions over several different tasks supervised by a regular workshop staff member. It would appear from the results of this study and the Didenko and Martin (1986) study, that the critical variable may have been the level of intellectual functioning of the populations. The level of functioning of the clients in the two studies was different. All the clients in the Didenko and Martin (1986) study were severely retarded (IQ's of 34 and below). In comparison, the clients in this study were in the moderate and mild ranges of retardation (mean IQ of 54). This difference in level of functioning can be quite significant in terms of the behavioral repertoires of the two populations. For example, only one individual in the Didenko and Martin (1986) study was able to engage in any kind of social interchange with others, and even that interchange was quite limited (personal communication, Didenko, 1986). However, the higher level of functioning of clients in the current study may have interacted with the workshop environment to contribute to more favourable social contingencies for higher productivity. For example, clients in the current study were verbal enough to recruit additional social interaction from the natural environment. When clients in

the current study reached their goals, they often showed their self-monitoring forms to the workshop supervisor, or to other staff members, and even to other clients. These other persons in the natural environment usually responded in positive ways.

Although the above variable appears to have been the critical variable, there are two other points of difference between the current study and that of Didenko and Martin (1986) which should be mentioned. These two differences might be considered by other researchers attempting to expand self-management procedures to the severely retarded over a typical workshop day. First, the Didenko and Martin (1986) study was conducted by a research assistant who modeled her supervision style on prebaseline observations of regular staff members. In comparison, the supervision in this study was conducted, for the most part, by a regular workshop staff member. Although the approximate ratio of interactions remained constant across baseline and experimental conditions, there was variability in her delivery of interactions. For example, during some periods she would interact frequently with the clients regarding social functions at the school, as well as providing work prompts or giving directions. During other periods, she would not interact with them at all. This is in direct contrast to the Didenko and Martin (1986) study which provided approximately one interaction per 15-minute period.

The staff member in the current study was free to respond to the demands of the environment by providing more input when she deemed it to be appropriate. The Didenko and Martin (1986) study provided praise for the clients achieving or exceeding their goal once per half-day at the end of the work session. This also occurred in the present study.

The combined results of this study and the Didenko and Martin (1986) study indicate that the self-management packages as described are suitable for moderately and mildly retarded clients but not for severely retarded clients. This does not mean that self-management procedures cannot be utilized successfully with severely retarded persons. However, it appears to indicate that changes will be necessary in the procedures if they are to be successful for this latter population.

In summary, both the self-management procedures in this study increased productivity with moderately and mildly handicapped workers. It was conducted under typical workshop conditions, over a typical working day, with a regular staff member providing the supervision. It specified not only the self-management procedures but also the back-up contingencies (social) which appeared to support the self-management procedures. From the data, there were no differences to support one condition over the other. Until further research indicates that one self-management procedure is more effective than the other, it would appear

to be more cost-effective to use the simpler procedure, the SMG. It would appear that this procedure, or a M-SRP, could be used in a sheltered workshop setting with moderately or mildly handicapped workers at this time. However, in order for it to be successfully implemented, the workshop system must be examined and modified to not only support increased productivity but also to encourage and support the use of self-management strategies by mentally handicapped persons.



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Appendix A

FREQUENTLY USED TERMS AND DEFINITIONS IN THE  
SELF-MANAGEMENT LITERATURE\*

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| Term                       | Definition  |
|----------------------------|---|
| Bandura Self-reinforcement | <p>Regulation of behavior by self-reward conditional upon matching self-prescribed standards of performance ...</p> <p>(1) ... Organism exercises full command over the reinforcers so that they are freely available for the taking ...</p> <p>(2) ... Self-administration is made conditional upon performing requisite behaviors....Self-prescription of a performance requirement...</p> <p>(3) ...Self-inforcement requires adoption of performance standards for determining the occasions on which a given behavior warrants self-reward (Bandura, 1976,</p> |

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pp. 135-136).

|        |  |  |
|--------|--|--|
| Kanfer | Self-management<br>or self-regulation  | Maintenance of behavior in<br>the absence of any immediate<br>environmental support or<br>feedback (Kanfer, 1971, p. 40).  |
|        | Self-monitoring or<br>self-observation | Deliberately and carefully<br>attending to one's own<br>behaviour (Kanfer, 1980, p. 338).  |
|        | Self-evaluation                        | Comparison between the<br>intervention obtained from<br>self-monitoring and the criteria<br>for the given behavior (Kanfer,<br>1980, p. 338).  |
|        | Self-reinforcement                     | Administration of (reinforcement),<br>contingent upon the degree to<br>which the behavior diverges<br>from the performance standards<br>(Kanfer, 1980, p. 338).  |
|        | Self-control                           | Describe(s) a person's<br>actions in a specific situation<br>...requires (1) that the behavior<br>in question is one that has<br>relatively equal positive and<br>aversive consequences;<br>(2) prior to the occurrences<br>of the behavior ... a controlling<br>response is introduced that |

alters the probability of the response to be controlled; (3) at the time that he performs the controlling response it is initiated by self-generated cues and is not under direct control of the social or physical environment (Kanfer, 1980, p. 342).

|        |                                 |   |
|--------|---------------------------------|---|
| Karoly | Self-management                 | Behavioral self-control and self-regulation (Karoly, 1977, p. 200).   |
|        | Self-regulation                 | ... the process of self-maintenance (when the goal of behavioral treatment is maintaining already modified behavior) (Karoly, 1977, p. 199) |
|        | Self-control                    | ...<br>... the special case of self-regulation that involves changing one's behavioral direction ... (Karoly, 1977, p. 199)...              |
| Kazdin | Self-control or self-management | ... those behaviors a person deliberately undertakes to achieve self-selected outcomes (Kazdin, 1984, p. 308).                              |

|        |                                     |   |
|--------|-------------------------------------|---|
|        | Self-monitoring or self-observation | Assessing or recording one's own behavior (Kazdin, 1984, p. 308).   |
|        | Self-reinforcement                  | Providing oneself with reinforcing consequences contingent upon behavior ... The client must be free to partake of the reinforcers at any time, whether or not a particular response is performed (Kazdin, 1984, p. 300).   |
|        | Self-punishment                     | Providing oneself with punishing consequences contingent upon behavior.   |
|        | Self-administered reinforcement     | Refers to those behaviors an individual deliberately undertakes to achieve self-selected outcomes by manipulating antecedent and consequent events.   |
| Nelson | Self-monitoring or self-recording   | Self-monitoring or self-recording is a two-stage process. First, the subject or client must notice or discriminate aspects of his or her own behavior, that is, determine that the target behavior has indeed occurred. Second, he or she must make the self-recording response, that is, |

use the procedure that records the occurrence of the target behavior (Nelson, 1977, p. 264).

|                    |                             |   |
|--------------------|-----------------------------|---|
| O'Leary<br>& Dubey | Self-instruction            | ... verbal statements to oneself which prompt, direct, or maintain behavior (O'Leary & Dubey, 1979, p. 450).                      |
|                    | Self-determined<br>criteria | ... setting standards for one's own performance prior to engaging in a task (O'Leary & Dubey, 1979, p. 452).                      |
| Shapiro            | Self-management             | ...all processes related to changing or maintaining one's own behavior (Shapiro, 1981, p. 268).                                   |
|                    | Self-monitoring             | ... a process which includes both self-assessment (self-observation, self-evaluation) and self-recording (Shapiro, 1981, p. 268). |
|                    | Self-assessment             | ...discriminating the occurrence of one's behavior (Shapiro, 1981, p. 268).   |

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