DOCUMENT RESUME

ED 293 228 EC 202 077

AUTHOR Hughes, Carolyn
TITLE The Effects of Self-Instruction on On-Task Behavior and Work Performance in a Vocational Training Setting.
PUB DATE 85
NOTE 104p.; Master's Thesis, Eastern Montana College.
PUB TYPE Dissertations/Theses - Master Theses (042) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS *Attention; *Behavior Modification; Generalization; Job Performance; Job Training; *Mental Retardation; Self Evaluation (Individuals); Sheltered Workshops; *Time on Task; Young Adults
IDENTIFIERS *Self Monitoring

ABSTRACT

Effects of a self-instructional training procedure on the on-task behavior of four mentally retarded young adults in a sheltered workshop were investigated using a multiple-baseline design across subjects. The subjects chosen had been identified as demonstrating a high incidence of off-task behavior for small assembly tasks such as stamping and stuffing envelopes, sorting mail by zip code, and collating printed material. Effects of the procedure on the rate and accuracy of task performance were recorded. Results indicated that mean on-task behavior of all four subjects increased an average of 74 percent over baseline performance, and generalized from the training to the workshop setting. A two-week followup check indicated that on-task behavior maintained over time. Supplemental recording indicated that rate of production did not increase substantially for any subject. (Author/JW)

# The Effects of Self-Instruction on On-Task Behavior and Work Performance in a Vocational Training Setting

Carolyn Hughes

A Thesis Presented to the Faculty of the School of Education at Eastern Montana College in Partial Fulfillment of the Requirements for the Degree of Master of Science in Special Education

Eastern Montana College

As members of the thesis committee of Carolyn Hughes we certify that we have read the thesis entitled The Effects of Self-Instruction on On-Task Behavior and Work Performance in a Vocational Training Setting and have participated in an oral examination of the candidate. It is our recommendation that the thesis be accepted as fulfilling the thesis requirement for the degree of Master of Science in Special Education with an option in Educationally Handicapped.

| Chairman of the Thesis Committee: | Date |
| --- | --- |
| | 7/17/85 |
| **Members of the Thesis Committee:** | |
| | |
| | 7/17/85 |
| | 7/17/85 |
| **Member of the Graduate Committee:** | |
| | 7-17-85 |

## Abstract

The effects of a self-instructional training procedure on the on-task behavior of four mentally retarded adults in a sheltered workshop were investigated using a multiple-baseline design across subjects. The subjects chosen had been identified by their trainers as demonstrating a high incidence of off-task behavior. Additionally, the effects of the procedure on the rate and accuracy of task performance were recorded. Results of the study indicated that on-task behavior increased substantially across all subjects following training and generalized from the training to the workshop setting. Furthermore, a two-week follow-up check indicated the on-task behavior maintained over time. Supplemental recording indicated rate of production did not increase substantially for any subject. The procedure appeared to be useful in increasing on-task behavior in the workshop setting and was discussed in terms of its implementation and cost effectiveness in a vocational training setting.

## Acknowledgements

I would like to give thanks to the many who supported me in the process of writing this thesis.

To the members of my thesis committee, Dr. Dan Petersen, Chairman, for his technical guidance and "emotional first aid," Dr. Ronald Sexton for the challenging questions he raised, Dr. Ricardo Garcia for his advice and encouragement, Dr. John Dodd for his expertise in formatting and editing, and Dr. Linda Christensen for her insightful comments and suggestions.

To the administration, staff, and clients of the Billings Workshop, Inc. for their endless cooperation, friendliness, and enthusiasm, and to Ted Green for his assistance in data collection.

To my daughters, Brooke and Meghan, for their patience and cooperation without which this project could not have been completed;

To Dr. Dan Petersen of EMC and Dr. Rosemary Newman of MSU for initially encouraging me to undertake this project, and to the countless individuals who offered me friendship and support throughout its undertaking.

# Table of Contents

## List of Figures

# List of Tables

# Chapter I

## Introduction

### Statement of the Problem

Self-instruction has been defined as a procedure used to develop an individual's self-control through covert verbal statements that prompt, guide, and maintain behavior (Bryant & Budd, 1982). The potential of self-instruction as a systematic problem-solving technique has been noted (Borkowski & Varnhagen, 1984) as has its potential as a facilitator for the acquisition of new behaviors and the increase of appropriate responding in a variety of settings (Burgio, Whitman, & Johnson, 1980). According to Burgio et al. (1980), self-instruction as a procedure has appeal as an intervention because the individual assumes the role of the treatment agent rather than relying on an external agent. "Since the individual is the source of behavioral control within the verbal mediation paradigm, maintenance and transfer of training effects should be facilitated" (Bornstein & Quevillon, 1976, p. 180).

Self-instructional training has been employed successfully in a variety of settings with various populations and behaviors. Its effectiveness at increasing on-task behavior has been investigated (Argulewicz, Elliott, & Spencer, 1982; Bornstein & Quevillon, 1976; Bryant & Budd, 1982; Burgio et al., 1980; Douglas, Parry, Marton, & Garson, 1976). Not only did these studies indicate the effectiveness of self-instruction in producing increases in on-task behavior in the training setting, but the effects of the training generalized across settings.

However, the results of studies investigating the effectiveness of self-instruction in increasing on-task behavior have not been unequivocal. Compared to a self-evaluation token economy group, students in a self-instruction group showed no change in on-task behavior (Anderson, Fodor, & Alpert, 1976). Friedling and O'Leary's (1979) replication of Bornstein and Quevillon's (1976) self-instruction procedure failed to produce changes in classroom on-task behavior. Self-instruction as a component of a self-control package increased on-task behavior during individual seatwork but the effects of the training did not generalize to a group instruction setting (Barkley, Copeland, & Sivage, 1980). Finally, Varni and Henker's (1979) self-instruction procedure failed to increase on-task behavior in the classroom until a self-monitoring and self-reinforcement technique was added. Apparently, further research is needed to investigate the effect of self-instructional training on the generalization of on-task behavior to settings other than the training setting.

Additionally, few studies have investigated the effectiveness of self-instruction with a mentally retarded population (cf. Borkowski & Varhagen, 1984; Burgio et al., 1980; Connis, 1979; Gardner, Clees, & Cole, 1983; Jackson & Boag, 1981). Furthermore, an exhaustive review of the literature has uncovered no studies, as yet, that have assessed the effect of self-instruction on the on-task behavior and work performance of mentally retarded adults in a vocational training setting.

Purpose of the Study

The present study was designed to investigate the effectiveness of a self-instructional training program for mentally retarded adults in a sheltered workshop setting and to attempt to demonstrate transfer of training effects from the training setting to the work area setting. The effect of the self-instructional procedure on the subjects' on-task behavior was assessed using a multiple-baseline design across subjects. Additionally, work performance of small assembly tasks was recorded in terms of rate and accuracy of production.

Hypothesis

Self-instructional training was predicted to increase on-task behavior in the work area setting. Increases in on-task behavior were predicted to occur systematically across subjects following the sequential introduction to each individual subject of the self-instructional training.

Significance of the Problem

Within vocational training settings, on-task behavior and performance of assigned tasks enhance the probability of competitive client employability (Payne & Patton, 1981; Sali &

Amir, 1970). Traditionally, responsibility for increasing appropriate behaviors of clients in vocational training settings, including on-task behavior and work production, has been placed on the training staff (Litrownik, 1982). However, staff management of client behavior tends to contribute to excessive client dependence on individual staff members, exorbitant investments of staff time, overspecificity of treatment effects, and limited durability and generalizability of behavior change (Gardner et al., 1983). Recently, in contrast, emphasis has been placed on switching the locus of control for individuals' behavior from external training agents to the individuals themselves (Kazdin, 1975). The development of self-managing actions is considered to be essential if desired behavior is to generalize and maintain over time (Bugenthal, Whalen, & Henker, 1977). Therefore, the ultimate goal of most behavior interventions should be to increase the ability of individuals to manage their own actions.

Self-instructional training has been found to be effective at transferring control of on-task behavior from the external agent to the individual (Bornstein & Quevillon, 1976; Burgio et al., 1980). Through this process individuals are trained to manage their own behavior by the use of specific verbalizations to facilitate the acquisition of new behaviors and increase appropriate responding in a variety of settings. The use of self-instruction to increase on-task behavior can have several advantages (O'Leary

& Dubey, 1979). First, using self-control is valued and typically expected by our culture. Second, an external agent may not always be capable of successfully implementing external control. Third, when clients can manage their own on-task behavior, training agents have more time to teach other skills. Fourth, a client performing under self-control procedures should be able to learn and stay on-task when supervision is not available. Fifth, the use of self-control may lead to more durable behavioral changes than relying on external change agents.

On-task behavior maintained by a client's self-management through the use of self-instruction is advantageous in a vocational training setting. Because trainers are spending less time enforcing on-task behavior, they have more time to teach valuable vocational skills. Furthermore, because the self-instructions themselves may become the stimulus for on-task behavior (O'Leary & Dubey, 1979), the appropriate behavior is more likely to occur in the absence of the trainer and to generalize and endure over time. Finally, self-management programs employed in a vocational training setting may enhance the probability of retarded adults transferring learned behavior from the training setting into the community i.e., work settings (Connis, 1979).

Definition of Terms

Mentally retarded. The definitions of mentally retarded used in this study were those by which clients previously had been identified for placement in the sheltered workshop at which the study was conducted (Appendix A).

Multiple-baseline design across subjects. A multiple-baseline design across subjects was defined as a single-subject experimental design in which a treatment is replicated across two or more subjects. A functional relationship may be demonstrated when changes in the dependent variables occur with the systematic and sequenced introduction of the independent variable (Alberto & Troutman, 1982).

On-task behavior. On-task behavior was defined as the subjects' engaging in motor task-related actions (e.g. stuffing envelopes, sorting mail, trimming strapping) for the entire 10 seconds of the observational interval.

Self-instruction. Self-instruction was considered to be a set of problem-orienting and problem-solving statements emitted by an individual which serves to focus attention and provide guidance through specific tasks (Albion & Salzberg, 1982). The procedure is based on a model developed by Meichenbaum and Goodman (1971) consisting of fading a set of prompts and instructions from an overt (spoken aloud), external (verbalized by a model) condition to a covert, self-produced target response (Bornstein & Quevillon, 1976). The training sequence consists of five steps (Meichenbaum & Goodman, 1971). First the experimenter performs a task, instructing aloud while the subject observes (modeling). Then the subject performs the same task while the experimenter instructs aloud (overt, external guidance). Next the subject performs the task again while self-instructing aloud (overt self-guidance), after which the subject performs the task while overtly whispering the instructions (faded, overt self-guidance). As the final step, the subject performs the task self-instructing silently (covert self-instruction).

Tasks. The tasks used in the training sessions and the 20-minute observational sessions were varied on a daily basis and were representative of the small assembly tasks of the workshop, e.g. stamping, sealing, and stuffing envelopes; sorting mail by zip code; collating printed material; and trimming, counting, and boxing strapping material. The tasks assigned to the individual subjects were selected by the trainers as being on the subjects' level but were tasks the subjects did not perform consistently on their own. The quantity of work assigned to the subjects always exceeded what they could complete in a single session.

Work performance. Work performance was measured in terms of rate and accuracy of production based on permanent product data collected for the daily 20-minute session. Rate of production was calculated based on the production formula used by the workshop (Appendix B). Accuracy was determined by calculating the percent of task items correctly completed compared to the total number of items completed. This was accomplished by dividing the number of correctly completed items by the total number of items completed and multiplying by 100.

# Chapter II

## Review of the Literature

### Theoretical Basis of Self-Instruction

Early investigations of self-instruction as a training procedure were based on a model developed by Luria (1961) and Vygotsky (1962). Derived from their work with children, these Soviet psychologists proposed three stages in the development of verbal control of one's own behavior (Meichenbaum, 1977). During the first stage, the speech of others, usually adults, controls and directs a child's behavior. In the second stage the child's own overt speech becomes an effective regulator of the behavior. Finally, the child's covert, or inner, speech assumes a self-regulating role. According to the model, in the early mastery of a voluntary act, speech initially serves a useful, supportive, and guiding function. With the development of task proficiency, overt speech fades to covert internalized speech (Meichenbaum, 1977). While the instructions of others continue to influence behavior throughout life, the self-instructional statements also exert control (Kazdin, 1975). Indeed, self-instructional statements are often evident in everyday life when individuals "think out loud" to describe a course of action they are pursuing.

The model developed by Luria and Vygotsky has become the theoretical framework upon which self-instruction as a procedure has been based. Although the sequence of the model has been challenged, the model has been valuable in generating a training paradigm to develop self-control (Meichenbaum, 1979). Implicit in the model is the interaction between verbal and nonverbal behavior, and that self-verbalizations can be used by an individual as a means of self-control (Skinner, 1953).

Self-Instructional Training Procedure

Investigations of self-instruction as a procedure primarily have been based on adaptations of a training sequence developed by Meichenbaum and Goodman (1971). The program was designed to follow the developmental sequence of the Soviet model which suggests a progression of self-verbalizations from external to internal control as an individual's age increases from childhood to adulthood (Meichenbaum & Goodman, 1971). To parallel the developmental sequence, the training sequence includes overt verbalizations of an adult, followed by the child's overt self-verbalizations, followed by covert self-verbalization, which should result in the child's own verbal control of his or her nonverbal behavior.

The actual training sequence is composed of a combination of modeling, successive approximations, graduated difficulty, overt and covert rehearsal, prompts, feedback, and social reinforcement. The sequence consists of five steps (Meichenbaum & Goodman, 1971). First the experimenter performs a task, instructing aloud while the subject observes (modeling). Then the subject performs the same task while the experimenter instructs aloud (overt, external guidance). Next the subject performs the task again while self-instructing aloud (overt self-guidance), after which the subject performs the task while overtly whispering the instructions (faded, overt self-guidance). As the final step, the subject performs the task self-instructing silently (covert self-instruction). The verbalizations which the experimenter models and the subject subsequently uses include (Meichenbaum & Goodman, 1971, p. 117): a) questions about the nature and demands of the task so as to compensate for a possible comprehension deficiency; b) answers to these questions in the form of cognitive rehearsal and planning in order to overcome any possible production deficiency; c) self-instructions in the form of self-guidance while performing the task in order to overcome any possible mediation deficiency; and d) self-reinforcement. The following is an example of the experimenter's modeled verbalizations which the student subsequently uses, initially overtly, then covertly (Meichenbaum and Goodman, 1971):

> Okay, what is it I have to do? You want me to copy the picture with the different lines. I have to go slow and be careful. Okay, draw the line down, down, good; then to the right, that's it; now down some more and to the left. Good, I'm doing fine so far. Remember go slow. Now back up again. No, I was supposed to go down. That's okay. Just erase the line carefully....Good. Even if I make an error I can go on

slowly and carefully. Okay, I have to go down now. Finished. I did it. (p. 117)

These verbalizations include the following components (Alberto & Troutman, 1982):

1. Problem definition (What is it I have to do?");

2. Focusing attention and response guidance (Carefully...draw the line down");

3. Self-reinforcement (Good, I'm doing fine"); and

4. Self-evaluation coping skills and error-correcting options (That's okay....Even if I make an error I can go on slowly.") (p. 316).

Self-instructional training is designed to provide individuals with a problem-solving strategy which can be applied to their own behavior. Self-regulation is stressed, and the individual is trained explicitly in the use of task-relevant "private speech" and the inhibition of task-irrelevant "private speech" (Harris, 1982). The intention is that self-verbalizations will gain a new significance through which an individual develops a "learning set" used to engender self-control (Meichenbaum & Goodman, 1971). Through self-instructional training, individuals are taught a procedure for self-management of the process of task-completion by identifying and guiding themselves through the process necessary to solve problems (Alberto & Troutman, 1982). Furthermore, the training sequence is designed to transfer control from the experimenter to the individuals themselves, thereby making the individuals the agent for their own treatment and ultimately the management of their own behavior.

Effective Implementation of Self-Instruction

Early investigations of self-verbalizations (Bem, 1967; Lovaas, 1964; Luria, 1961; Meichenbaum & Goodman, 1969a, 1969b; Vogotsky, 1962) indicated speech could function as a means for developing motor control. These studies demonstrated the efficacy of self-instructional training at increasing accuracy of performance on a variety of motor tasks including: bulb-pressing, level-pressing, and finger-tapping in response to varying stimuli. Following the success of these initial studies, self-verbalizations have been used to develop self-control with a wide range of behaviors (Burgio et al., 1980). These studies have been grouped by the type of dependent variable studied: resistance to temptation, attentional problems, aggression, academic performance, and a variety of social and personal behaviors.

Subsequent studies demonstrated the effectiveness of self-instruction in increasing resistance to temptation. O'Leary (1968) taught forty-eight boys "right" or "wrong" responses to discriminative stimuli. Both right and wrong responses were consequated with token reinforcers. O'Leary found that boys who were trained to use self-instruction "cheated" less by responding less frequently to "wrong" stimuli than those who did not receive self-instructional training. Hartig and Kanfer (1973) clearly demonstrated that self-instruction prolonged the waiting period in which children resisted responding to attractive toys in a temptation situation. The children were asked not to turn around and look at the toys in the experimenter's absence. Investigating children's ability to delay gratification, Miller, Weinstein, and Karniol (1978) found that self-instruction enabled children to endure a waiting period which resulted in receiving a preferred choice of food as compared to a nonpreferred choice.

Studies dealing with attentional problems have focused on impulsive behavior, on-task behavior, and attending behavior. Bugenthal, Whalen, and Henker (1977); Palkes, Stewart, and Freedman (1971); and Palkes, Stewart, and Kahana (1968) established the effectiveness of self-instruction as a means of decreasing the impulsive behavior of hyperactive children. Self-instructional training resulted in improved performance on the Porteus Maze Test, a measurement of an individual's impulsiveness and distractibility. Meichenbaum and Goodman (1971) also found a decrease in impulsive behavior in hyperactive children as a result of self-instructional training as evidenced by improved scores on the Porteus Maze Test. Additionally, improvement was found in IQ performance on the WISC, as well as in performance on a variety of sensori-motor tasks.

A series of studies investigated the effectiveness of self-instruction in decreasing impulsivity as indicated by performance on the latency and error measures of Kagan's Matching Familiar Figures (MFF) Test (Bender, 1976; Genshaft & Hirt, 1979; Kendall & Finch, 1976, 1978; Meichenbaum & Goodman, 1969; Nichol, Cohen, Meyers, & Schleser, 1982; Peters & Davies, 1981). The MFF requires the subject to match a familiar stimulus figure with six variants, only one of which is identical to the standard. For each item, data on response latency and number of errors are collected. Children who respond quickly and make many errors are identified as impulsive and those who take their time are identified as reflective (Meichenbaum, 1977). On this basis, the studies cited found an increase in latency of responding and a decrease in errors in the performance of impulsive children after self-instructional training.

Self-instruction also has been found effective in increasing on-task behavior. Bornstein and Quevillon (1976) demonstrated a dramatic increase in the on-task behavior of overactive preschool boys with the introduction cf a self-instructional program. Furthermore, the effects of the training generalized from the experimental setting to the classroom and treatment gains were maintained 22.5 weeks after baseline was initiated. Burgio et al. (1980) found an increase in the on-task behavior of highly distractible retarded children following training in self-instruction. Increases in on-task behavior were observed not only in the training setting but in two generalization settings (a one-to-one and a classroom situation).

Increases in classroom attending behaviors have been observed following self-instructional training. An increase in the attending behaviors of hyperactive boys which was maintained over a six-month period was demonstrated by Douglas et al. (1976). Snyder and White (1979) investigated the use of self-instruction with behaviorally disturbed, institutionalized adolescents. Not only were attending behaviors increased, but a significant improvement in performance of daily living requirements was observed as well as a decrease in impulsive behaviors. The effects of the treatment either were found to be maintained or augmented at a six-week follow-up. Argulewicz et al. (1982) noted the increase in attending behavior of a hyperactive, distractible fourth-grade boy as a result of a self-instructional "tell-show-do" training model. The target behaviors which were increased were a) sitting squarely, b) leaning forward, and c) focusing the eyes on the person or object of attention.

The efficacy of self-instruction as a means of decreasing aggressive behavior has been investigated. A self-instructional "Think Aloud" program produced decreases in aggressive behavior and improvement of pro-social behaviors in hyperaggressive second grade boys (Camp, Blom, Hebert, & van Doorninck, 1977). Evidence of behavioral changes was demonstrated both in teacher ratings of aggressive and pro-social behavior and in the pattern of performance on a battery of cognitive tests. Forman (1980) found a decrease in the aggressive behavior of a group of defiant elementary school children trained in self-instruction as compared to a placebo control group which received no training. Aggression was measured in terms of teacher rating, teacher records of aggressive behavior and independent observation of inappropriate behavior.

The implementation of self-instructional training has resulted in improvement in academic performance. A group of fifth graders identified as "poor readers" increased their performance on a sentence completion reading test following self-instructional training (Malamuth, 1979). Sustained attention also was increased as measured on the Audio-Visual Checking Task (AVCT). Albion and Salzberg (1981) investigated the effects of self-instruction on the mathematics performance of mildly mentally retarded elementary school children. The experimental conditions resulted in an increased rate of correctly performed mathematics problems. Bryant and Budd (1982) demonstrated increased levels of accuracy on the academic tasks of noncompliant low academic preschoolers following self-instructional training. Furthermore, the training resulted in increased accuracy on academic worksheets in the classroom similar to those used in the training situation. Leon and Pepe (1983) investigated the effects of self-instruction on a group of students demonstrating a minimum deficit in mathematics of two years. The results of the study indicated that self-instruction was effective in improving performance on the Key Math Diagnostic Test as compared to the performance of a control group.

Self-instruction as a procedure has produced changes in a variety of social and personal behaviors. One area of investigation has been the attempt to decrease anxiety behaviors.

Self-report measures indicated the effectiveness of self-instructional training in decreasing public speaking fears in a population of high school students reporting public speaking anxiety (Thorpe, Amatu, Blakely, & Burns, 1976). Self-instruction also has decreased anxiety associated with academic performance among college students (Nam, 1980); mathematics and anxiety among adolescent girls (Genshaft, 1982); performance anxiety among pianists (Kendrick, Craig, Lawson, & Davidson, 1982); test anxiety among seventh-graders (Stevens & Pihl, 1983); and performance efficiency anxiety among adults (Rosin & Nelson, 1983). Self-instruction also appears to be effective in coping with cancer (Weisman & Sobel, 1979) and in combination with Zen meditation in decreasing anxiety and producing a state of relaxation (Shapiro, 1978).

Investigations of social and personal behaviors are not limited to anxiety reduction. Meichenbaum and Goodman (1971) found self-instruction effective in modifying the behavior of schizophrenics, phobics, and smokers as well as speech-and test-anxious students. Meichenbaum (1975a) used self-instruction to enhance creativity. Meyers, Mercatoris, and Sirota (1976) found the procedure effective in reducing the frequency of hospitalized chronic schizophrenics' inappropriate verbalizations. A self-instructional technique was demonstrated to be effective in reducing chronic anger problems in adults (Novaco, 1976). Bugenthal, Collins, Collins, and Chaney (1978) found self-instruction produced long-term benefits in children's increased perception of their ability to control their own academic performance. Colen, De James, Norcera, and Ramberger (1980) used a self-instructional strategy to increase exercise and studying behavior in two adult women. Siddle (1980) found self-instruction effective in providing an interpersonal problem-solving technique for adolescents.

Ineffective Implementation of Self-Instruction

Self-instruction as a procedure has not produced successful results unequivocally. Higa, Tharp, and Calkins (1978) and Jarvis (1968) failed to support Luria's hypothesis (1961) that self-verbalizations can control sensori-motor performance. Robin, Armel, and O'Leary (1975) did find self-instruction more effective than direct training for remediating the writing deficiencies of young children. However, higher rates of verbalizations were not correlated with superior levels of performance. Additionally, Robin et al. (1976) indicated that the difficulty of teaching self-instructional responding was great, that the amount of time required to teach self-instruction decreased the amount of time available for academic performance, and that the cost effectiveness of self-instruction compared to the direct-training procedure was questionable.

Other investigations have demonstrated further ineffectual uses of self-instruction. In a study designed to decrease impulsivity, a self-instructional group was no more effective than a response cost group or a placebo control group (Arnold & Forehand, 1978). The use of self-instruction also has failed to increase on-task classroom behavior (Anderson et al., 1976; Friedling & O'Leary, 1979). Self-instruction with modeling was found to be no more effective than modeling alone in facilitating performance on cognitive tasks (Denney & Turner, 1979). Barkley et al. (1980) found improved attention to tasks did not generalize from individual seat work to group instruction; furthermore, the results of a self-instructional social skills training package indicated little generalized effect of the improvement of the social deficits of isolated preschool children (Combs & Lahey, 1981). Finally, with a group of hyperactive, disruptive boys, self-instructional training did not improve academic performance in reading and mathematics or decrease hyperactive behaviors (Varni & Henker, 1979).

In addition, Borkowski and 'arnhagen (1984) found self-instructional training was both time consuming and no more effective than a traditional didactic training format in facilitating the maintenance of complex learning strategies or recall. Camp et al.

(1977) noted in their study with aggressive boys that not only did appropriate self-instructions increase, but voluminous inappropriate verbalizations also increased. Finally, it has been reported that few investigations of self-instruction have dealt with either mentally retarded populations (Borkowski & Varnhagen, 1984; Burgio et al., 1980; Connis, 1979; Gardner et al., 1983; Jackson & Boag, 1981) or aggressive populations (Wilson, 1984).

Factors Affecting the Success of Self-Instructional Training

Many factors appear to govern the effectiveness of self-instructional training. Elements of the training procedure itself appear to be a major determinant in the effectiveness of self-instruction.

Self-instructional training programs have ranged from one 15-minute session (Fry & Preston, 1979) to 11-week-long sessions (Steele & Barling, 1982). Although the length of the training sessions does not correlate consistently with the success of the treatment, lack of training time may account for the failure of some treatment programs to produce behavioral changes (Combs & Lahey, 1981; Denney & Turner, 1979; Varni & Henker, 1979). Additionally, a determining factor may be the actual time spent practicing the self-verbalizations in the training setting (Fry & Preston, 1979) and the actual frequency of self-instructing during training (Cohen et al., 1980).

The content of the verbalizations used in the training also appear to contribute to the success of a self-instructional program. Task-relevant verbalizations appear to be more effective than task-irrelevant verbalizations (Anderson & Moreland, 1982; Hartig & Kanfer, 1973). Additionally, task-specific verbalizations appear to facilitate task-acquisition while task-general verbalizations appear to facilitate generalization of task behaviors (Albion & Salzberg, 1982; Borkowski & Varnhagen, 1984; Miller et al., 1978; Nichol, Cohen, Meyers, & Schleser, 1982; Schleser, Meyers, Cohen, & Thackwray, 1983). In the context of self-instructional training, task-specific verbalizations refer to strategies relevant only to the immediate task while task-general statements are relevant across a variety of tasks. Possibly the most effective use of task-oriented statements in training would be to fade from task-specific to task-general verbalizations as the target behavior proceeds from acquisition to maintenance (Harris, 1982).

Furthermore, self-instruction appears to be more effective if the focus of the verbalizations is the behavior most subject to consequences. In resistance to temptation paradigms, self-instruction was more effective when the verbalizations focused on resisting the temptation rather than completing an assigned task (Miller et al., 1978; Mischel & Patterson, 1976; Patterson & Mischel, 1976; Sawin & Parke, 1979). The children studied were reinforced for resisting temptation, not for completing the task.

Additionally, verbalizations focused on transferring the task response from the training to the classroom setting appear to facilitate generalization (Bornstein & Quevillon, 1976; Burgio et al., 1980; Camp et al., 1977; Snyder & White, 1979; Steele & Barling, 1982). In addition, the students were instructed and reinforced for using the self-instructions in the generalization setting. Finally, it appears the complete sequence of fading overt verbalizations to covert is a required component of a self-instructional procedure (Fry & Preston, 1979). Implemented singly, neither overt nor covert verbalizations appear to be effective. However, once a behavior has been mastered and is regulated by covert speech, imposition of overt verbalization may interfere with performance (Keogh & Glover, 1980).

The use of contingent reinforcement during training appears to facilitate the effectiveness of self-instruction (Bornstein & Quevillon, 1976; Bryant & Budd, 1982; Burgio et al., 1980; Combs & Lahey, 1981). Studies showed that students reinforced for correct performance of the training steps demonstrated improvement in target behaviors in both the training and classroom setting.

The nature of the task itself may contribute to the differential effects of self-instructional training. Motor-control deficiencies, resistance-to-temptation, rule-following and on-task behavior may be influenced more by self-instructional training than performance related to task ability (Bornstein & Quevillon, 1976).

However, it may be simply that a longer period of time is necessary before observing changes in some behaviors, e.g. academic (Burgio et al., 1980). The difficulty of the task is a further determinant of the technique's effectiveness. It appears the targeted behaviors must be in the student's repertoire at the time of intervention to facilitate behavioral change (Albion & Salzberg, 1982; O'Leary & Dubey, 1979). Furthermore, the similarity of task materials in the training situation to those in the classroom may produce more extensive behavioral changes (Bryant & Budd, 1982). Additionally, it has been suggested the training tasks and materials should be interesting to and age appropriate for the child being treated (Kendall, 1977).

Other factors determining the effectiveness of self-instruction may be the extent to which the procedure actually is employed during task performance (O'Leary & Dubey, 1979). Additionally, self-instruction may have a differential effect depending on the age of the children employing the technique (Hartig & Kanfer, 1973) and their past history of reinforcement of complying with instructions (Burrow & Bucher, 1978). A further consideration is the context of environmental contingencies available for maintaining the desired behavior. Transfer of training from the experimental setting to the classroom might be a result of the "behavioral trap" (Baer & Wolf, 1970) which, upon entry, shapes and maintains an ever-increasing repertoire of appropriate behavior in children.

Furthermore, the inclusion of parents and teachers in the training program has been found to aid the generalization of self-instructional techniques across settings (Douglas et al., 1976).

Clearly, self-instructional training "should not be viewed as regimented or austere but, rather, individually tailored and highly responsive to each child" (Meichenbaum, 1977, p. 98). The individual style of each child must be considered and the verbalizations used during training varied accordingly (Douglas et al., 1976). An effort must be made not to teach the verbalizations in a mechanical, rote-learning manner but to allow the student to develop reasonable strategies of his own (Meichenbaum, 1975b). The student must be actively involved in generating the training package (Cohen, Schleser, & Meyers, 1981; Meichenbaum, 1982; Nichol et al., 1982), and the rate at which the experimenter proceeds through the phases of the self-instructional training procedure should be varied according to the needs of the individual (Meichenbaum, 1975b). Furthermore, the importance of developing a rationale for the treatment with each individual student has been stressed (Albion & Salzberg, 1982; Douglas et al., 1976; Meichenbaum, 1982; Snyder & White, 1979), as well as establishing rapport between the trainer and student (Craighead, Wilcoxon-Craighead, & Meyers, 1978).

Various studies seem to indicate self-instruction becomes more effective when implemented as a "package" combined with other behavioral techniques. Bornstein and Quevillon's (1976) highly effective self-instructional program involved a wide variety of procedures, including instruction, self-instruction, verbal modeling, prompts, external reinforcement, and fading. Meichenbaum and Goodman (1971) found that combining self-instruction with modeling, reinforcement, and aversive consequences was effective in modifying the behavior of phobics, schizophrenics, smokers, speech-and test-anxious students and impulsive children. Burgio et al. (1980) employed a classroom imagery instructional procedure to assist children in recognizing situations where self-instruction was appropriate. An addition to the self-instructional package was the use of visual, audio, and in vivo stimuli similar to those likely to be encountered in the classroom, multiple exemplars of academic tasks encountered in the classroom, and reinforcement of the chain of various self-instructional components. Finally, Bryant and Budd (1982) used worksheets analogous to those assigned in class as the primary tasks for training, and implemented instructions, modeling, practice in self-instruction, and teacher feedback in conjunction with the assigned tasks.

Additional behavioral techniques have been employed effectively in self-instructional packages. Visual cues have been effective as a stimulus for self-instructing behavior to occur (Barkley et al., 1980; Cohen et al., 1980; Connis, 1979; Craighead et al., 1978; Kendall & Zupan, 1981; Palkes et al., 1968; Steele & Barling, 1982).

Kendall and Zupan (1981) employed a self-evaluation checklist to be completed by the student following each training session. Accurate self-evaluation (that which matched the trainer's evaluation) was reinforced using a token economy. Genshaft and Hirt (1979) and Meichenbaum and Cameron (1974) utilized peer modeling and peer tutoring while Barkley et al. (1980) and Kendall and Zupan (1981) effectively employed a group modeling process for training self-instructional procedures. Group contingencies have been implemented to assure generalization of the target behavior from the training to the classroom setting (Kazdin, 1975). Self-instruction has been used effectively in conjunction with token economies (Craighead et al., 1978; Friedling & O'Leary, 1979; Kendall & Zupan, 1981; Robertson, Simon, Pachman, & Drabman, 1979); self-monitoring (Kelly, Salzberg, Levy, Warrenteltz, Adams, Crouse, & Beegle, 1983); and self-reinforcement and self-evaluation (Fantuzzo, Harrell, & McLeod, 1979; O'Leary & Dubey, 1979; Varni & Henker, 1979). Self-instruction also has been effective with response cost for incorrect performance during training (Kendall, 1978) and role playing to enhance correct training performance (Snyder & White, 1979).

An addition to the increased effectiveness of self-instruction when utilized as a "package" is a systematic programming for generalization and maintenance (Kazdin, 1975; Kendall, 1977; Meichenbaum, 1980). The observed lack of generalization to other settings found in some investigation of self-instruction may have been due to inadequate programming of generalized use of the procedure (O'Leary & Dubey, 1979). General guidelines for training for generalization and maintenance have been provided by several investigators (Baer, 1981; Rhodes, Morgan, & Young, 1983; Stokes & Baer, 1977). Additionally, the following specific procedures appear to be appropriate to the generalization and maintenance of the effects of self-instructional training.

Incorporating multiple and diverse tasks into the training sessions has produced widespread generalization to the classroom setting (Bryant & Budd, 1982). A nonspecificity of the verbalizations used in the self-instructional training has enhanced generalization (O'Leary & Dubey, 1979). Both response cost (Kendall & Finch, 1976) and contingent reinforcement (Bornstein & Quevillon, 1976) have been effective factors in increasing generalization and maintenance. Comb'ning self-reinforcement, self-evaluation, and self-monitoring into the treatment program has enhanced generalization and maintenance (Alberto & Troutman, 1982). Finally, O'Leary and Dubey (1979) note that "naturally occurring events must, at the very least, support the behavior change thereby indirectly reinforcing the child's use of the procedure" (p. 462).

## Summary

Investigations of self-instructional training have produced mixed results. Apparently, there are many variables to consider in the implementation of a self-instructional procedure in order to ensure its effectiveness. In particular, systematic programming for generalization and maintenance is required to provide for the actual implementation of the procedure in the classroom. At the same time, certain strengths of self-instruction as a procedure have been noted. Barkley et al. (1980) and Cohen et al. (1980) found the procedure both cost effective and easy to implement, producing major behavioral changes with minimal external intervention. Leon and Pepe (1983) noted that the question-and-answer format of self-instructional training could be used to guide a student through a desired response chain. In addition, the training includes a procedure that transfers control of the behavior from teacher- to student-generated cues. The flexibility of self-instruction also has been observed as demonstrated by the ease with which the procedure may be adapted to meet individual needs (Douglas et al., 1976; Kendall, 1977; Meichenbaum, 1975b). Finally, Burgio et al. (1980) suggest it is imperative that self-instructional technology not be viewed as a completed product, to be used without refinement. Rather self-instruction should be considered in an embryonic stage of development, in which its potential effectiveness will be established through future research.

# Chapter III

## Methodology and Procedures

### Subjects

The subjects in this study were four mentally retarded adults, one male and three females, who were employed by a sheltered workshop for vocational training in a northwestern city. Table 1 presents the age, sex, handicapping condition, and number of years attending the workshop for each subject using a ficticious name.

The subjects were selected on the basis of trainer report of direct observation of a high incidence of off-task behavior and the ability to verbalize. The subjects' high incidence of off-task behavior was confirmed by direct observation by the experimenter prior to baseline.

Felicia was a 25-year-old female who had been assessed as low trainable retarded. At the onset of the study she had been attending the workshop for 4 years and resided in a group home. Her placement goals included improving accuracy and productivity and learning job skills.

Pete was a 21-year-old male who was assessed as moderately mentally retarded. He had attended the workshop for 4 months at the onset of the study and lived with a relative. Pete's long-range placement goal was competitive employment.

Diana was a 26-year-old female who was assessed as mildly mentally retarded. At the onset of the study she had attended the

Table 1

Characteristics of Subjects

| Subject | Age | Sex | Handicapping Condition | Years in Workshop |
|---|---|---|---|---|
| Felicia | 25 | female | moderately mentally retarded | 4.0 |
| Pete | 21 | male | moderately mentally retarded | 0.3 |
| Diana | 26 | female | mildly mentally retarded | 0.3 |
| Julie | 30 | female | moderately mentally retarded, brain-damaged | 8.0 |

workshop for 4 months and lived with a relative. Diana's placement goals were to increase productivity. attending-to-task, and working independently.

Julie was a 30-year-old female who was assessed as moderately mentally retarded and brain-damaged. She had attended the workshop for 8 years at the onset of the study and lived in a group home. Julie's placement goals included improving the basic work habits of speed, quality, and attention span, working independently, and increasing the ability to follow directions.

Setting

The study took place in two settings in the workshop environment, a training room and the work area. Training was conducted individually with each subject in the training setting which was an enclosed room adjacent to the work area. It contained one table with two chairs placed around it and a storage area. Observations of the subjects while working took place in the second setting which was a large work area for 15-20 mentally retarded adult clients. Those present in the work area other than the clients included, at a maximum, two training staff with undergraduate B.S. degrees, one in rehabilitation and one in psychology, and an undergraduate intern in rehabilitation who served as an aide. However, usually only one staff member at a time was present in the work area and engaged in client supervision. The work area contained five work tables, two trainer's desks, and storage areas for equipment and supplies. The clients in the work area performed various small assembly tasks, on a contracted or simulated basis.

Dependent Variables

The dependent variables were on-task behavior and work performance. On-task behavior was defined as the subjects' engaging in motor task-related actions (e.g. stuffing envelopes, sorting mail, trimming strapping) for the entire 10 seconds of the observational interval. Work performance was measured in terms of accuracy and rate of work production recorded for the daily 20-minute sessions in the work area setting. Off-task behaviors included engaging in any unassigned activity: leaving the work area, remaining idle, playing with task materials, talking, shouting, fighting, kicking, or looking away for more than a 5-second duration from the assigned task.

Tasks

The tasks used in the training sessions and the 20-minute observational sessions were varied on a daily basis and were representative of the small assembly tasks of the workshop, e.g. stamping, sealing, and stuffing envelopes; sorting mail by zip code; collating printed material; and trimming, counting, and boxing strapping material. The tasks assigned to the individual subjects were selected by the trainers as being on the subjects' level but were tasks the subjects did not perform consistently on their own. The quantity of work assigned to the subjects always exceeded what they could complete in a single session.

Observation and Recording

Measures of pertinent behavior were obtained through two methods: a) direct observation of subject responses in the work area, and b) permanent product data of work performance. Direct observations of on-task behavior were conducted daily by the experimenter in the work area for 20-minute sessions of independent work of small assembly tasks. The measures of on-task performance were determined on a 10-second observe, 10-second record interval recording system. Observation of each subject was done on a rotational basis in a random order. Responses were scored on an interval recording sheet (Appendix B) in terms of their occurrence or nonoccurrence within the 10-second intervals. Occurrence or nonoccurrence of the behavior was recorded only once within an interval. A percentage of on-task behavior then was calculated by dividing the number of intervals in which on-task behavior occurred by the total number of intervals recorded and multiplying by 100.

Work performance was measured in terms of rate and accuracy of production based on permanent product data collected for the daily 20-minute sessions. Rate of production was calculated based on the production formula used by the workshop (Appendix C). Accuracy was determined by calculating the percent of task items correctly completed compared to the total number of items completed. This was accomplished by dividing the number of correctly completed items by the total number of items completed and multiplying by 100. Data collected on both on-task behavior and work performance then were charted on a daily basis (Appendix D).

<u>Reliability Measures</u>

The reliability of the direct observation of on-task behavior was assessed at least once per condition for each subject by the use of a second observer. Interobserver agreement was obtained by comparing, interval by interval, the independent records of the two observers who independently and simultaneously recorded the behaviors. To be scored as an agreement, both observers had to record that the behavior did or did not occur in the same interval. Overal' .bility then was calculated as agreements divided by agreem .lus disagreements multiplied by 100. Additionally, occurrence/nonoccurrence reliability was calculated as defined by Hopkins and Hermann (1977) (Appendix E). Overall reliability and occurrence/nonoccurrence reliability then were compared to chance reliability which was calculated as defined by Hopkins and Hermann (1977) (Appendix E).

Reliability measures on the rate and accuracy of production also were obtained at least once per condition for each subject by the use of a second observer. Agreement was obtained by a comparison of the counting done by the two observers of the task items completed correctly and incorrectly. Accuracy was determined based on performance criteria established by the workshop at which the study was conducted. Reliability was calculated as agreements divided by agreements plus disagreements multiplied by 100.

Interobserver reliability for each dependent variable was observed to be attained if a mean overall reliability of 90% or better was established.

Observers

The first observer, the experimenter who had designed the study, was a graduate student in special education with eight years regular education teaching experience. The second observer was an undergraduate student in human services with twelve years experience in juvenile detention and treatment centers.

Experimental Design

A multiple baseline across subjects was employed to evaluate the effects of the experimental training condition on the subjects' behavior in the work area setting. Following baseline observation of the target behaviors in the work area setting, the self-instructional on-task training was introduced sequentially to the four subjects in the training setting. Following the self-instructional training condition, observation of the target behaviors was conducted sequentially for each subject in the work area setting during the post-self-instructional on-task training condition. The next sequentially introduced condition of the study consisted of self-instructional rate training in the training area, followed by sequential observation of the target behaviors of the four subjects in the work area setting during the post-self-instructional rate training condition. The five conditions of the study are summarized as follows:

1. Baseline
2. Self-instructional on-task training
3. Post-self-instructional on-task training
4. Self-instructional rate training
5. Post-self-instructional rate training

## Procedure

Baseline. Data were taken for all four subjects during the first four days of the investigation until a trend in the data which was not ascending was established for the first subject. An ascending trend of the behavior was defined as three consecutive data points in an ascending direction (Alberto & Troutman, 1982). During baseline observation there was no treatment intervention. Data were collected for both on-task behavior and work production in the work area setting during the daily 20-minute sessions. At the beginning of each session, the training staff described how to complete the task assigned for the day after which the subjects were instructed to work independently. Staff interaction with subjects remained infrequent and consistent across each experimental condition.

Self-instructional on-task training. Following baseline, training for Felicia began on Day 5 of the study. Training for the other three subjects followed on a sequential basis with training for Pete beginning on Day 9 of the study, for Diana on Day 13, and for Julie on Day 16. Each subject was taken individually by the experimenter to the training setting for an initial 30-minute training session immediately preceding the 20-minute observation session. Subsequent training sessions also lasting 30 minutes took place until the subjects performed at an experimenter-determined criterion level. The criterion used across subjects was correctly self-instructing without prompting for 2 consecutive days. The self-instructional on-task training condition consisted of the following steps:

Session 1

1. The experimenter developed a rationale for self-instructional training with the subjects by presenting the training as a "trick" which could help the subjects work better. It was suggested working better could elicit more praise and less criticism from the trainers in the work area setting; that it would enable the subjects to work by themselves without constantly being told what to do, and that it might enable the subjects to get and keep a job outside the workshop setting. Dollar bills also were presented to the subjects with the suggestion that more money could be earned for completing more work. Suggestions for items which the subjects

liked to buy with their money then were elicited and discussed. Additionally, brightly colored bar graphs of the subjects' on-task behavior during baseline were presented with the suggestion that the data on the graphs could be improved. The graphs were then shown each subsequent day of training to the subjects as a visual representation of performance improvement.

2. The experimenter suggested to the subjects "thinking out loud" could help the subjects work better in the work area setting. The experimenter then mentioned several examples of the use of "thinking out loud" for everyday use (e.g. learning to drive a car or learning to knit). It then was re-emphasized "thinking out loud" could improve work performance.

3. At the beginning of each training session, the subjects were told they would receive their choice of a stick of gum or a lifesaver at the end of the session based on correct performance and attending to the experimenter during training. Additionally, throughout the training sessions frequent social reinforcers, including verbal praise, smiling, and touching were delivered by the experimenter contingent on correct performance. As the sessions advanced, social reinforcement was provided less frequently.

4. To practice the self-instructions, varied tasks representative of those performed in the daily 20-minute sessions in the work area setting were introduced into the training session. The subjects were instructed to pretend they were in the work area

setting and had been told by their trainer to complete the assigned task. The self-instructional training used in task completion followed Meichenbaum and Goodman's training sequence (1971):

A. First the experimenter performed the task saying the self-instructions aloud while the subjects observed.

B. Then the subjects performed the task while the experimenter again instructed aloud.

C. Next the subjects performed the task again while instructing themselves aloud.

D. During the last step, the subjects performed the task overtly whispering the self-instructions. (The final step of the Meichenbaum and Goodman training sequence in which the subjects perform the task while guiding themselves with covert self-instruction was not implemented because its use did not seem necessary with or appropriate to the subject population because of the following factors: a) Perhaps because of a language deficit characteristic of a mentally retarded population, the subjects did not appear to respond when instructed by the experimenter to self-instruct covertly. b) Overt whispering of self-instructions did not seem inappropriate in a sheltered workshop setting in which clients frequently verbalize while working. c) If the self-instructions were not faded to covert, it would be possible to observe the subjects' self-instructing overtly in the work area setting).

The self-instructions used during task completion were based on the model of Meichenbaum and Goodman (1971):

A. Problem definition

B. Focusing attention and response guidance

C. Self-reinforcement

D. Self-evaluation coping statements and error-correcting options.

An example of the self-instructions modeled by the trainer and subsequently repeated, with the individual adaptations, by the subjects included the following:

A. "What does _____ want me to do?"

B. "First I must pick up the envelope. Then I put in the yellow letter, then the green letter. Now I put down the envelope."

C. "Now check back. Good, I did a good job. Next one." or "Oops. Better fix it."

5. At the close of the session, the subjects were reminded to use the self-instructions in the workshop setting.

Sessions 2-4

1. At the beginning of each subsequent training session, the subjects were reminded that contingent reinforcement would be available at the close of the session. Next, their graphed performance from the previous day was shown and discussed. Then the experimenter showed the subjects a color photograph taken of

themselves working in the work area setting. The subjects were told that after completing each task item while self-instructing to look at the card and self-reinforce, then prompt themselves to continue working by saying "Next one."

2. Task completion then was rehearsed by the experimenter and subjects employing the subjects' picture at the completion of each task item and using the steps outlined in Session 1.

3. At the close of each session, the subjects were instructed that their pictures would be placed on their work tables during the 20-minute observational sessions and that use of the picture should improve work performance.

4. The training sessions were continued until the subjects demonstrated correct performance of the self-instructions without prompting for two consecutive days.

Post-self-instructional on-task training. During the post-self-instructional on-task training condition, observation of the target behaviors of the four subjects was conducted in the work area setting.

Self-instructional rate training. The procedures used during the self-instructional rate training condition were similar to those described for on-task training. However, in this condition, the subjects were instructed to say "Go faster" when looking at their pictures, prior to self-reinforcing. Furthermore, the subjects were trained in groups of two rather than individually.

Training was continued until the subjects could perform the self-instructions correctly without prompts for two consecutive days. Self-instructional rate training lasted two days for all subjects.

Post-self-instructional rate training. During the post-self-instructional rate training condition, observation of the target behaviors of the four subjects was conducted in the work area setting.

## Treatment of the Data

The data gathered in the work area setting during the study were charted daily during all experimental conditions: baseline, self-instructional on-task training, post-self-instructional on-task training, self-instructional rate training, and post-self-instructional rate training (Appendix D). On-task behavior was charted in terms of percent of time-on-task. Work performance was charted in terms of rate of production and percent of accuracy. The treatment was assumed to be effective if percent of time-on-task increased in mean 25% over baseline following training.

## Pilot Study

A pilot study was conducted three months prior to the present study which investigated the effectiveness of self-instruction at increasing on-task behavior and improving mathematics performance. The subject of the study was a 13-year-old male who had been placed in a residential treatment program for emotionally disturbed children and youth. The subject had been selected based on teacher report of direct observation of a high incidence of off-task behavior and poor mathematics performance. During baseline, the subject's mean percent on-task behavior was 19%. Following three 30-minute training sessions on consecutive days, the subject's mean percent on-task behavior was 95%, demonstrating a 405% increase over baseline. Rate of correctly completed mathematics problems increased from a mean of 0.3 problems per minute during baseline to a mean of 7.4 problems per minute following training.

# Chapter IV

## Results

### Reliability

Interobserver reliability was assessed for 31% of the observations during the study across each experimental condition for on-task behavior. Mean interobserver reliability scores as compared to chance reliability are summarized in Table 2 (see Appendix A for a description of the reliability formulas used). The mean overall reliability was 91%, ranging from 88% to 97% and representing 11% more than chance overall reliability of 80%. Occurrence reliability was 90%, ranging from 84% to 96% and representing 26% more than chance occurrence of 64%. Nonoccurrence reliability was 59%, ranging from 50% to 71% and representing 56% more than chance nonoccurrence reliability of 3%.

Reliability also was assessed for rate and accuracy of production across subjects and conditions. Mean overall reliability for rate and accuracy was 99%, ranging from 98% to 100%.

### On-Task Behavior

Figure 1 represents the daily percent on-task measures for each subject across all experimental conditions. The means and percent of increase of performance over baseline for each subject per condition are summarized in Table 3, while the means and ranges per subject are represented in Table 4.

The mean on-task behavior during baseline for Felicia was 39%,

Table 2

Interobserver Reliability Compared to Chance Reliability

| | Reliability | | | | | |
|---|---|---|---|---|---|---|
| Observation Session | Overall | Chance Overall | Occurrence | Chance Occurrence | Nonoccurrence | Chance Nonoccurrence |
| 4 | 88 | 51 | 85 | 43 | 66 | 8 |
| 6 | 92 | 61 | 90 | 55 | 71 | 6 |
| 9 | 88 | 62 | 84 | 61 | 53 | 1 |
| 13 | 90 | 65 | 88 | 61 | 60 | 4 |
| 18 | 95 | 83 | 95 | 82 | 57 | 1 |
| 20 | 92 | 70 | 91 | 68 | 55 | 2 |
| 23 | 90 | 58 | 89 | 56 | 50 | 2 |
| 25 | 90 | 67 | 88 | 64 | 57 | 3 |
| 28 | 97 | 88 | 96 | 87 | 60 | 1 |
| Means | 91 | 80 | 90 | 64 | 59 | 3 |

Figure Caption

Figure 1. Percent on-task behavior and rate of production.

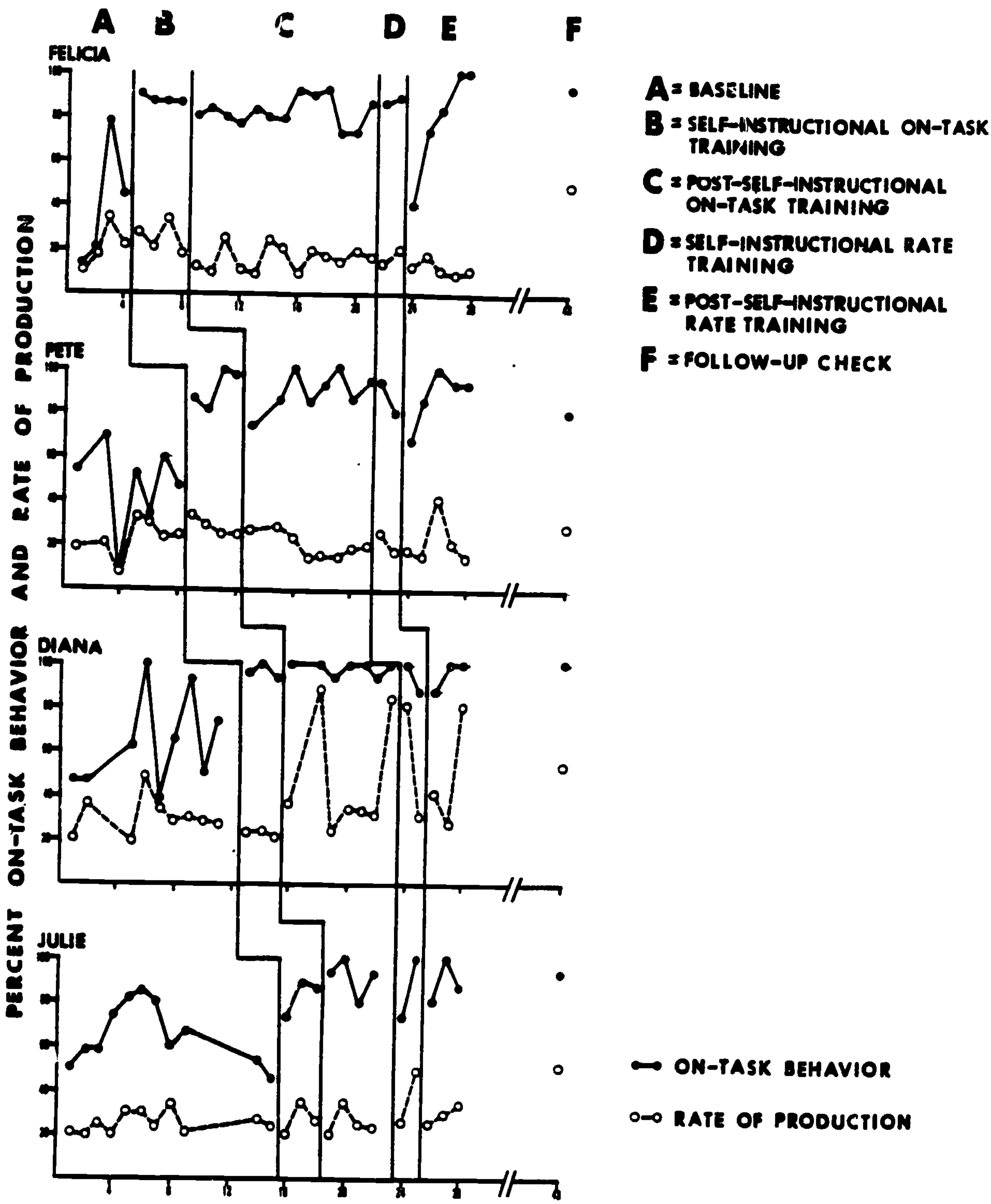

A B C D E F
FELICIA
PETE
DIANA
JULIE
PERCENT ON-TASK BEHAVIOR AND RATE OF PRODUCTION
A = BASELINE
B = SELF-INSTRUCTIONAL ON-TASK TRAINING
C = POST-SELF-INSTRUCTIONAL ON-TASK TRAINING
D = SELF-INSTRUCTIONAL RATE TRAINING
E = POST-SELF-INSTRUCTIONAL RATE TRAINING
F = FOLLOW-UP CHECK
ON-TASK BEHAVIOR
RATE OF PRODUCTION

Table 3

On-Task Behavior as Represented by Actual Percent Increase in Mean Over Baseline Compared to a Stated Criterion Increase of 25% Over Baseline

| Subject | Stated criterion % increase over baseline | % increase over baseline[a] |
|---|---|---|
| Felicia | 25 | 113 |
| Pete | 25 | 91 |
| Diana | 25 | 51 |
| Julie | 25 | 42 |
| Average | 25 | 74 |

[a]The values were calculated based on mean on-task behavior during the post-self-instructional on-task training condition.

Table 4

Means and Ranges of Dependent Variables During Baseline and Following Self-Instructional Training

On-Task Behavior--Means and Ranges

| Subject | Baseline | | Post-On-Task Training | | Post-Rate Training | |
|---|---|---|---|---|---|---|
| | Mean | Range | Mean | Range | Mean | Range |
| Felicia | 39 | 13- 78 | 83 | 73- 93 | 80 | 40-100 |
| Pete | 47 | 11- 70 | 90 | 75-100 | 88 | 67-100 |
| Diana | 65 | 40-100 | 98 | 93-100 | 96 | 87-100 |
| Julie | 65 | 46- 80 | 92 | 80-100 | 89 | 80-100 |
| Average Means | 54 | | 91 | | 88 | |

Rate of Production--Means and Ranges

| Subject | Baseline | | Post-On-Task Training | | Post-Rate Training | |
|---|---|---|---|---|---|---|
| | Mean | Range | Mean | Range | Mean | Range |
| Felicia | 22 | 12- 34 | 17 | 9- 25 | 12 | 11- 18 |
| Pete | 23 | 9- 34 | 20 | 14- 28 | 22 | 15- 42 |
| Diana | 30 | 19- 48 | 47 | 24- 88 | 49 | 26- 81 |
| Julie | 25 | 20- 33 | 26 | 20- 35 | 29 | 26- 33 |
| Average Means | 25 | | 28 | | 28 | |

Table 4 (continued)

Accuracy of Production--Means and Ranges

| Subject | Baseline | | Post-On-Task Training | | Post-Rate Training | |
|---|---|---|---|---|---|---|
| | Mean | Range | Mean | Range | Mean | Range |
| Felicia | 92 | 68-100 | 100 | 100 | 100 | 100 |
| Pete | 100 | 98-100 | 100 | 100 | 100 | 100 |
| Diana | 100 | 100 | 100 | 100 | 100 | 100 |
| Julie | 90 | 67-100 | 98 | 90-100 | 98 | 95-100 |
| Average Means | 96 | | 100 | | 100 | |

ranging from 13% to 78%. Following the on-task training condition, mean on-task behavior increased to 83%, ranging from 73% to 90% and indicating a 113% increase over baseline. Mean on-task behavior following rate training was 80%, ranging from 40% to 100% and indicating a 105% increase over baseline. On-task behavior at the two-week follow-up observation was 93%.

The mean on-task behavior during baseline for Pete was 47%, ranging from 11% to 70%. Following the on-task training condition, mean on-task behavior increased to 90%, ranging from 75% to 100% and indicating a 91% increase over baseline. Mean on-task behavior following rate training was 88%, ranging from 67% to 100% and indicating an 87% increase over baseline. On-task behavior at the two-week follow-up observation was 80%.

The mean on-task behavior during baseline for Diana was 65%, ranging from 40% to 100%. Following the on-task training condition, mean on-task behavior increased to 98%, ranging from 93% to 100% and indicating a 51% increase over baseline. Mean on-task behavior following rate training was 96%, ranging from 87% to 100% and indicating a 48% increase over baseline. On-task behavior at the two-week follow-up observation was 100%.

The mean on-task behavior during baseline for Julie was 65%, ranging from 46% to 80%. Following the on-task training condition, mean on-task behavior increased to 92%, ranging from 80% to 100% and indicating a 42% increase over baseline. Mean on-task behavior following rate training was 89%, ranging from 80% to 100% and indicating a 37% increase over baseline. On-task behavior at the two-week follow-up observation was 93%.

Rate of Production

Figure 1 represents the daily rate of production of each subject across all experimental conditions. Table 4 represents the means and ranges per subject for each condition for rate of production.

The mean rate of production during baseline for Felicia was 22%, ranging from 12% to 34%. Following the on-task training condition, rate of production was 17%, ranging from 9% to 25%, and following the rate training condition, the mean was 12%, ranging from 11% to 18%. Rate of production at the two-week follow-up observation was 49%.

The mean rate of production during baseline for F.te was 23%, ranging from 9% to 34%. Following the on-task training condition, rate of production was 20%, ranging from 14% to 28%, and following the rate training condition, the mean was 22%, ranging from 15% to 42%. Rate of production at the two-week follow-up observation was 28%.

The mean rate of production during baseline for Diana was 30%, ranging from 19% to 48%. Following the on-task training condition, rate of production was 47%, ranging from 24% to 88%, and following the rate training condition, the mean was 49%, ranging from 26% to

81%. Rate of production at the two-week follow-up observation was 54%.

The mean rate of production during baseline for Julie was 25%, ranging from 20% to 33%. Following the on-task training condition, rate of production was 26%, ranging from 20% to 35%, and following the rate training condition, the mean was 29%, ranging from 26% to 33%. Rate of production at the two-week follow-up observation was 51%.

Accuracy of Production

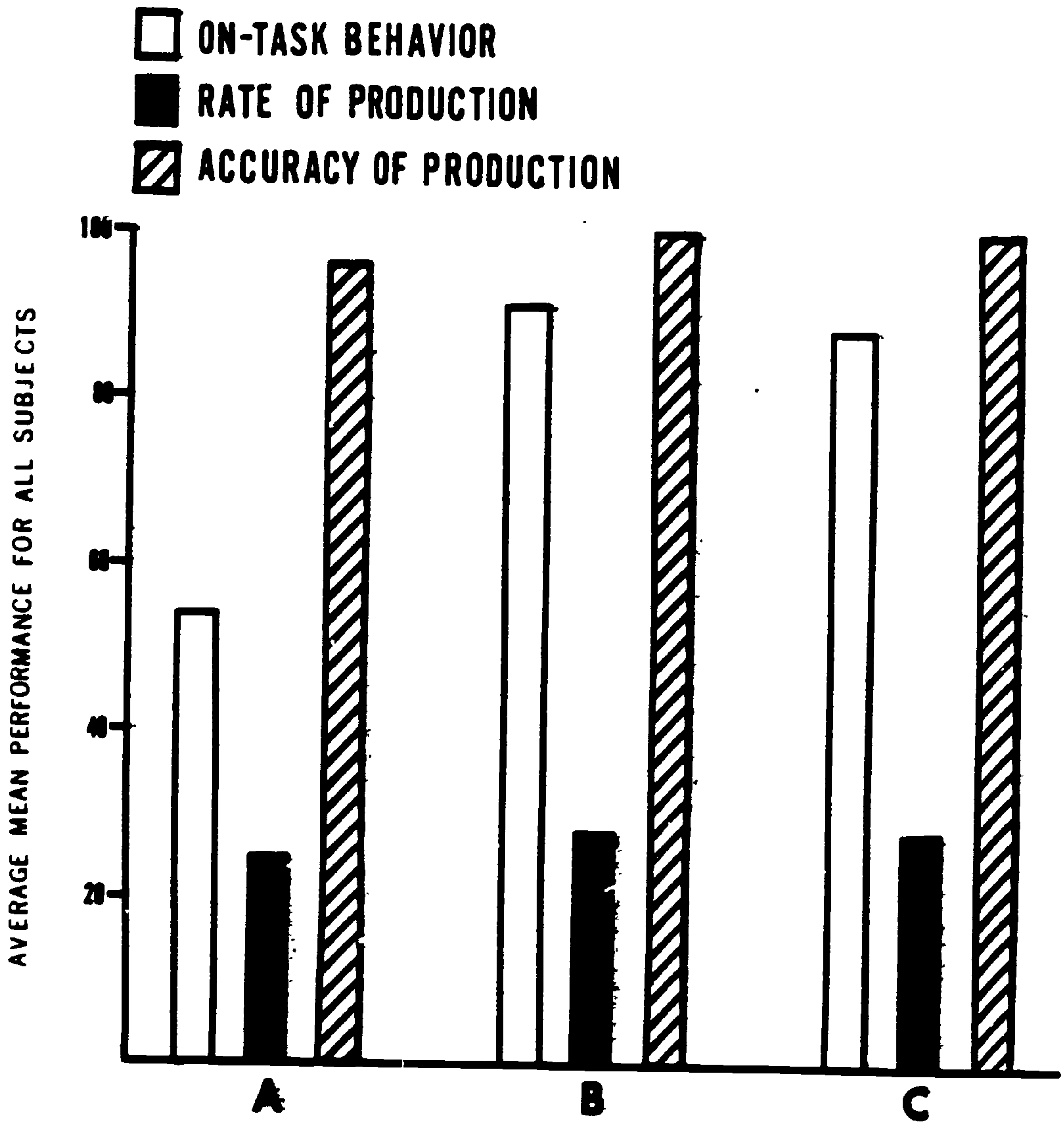
Daily measures of accuracy of production were gathered for each subject across all experimental conditions. Table 4 represents the means and ranges per subject for each condition for accuracy of production. Mean accuracy during baseline for Felicia was 92%, ranging from 68% to 100%. Accuracy was measured consistently as 100% across all subsequent conditions. Mean accuracy during baseline for Pete was 100% ranging from 98% to 100%. Accuracy was measured consistently as 100% across all subsequent conditions. Accuracy for Diana was measured consistently as 100% across all experimental conditions of the study. Mean accuracy during baseline for Julie was 90%, ranging from 67% to 100%. Following the on-task training condition, accuracy was 98%, ranging from 90% to 100%, and following the rate training condition, the mean was 98%, ranging from 95% to 100%.

Summary of Data

Figure 2 represents a summary of the data for the dependent variables across all experimental conditions. Mean performances of all four subjects have been averaged and are presented graphically for each condition. During baseline, the average mean performances of all subjects were: on-task behavior, 54%; rate of production, 25%; accuracy of production, 96%. Following the on-task training condition, average mean performances were: on-task behavior, 91% (representing a 74% increase over baseline); rate of production, 28%; accuracy of production, 100%. Following the rate training condition, average mean performances were: on-task behavior, 88% (representing a 69% increase over baseline); rate of production, 28%; accuracy of production, 100%.

Figure Caption

Figure 2. Summary of data.




A= BASELINE

B= POST-SELF-INSTRUCTIONAL ON-TASK TRAINING

C= POST-SELF-INSTRUCTIONAL RATE TRAINING

# Chapter V

## Discussion

### Summary

The present results demonstrate the effectiveness of a self-instructional training procedure at increasing and generalizing the on-task behavior of four mentally retarded adults. Following a brief self-instructional on-task training program in the training setting, mean on-task behavior of all four subjects increased an average of 74% over baseline performance which maintained at an average of 69% over baseline following self-instructional rate training. A two-week follow-up check indicated the on-task behavior had maintained in the absence of the experimenter.

Rate of performance did not increase substantially for any subject following either the self-instructional on-task training or subsequent self-instructional rate training conditions. Accuracy of production for all subjects maintained at or near 100% for the extent of the study.

### Conclusions

The self-instructional training procedure employed in this study appeared to produce an increase in the subjects' on-task behavior in the work area setting. A functional relationship between the self-instructional training procedure and the increase in on-task behavior can be established based on the following factors.

One factor indicating the procedure and behavior change were functionally related was the use of a multiple-baseline design across subjects which allowed the effect of the self-instructional training to be assessed through successive applications across subjects and behaviors and measured across time. Indicative of the effectiveness of the procedure was the on-task behavior of each subject increased systematically and sequentially following the introduction to each subject of the self-instructional training.

Secondly, based on recorded measures, positive trainer attention remained infrequent and consistent throughout the study and did not increase when the subjects' on-task behavior increased. Therefore, the increase in on-task behavior for each subject appears to be the result of the systematic introduction of the self-instructional training itself rather than the possible reinforcing effects of increased trainer attention.

A third factor relating the training procedure and the behavior change was that the skills necessary for task completion were in the subjects' repertoire prior to the introduction of the self-instructional training, as indicated by the high percentage of accuracy of work performance demonstrated by the subjects in baseline. Therefore, an increase in on-task behavior would appear to be due to the self-instructions themselves, rather than the acquisition of new task-related skills (Albion & Salzberg, 1982; O'Leary & Dubey, 1979).

A final factor establishing a functional relationship between the self-instructional training and the increase in on-task behavior was the overt self-instructing by several of the subjects in the work area setting accompanying the increases in on-task behavior. Observations of overt self-instructing were noted by both the experimenter during the 20-minute observation sessions and the training staff at other times in the day when the experimenter was absent. Additionally, one subject was observed by the training staff instructing a neighboring client who was not working, using the self-instructions taught in the training sessions. Furthermore, the experimenter observed the subjects overtly reinforcing each other using the trained self-instructional statements when task items were being counted by the experimenter following several of the observational sessions.

Clearly, the self-instructional training procedure implemented in this study was functionally related to the increase in the subjects' on-task behavior. The training procedure in the study consisted of a variety of components presented as a "package," providing a variation on other self-instructional programs utilized in past studies. Any of the following single components or combination of components of the package may have contributed to its effectiveness at increasing the subjects' on-task behavior in the work area setting.

First, the importance of developing a rationale for self-instructing has been noted as a factor essential to the success of a self-instructional training program (Albion & Salzberg, 1982) Douglas et al., 1976; Meichenbaum, 1982; Snyder & White, 1979). In this study, a rationale for self-instructing in the workshop setting was presented by the experimenter to each subject consisting of verbal suggestions and visual aids. Specifically, self-instructional training was presented as a "trick" which could help the subjects work better. Its use was suggested as enhancing the probability of increased praise and decreased criticism and instructions from the workshop training staff, in addition to increasing the likelihood of competitive employment outside the workshop setting. Additionally, dollar bills were presented to the subjects with the suggestion that increased money could be earned for more work. Finally, bar graphs of the subjects' on-task behavior during baseline were shown to the subjects with the suggestion that performance could be improved. The systematic development of this rationale with each subject in this study may have contributed to the effectiveness of the training package at increasing on-task behavior.

Next, the use of reinforcement for correct performance during training has been indicated as a critical factor contributing to the effectiveness of a self-instructional training program Bornstein & Quevillon, 1976; Bryant & Budd, 1982; Burgio et al., 1980; Combs & Lahey, 1981). The training procedure employed in the present study provided a choice of gum or candy at the end of each training session contingent on correct performance during training. Additionally, frequent social reinforcers, including verbal praise, smiling and touching, were delivered throughout the training sessions contingent on correct performance.

Another component of the self-instructional training package which may have contributed to its effectiveness was the subjects' performance in the training sessions of varied tasks representative of the work area setting. Varying the tasks in training may have facilitated generalization of the on-task behavior to the work area setting by training multiple exemplars of the desired behavior (Bryant & Budd, 1982; Burgio et al., 1980; Stokes & Baer, 1977).

An additional component of the present procedure possibly accounting for its effectiveness was the self-instructions were not presented to the subjects in a rote-learning fashion during training. Rather, as in previously successful investigations of self-instruction, the subjects were allowed to develop individual verbalizations of their own (Douglas et al., 1976; Meichenbaum, 1975b) and the rate at which training proceeded and the number of days of actual training varied according to the individual subjects' progress in self-instructing (Douglas et al., 1976; Kendall, 1977; Meichenbaum, 1975b). This training component may be an especially critical factor with a mentally retarded population with a characteristically limited language repertoire. Developing verbalizations of their own may have allowed the subjects in the study to choose words which provided stimulus control for their own behavior. Attempting to superimpose an external language on the subjects, not within their repertoire, may not have been as effective in producing the desired behavior change.

The use of colored photographs of the subjects placed in the work area setting also may have contributed to the increase in on-task behavior observed in this study. The effectiveness of visual cues, including photographs, pictorial cues, and written instructions, as stimuli for self-instructing has been noted in other investigations of self-instruction (Barkley et al., 1980; Cohen et al., 1980; Connis, 1979; Craighead et al., 1978; Kendall & Zupan, 1981; Palkes et al., 1968; Steele & Barling, 1982).

A final component of the self-instructional training package may have contributed to its effectiveness at increasing and generalizing on-task behavior. The subjects in the current study, while in the training sessions, were instructed to "pretend" they were in the work area setting performing tasks assigned by the training staff. Additionally, at the close of each session, the subjects were reminded to self-instruct when in the work area setting. The use of these specific instructions may have enhanced the increase in the subjects' on-task behavior and the generalization of the behavior from the training to the work area setting, as suggested by previous investigations of self-instruction (Bornstein

& Quevillon, 1976; Burgio et al., 1980; Camp et al., 1977; Snyder & White, 1979; Steele & Barlin, 1982).

The self-instructional training procedure implemented in this study appeared to have been effective at increasing on-task behavior with four mentally retarded adults in a vocational training setting. Following the self-instructional on-task training condition, the on-task behavior of all four subjects increased immediately and substantially. However, self-instructional training was not effective at increasing the subjects' rate of production in this study. Following the self-instructional rate training condition, rate of performance did not increase substantially for any of the subjects. Relevant to these results, data from past studies have indicated the relationship between on-task behavior and rate of performance is unclear (Burgio et al., 1980). Some studie ve indicated increasing on-task behavior produces a correspo ng increase in rate of performance (O'Leary, Becker, Evans, & Saudargas, 1969; Surratt, Ulrich, & Hawkins, 1969; Whitman, Scibak, Butler, Richter, & Johnson, 1982). Other studies have suggested correlated behavioral changes do not occur (Ferritor, Buckholdt, Hamblin, & Smith, 1972; Loos, Williams, & Bailey, 1977; Marholin & Steinman, 1977). Consistent with the present study, studies investigating the use of self-instruction have found an increase in on-task behavior without a corresponding increase in rate of performance (Bryant & Budd, 1982; Burgio et al., 1980; Friedling &

O'Leary, 1979). Several possible explanations could account for the differential effects of the training.

Possibly the subjects' performance level had achieved maximum rate of production during baseline. However, such an explanation would have low probability across four individual subjects. It may be more likely some behaviors, including on-task behavior, are more readily modified by self-instructional training than others (Bornstein & Quevillon, 1976). While facilitating on-task behavior, self-instructing, as a competing behavior, may interfere with rate of performance. It may be that a direct contingency on rate would be more effective than self-instruction at producing an increase in rate of performance.

One possible explanation for the lack of increase in rate of performance may relate to the subject population of the present study. It may be that while mentally retarded individuals are able to discriminate on-task compared to off-task behavior, they may not be able to discriminate increases in rate. The subjects in the study were able to verbalize to the experimenter that being on-task meant "no talking, no looking around" and that it meant "working" as compared to not working. The act of completing each task item may have provided a visible product indicating to the subjects they were indeed "on-task." However, increasing rate may have been an abstraction for which no equivalent product was available to the individual, without an actual item count, as an indication that an increase in rate had been achieved. Whereas mentally retarded individuals may be able to discriminate directly from their own behavior when they are actually on-task, an increase in rate of performance may need to be inferred from the number of items completed following an interval of time. In this sense, the self-reinforcement provided by self-instructing for staying on-task would be delivered immediately and continually following completion of each task item. However, self-reinforcement for rate increase would be contingent on the passage of an interval of time from which an increase in rate would have to be inferred. The lack of immediate and continual self-reinforcement available may explain the corresponding lack of increase in rate of production found in this study.

Implications

The self-instructional procedure employed in this study produced a substantial and immediate increase in on-task behavior following training. Cost of the training package as an intervention was minimal in terms of time and materials. The training procedure was acquired within 30 minutes by the experimenter and on subsequent occasions readily was taught by the experimenter to other educators. Additionally, the self-instructional training of each subject in the study was brief, consisting of a maximum of four 30-minute sessions. The cost of required materials (e.g. gum, candy, experimenter-constructed bar graphs) was practically negligible.

The present self-instructional training procedure could provide a means for increasing and maintaining on-task behavior in a workshop setting with minimal external intervention. In the present study, on-task behavior appeared to maintain without the presence of the experimenter who had provided the self-instructional training. Exit questionnaires completed by the two training staff who supervised in the work area setting would seem to indicate the staff viewed the procedure as effective at increasing and maintaining on-task behavior. A spontaneous request to learn how to provide self-instructional on-task training in the workshop setting also was expressed by the staff. Apparently, self-instruction as a procedure had gained social validity in the setting of the present study.

The use of self-instruction to increase on-task behavior could have direct application for mentally retarded adults in a vocational training setting despite a lack of increase in rate of production. Studies have indicated the success or failure of mentally retarded adults in community vocational settings is more related to performance of appropriate social behaviors than performance of required tasks (Gardner et al., 1983; Gold, 1975; Payne & Patton, 1981). On-task behavior has been identified as a characteristic associated with successful employment of the mentally retarded (Payne & Patton, 1981; Sali & Amir, 1970). By maintaining on-task behavior, the mentally retarded individual presents a more socially acceptable physical appearance than by talking, remaining idle, or looking away from the task for extended time intervals, regardless of actual rate of production. Apparently, the likelihood of competitive employability in a sheltered workshop setting could be enhanced by increased client on-task behavior.

Self-instruction could be viewed as a technique which has wide application across a variety of settings, behaviors, and populations. The present study found self-instruction to be effective at increasing on-task behavior with mentally retarded adults in a vocational training setting. Further research should attempt to isolate which of the components of the particular training procedure used in this study contributed to the effectiveness of the total training package at increasing on-task behavior in the subject population. Additionally, subsequent investigations could explore modifications in the procedure which might facilitate an increase in rate of production with mentally retarded individuals.

The present study provides an investigation of the use of self-instruction with a novel population: the mentally retarded adult. Its effectiveness indicates mentally retarded adults can be taught to manage their own on-task behavior. Further investigations of the procedure could explore its application across a variety of behaviors with the mentally retarded, perhaps identifying other self-management skills which this population could acquire.

References

Alberto, P. A., & Troutman, A. C. (1982). Applied behavior analysis for teachers: Influencing student performance. New York: Charles Merrill.

Albion, F. M., & Salzberg, C. L. (1982). The effect of self-instructions on the rate of correct addition problems with mentally retarded children. Education and Treatment of Children, 5, 121-131.

American Psychiatric Association. (1980). Diagnostic and statistical manual of mental disorders (3rd ed.). Washington, DC: Author.

Anderson, L., Fodor, I., & Alpert, M. (1976). A comparison of methods for training self-control. Behavior Therapy, 7, 649-658.

Anderson, W. H., Jr., & Moreland, K. L. (1982). Instrumental vs. moralistic self-verbalizations in delaying gratification. Merrill-Palmer Quarterly, 28, 291-296.

Argulewicz, E. N., Elliott, S. N., & Spencer, D. (1982). Application of a cognitive-behavioral intervention for improving classroom attention. School Psychology Review, 11, 90-95.

Arnold, S. C., & Forehand, R. (1978). A comparison of cognitive training and response cost procedures in modifying cognitive styles of impulsive children. Cognitive Therapy and Research, 2, 183-187.

Baer, D. M. (1981). How to plan for generalization. Lawrence, KS: H & H Enterprises.

Baer, D. M., & Wolf, M. M. (1970). The entry into natural communities of reinforcement. In R. Ulrich, T. Stachnik, & J. Marby (Eds.), Control of human behavior: From cure to prevention (Vol. 2) (pp. 319-324). Glenview, IL: Scott, Foresman.

Barkley, R. A., Copeland, A. P., & Sivage, C. (1980). A self-control classroom for hyperactive children. Journal of Autism and Developmental Disorders, 10, 75-89.

Bem, S. L. (1967). Verbal-self control: The establishment of effective self-instruction. Journal of Experimental Psychology, 74, 485-491.

Bender, N. N. (1976). Self-verbalization versus tutor verbalization in modifying impulsivity. Journal of Educational Psychology, 68, 347-354.

Borkowski, J. G., & Varnhagen, C. K. (1984). Transfer of learning strategies: Contrast of self-instructional and traditional training formats with EMR children. American Journal of Mental Deficiency, 88, 369-379.

Bornstein, P. H., & Quevillon, R. P. (1976). The effects of a self-instructional package on overactive preschool boys. Journal of Applied Behavior Analysis, 9, 179-188.

Bryant, L. E., & Budd, K. S. (1982). Self-instructional training to increase independent work performance in preschoolers. Journal of Applied Behavior Analysis, 15, 259-271.

Bugenthal, D. B., Collins, S., Collins, L., & Chaney, L. A. (1978). Attributional and behavioral changes following two behavior management interventions with hyperactive boys: A follow-up study. Child Development, 49, 247-250.

Bugenthal, D. B., Whalen, C. K., & Henker, B. (1977). Causal attributions of hyperactive children and motivational assumptions of two behavior-change approaches: Evidence for an interactionist position. Child Development, 48, 874-884.

Burgio, L. D., Whitman, T. L., & Johnson, M. R. (1980). A self-instructional package for increasing attending behavior in educable mentally retarded children. Journal of Applied Behavior Analysis, 13, 443-459.

Burron, D., & Bucher, B. (1978). Self-instructions as discriminative cues for rule-breaking or rule-following. Journal of Experimental Child Psychology, 26, 46-57.

Camp, B. W., Blom, G. E., Hebert, F., van Doorninck, W. J. (1977). "Think aloud": A program for developing self-control in young aggressive boys. Journal of Abnormal Child Psychology, 5, 157-169.

Cohen, R., De James, P., Nocera, B., Ramberger, M. (1980). Application of a simple self-instruction procedure on adults' exercise and studying: Two case reports. Psychological Reports, 46, 443-451.

Cohen, R., Schleser, R., & Meyers, A. (1981). Self-instructions: Effects of cognitive level and active rehearsal. Journal of Experimental Child Psychology, 32, 65-76.

Combs, M. L., & Lahey, B. B. (1981). A cognitive social skills training program: Evaluation with young children. Behavior Modification, 5, 39-60.

Connis, R. T. (1979). The effects of sequential pictorial cues, self-recording, and praise on the job task sequencing of retarded adults. Journal of Applied Behavior Analysis, 12, 355-361.

Craighead, W. E., & Wilcoxon-Craighead, L., & Meyers, A. (1978). New directions in behavior modification with children. In H. Hersen, R. Eisler, & P. Miller (Eds.), Progress in behavior modification (Vol. 6) (pp. 159-201). New York: Academic Press.

Denney, N. W., & Turner, M. C. (1979). Facilitating cognitive performance in children: A comparison of strategy modeling and strategy modeling with overt self-verbalization. Journal of Experimental Child Psychology, 28, 119-131.

Douglas, V. I., Parry, P., Marton, P., & Garson, C. (1976). Assessment of a cognitive training program for hyperactive children. Journal of Abnormal Child Psychology, 4, 389-410.

Fantuzzo, J., Harrell, K., & McLeod, M. (1979). Across-subject generalization of attending behavior as a function of self-regulation training. Child Behavior Therapy, 1, 313-321.

Ferritor, D. E., Buckholdt, D., Hamblin, R. L., & Smith, L. (1972). The noneffects of contingent reinforcement for attending behavior on work accomplished. Journal of Applied Behavior Analysis, 5, 7-17.

Forman, S. G. (1980). A comparison of cognitive training and response cost procedures in modifying aggressive behavior of elementary school children. Behavior Therapy, 11, 594-600.

Friedling, C., & O'Leary, S. G. (1979). Effects of self-instructional training on second- and third-grade hyperactive children: A failure to replicate. Journal of Applied Behavior Analysis, 12, 211-219.

Fry, P. S., & Preston, J. (1979). Resistance to temptation as a function of internalization and three modes of self-verbalization. Journal of Clinical Psychology, 35, 121-129.

Gardner, W. I., Clees, T. J., & Cole, C. L. (1983). Self-management of disruptive verbal ruminations by a mentally retarded adult. Applied Research in Mental Retardation, 4, 41-58.

Genshaft, J. L. (1982). The use of cognitive behavior therapy for reducing math anxiety. School Psychology Review, 11, 32-34.

Genshaft, J. L., & Hirt, M. (1979). Race effects in modifying cognitive impulsivity through self-instruction and modeling.

Journal of Experimental Child Psychology, 27, 185-194.

Gold, M. (1975). Vocational training. In J. Wortis (Ed.), Mental retardation and developmental disabilities (Vol. 7) (pp. 254-264). New York: Brunner/Mazel.

Harris, K. R. (1982). Cognitive-behavior modification: Application with exceptional students. Focus on Exceptional Children, 15, 1-16.

Hartig, & Kanfer, F. H. (1973). The role of verbal self-instruction in children's resistance to temptation. Journal of Personality and Social Psychology, 25, 259-267.

Higa, W. R., Tharp, R. G., & Calkins, R. P. (1978). Developmental verbal control of behavior: Implications for self-instructional training. Journal of Experimental Child Psychology, 26, 489-497.

Hopkins, B. L., & Hermann, J. A. (1977). Evaluating interobserver reliability of interval data. Journal of Applied Behavior Analysis, 10, 121-126.

Jackson, H. J., & Boag, P. G. (1981). The efficacy of self-control procedures as motivational strategies with mentally retarded persons: A review of the literature and guidelines for future research. Australian Journal of Developmental Disabilities, 7, 65-79.

Jarvis, P. E. (1968). Verbal control of sensory-motor performance. Human Development, 11, 172-183.

Kazdin, A. E. (1975). Behavior modification in applied settings. Homewood, IL: Dorsey Press.

Kelly, W. J., Salzberg, C. L., Levy, S. M., Warrenteltz, R. B., Adams, T. W., Crouse, T. R., & Beegle, G. P. (1983). The effects of role-playing and self-monitoring on the generalization of vocational social skills by behaviorally disordered adolescents. Behavioral Disorders, 9, 27-35.

Kendall, P. C. (1977). On the efficacious us f verbal self-instructional procedures with children. Cognitive Therapy and Research, 1, 331-341.

Kendall, P. C., & Finch, A. J., Jr. (1976). A cognitive-behavioral treatment for impulse control: A case study. Journal of Consulting and Clinical Psychology, 44, 852-857.

Kendall, P. C., & Finch, A. J., Jr. (1978). A cognitive-behavioral treatment for impulsivity: A group comparison study. Journal of Consulting and Clinical Psychology, 46, 110-118.

Kendall, P. C., & Zupan, B. A. (1981). Individual versus group application of cognitive-behavioral self-control procedures with children. Behavior Therapy, 12, 344-359.

Kendrick, M. J., Craig, K. D., Lawson, D. M., & Davidson, P. O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. Journal of Consulting and Clinical Psychology, 50, 353-362.

Keogh, B. K., & Glover, A. T. (1980). The generality and durability of cognitive training effects. Exceptional Education Quarterly, 1, 75-82.

Leon, J. A., & Pepe, H. J. (1983). Self-instructional training: Cognitive behavior modification for remediating arithmetic deficits. Exceptional Children, 50, 54-60.

Litrownik, A. J. (1982). Special considerations in the self-management training of the developmentally disabled. In P. Karoly, & F. Kanfer (Eds.), Self-management and behavior change: From theory to practice. (pp. 315-352). New York: Pergamon Press.

Loos, F. M., Williams, K. P., & Bailey, J. S. (1977). A multi-element analysis of the effect of teacher aides in an "open"-style classroom. Journal of Applied Behavior Analysis, 10, 437-448.

Lovaas, O. I. (1964). Cue properties of words: The control of operant responding by rote and content of verbal operants. Child Development, 35, 245-256.

Luria, A. R. (1961). The Role of speech in the regulation of normal and abnormal behavior. New York: Pergamon Press.

Malamuth, Z. N. (1979). Self-management training for children with reading problems: Effects on reading performance and sustained attention. Cognitive Therapy and Research, 3, 279-289.

Marholin, D., II, & Steinman, W. M. (1977). Stimulus control in the classroom as a function of the behavior reinforced.

Journal of Applied Behavior Analysis, 10, 465-478.

Meichenbaum, D. (1975a). Enhancing creativity by modifying what subjects say to themselves. American Educational Research Journal, 12, 129-145.

Meichenbaum, D. (1975b). Self-instructional methods. In F. H. Kanfer, & A. P. Goldstein (Eds.), Helping People change (pp. 357-391). New York: Pergamon Press.

Meichenbaum, D. (1977). Cognitive behavior modification: An integrative approach. New York: Plenum Press.

Meichenbaum, D. (1979). Teaching children self-control. In B. B. Lahey, & A. E. Kazdin (Eds.), Advances in clinical child psychology (Vol. 2) (pp. 1-33). New York: Plenum Press.

Meichenbaum, D. (1980). Cognitive behavior modification with exceptional children: A promise yet unfulfilled. Exceptional Education Quarterly, 1, 83-88.

Meichenbaum, D. (1982). Teaching thinking: A cognitive-behavioral approach. Austin, TX: Society for Learning Disabilities and Remedial Education.

Meichenbaum, D. & Cameron, R. (1974). The clinical potential of modifying what clients say to themselves. In M. J. Mahoney, & C. E. Thoresen, Self-control: Power to the people (pp. 263-290. Monterey, CA: Brooks/Cole.

Meichenbaum, D., & Goodman, J. (1969a). The developmental control of operant motor responding by verbal operants. Journal of

Experimental Child Psychology, 7, 553-565.

Meichenbaum, D., & Goodman, J. (1969b). Reflection-impulsivity and verbal control of motor behavior. Child Development, 40, 785-797.

Meichenbaum, D., & Goodman, J. (1971). Training impulsive children to talk to themselves: A means of developing self-control. Journal of Abnormal Psychology, 77, 115-126.

Meyers, A., Mercatoris, M., & Sirota, A. (1976). Use of covert self-instruction for the elimination of psychotic speech. Journal of Consulting and Clinical Psychology, 44, 480-482.

Miller, D. T., & Weinstein, S. M. (1978). Effects of age and self-verbalization on children's ability to delay gratification. Developmental Psychology, 14, 569-570.

Mischel, W., & Patterson, C. J. (1976). Substantive and structural elements of effective plans for self-control. Journal of Personality and Social Psychology, 34, 942-950.

Nam, S. K. (1980). Cognitive-behavioral treatment for students' adaptation to academic major departments and improvement of academic performances. Behavior Therapy, 11, 256-262.

Nichol, G., Cohen, R., Meyers, A., & Schleser, R. (1982). Generalization of self-instructional training. Journal of Applied Developmental Psychology, 3, 205-215.

Novaco, R. W. (1976). Treatment of chronic anger through cognitive and relaxation controls. Journal of Consulting and Clinical

Psychology, 44, 681.

Office of Public Instruction. (1983). Special Education Reference Manual Montana Laws and Rules December 1983. Helena, MT: Author.

O'Leary, K. D. (1968). The effects of self-instruction on immoral behavior. Journal of Experimental Child Psychology, 6, 297-301.

O'Leary, K. D., Becker, W. C., Evans, M. B., & Saudargas, R. A. (1969). A token re .orcement program in a public school: A replication and systematic analysis. Journal of Applied Behavior Analysis, 2, 3-13.

O'Leary, S. G., & Dubey, D. R. (1979). Applications of self-control procedures by children: A review. Journal of Applied Behavior Analysis, 12, 449-465.

Palkes, H. P., Stewart, M., & Freedman, J. (1971). Improvement in maze performance of hyperactive boys as a function of verbal-training procedures. The Journal of Special Education, 5, 337-342.

Palkes, H. P., Stewart, M., & Kahana, B. (1968). Porteus maze performance of hyperactive boys after training in self-directed verbal commands. Child Development, 39, 817-826.

Patterson, C. J., & Mischel, W. (1976). Effects of temptation-inhibiting and task-facilitating plans on self-control. Journal of Personality and Social Psychology, 33, 209-217.

Payne, J. S., & Patton, J. R. (1981). Mental retardation. Columbus, OH: Charles Merrill.

Peters, R. D., & Davies, K. (1981). Effects of self-instructional training on cognitive impulsivity of mentally retarded adolescents. American Journal of Mental Deficiency, 85, 377-382.

Rhode. G., Morgan, D. P., & Young, K. R. (1983). Generalization and maintenance of treatment gains of behaviorally handicapped students from resource rooms to regular classrooms using self-evaluation procedures. Journal of Applied Behavior Analysis, 16, 171-188.

Robertson, S. J., Simon, S. J., Pachman, J. S., & Drabman, R. S. (1979). Self-control and generalization procedures in a classroom of disruptive retarded children. Child Behavior Therapy, 1, 347-362.

Robin, A. L., Armel, S., & O'Leary, K. D. (1975). The effects of self-instruction on writing deficiencies. Behavior Therapy, 6, 178-187.

Rosin, L., & Nelson, W. M. (1983). The effects of rational and irrational self-verbalizations on performance efficiency and levels of anxiety. Journal of Clinical Psychology, 39, 208-213.

Sali, J., & Amir, M. (1970). Personal factors influencing the retarded person's success at work: A report from Israel.

American Journal of Mental Deficiency, 76, 42-47.

Sawin, D. B., & Parke, R. D. (1979). Development of self-verbalized control of resistance to deviation. Developmental Psychology, 15, 120-127.

Schleser, R., Meyers, A. W., Cohen, R., & Thackwray, D. (1983). Self-instruction interventions with non-self-controlled children: Effects of discovery versus faded rehearsal. Journal of Consulting and Clinical Psychology, 51, 954-955.

Shapiro, D. H., Jr. (1978). Instructions for a training package combining formal and informal Zen meditation with behavioral self-control strategies. Psychologia, 21, 70-76.

Siddle, B. G. (1980). Interpersonal problem-solving training with adolescents: A cognitive behavioral approach. Dissertation Abstracts International, 41, 701B.

Skinner, B. F. (1953). Science and human behavior. New York: Macmillan.

Snyder, J. J., & White, M. J. (1979). The use of cognitive self-instruction in the treatment of behaviorally disturbed adolescents. Behavior Therapy, 10, 227-235.

Steele, K., & Barling, J. (1982). Self-instruction and learning disabilities: Maintenance, generalization, and subject characteristics. The Journal of General Psychology, 106, 141-154.

Stevens, R., & Pihl, R. O. (1983). Learning to cope with school:

A study of the effects of a coping skill training program with test-vulnerable 7th-grade students. Cognitive Therapy and Research, 7, 155-158.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. Journal of Applied Behavior Analysis, 10, 349-367.

Surratt, P. R., Ulrich, R. E., & Hawkins, R. P. (1969). An elementary student as a behavioral engineer. Journal of Applied Behavior Analysis, 2, 85-92.

Thorpe, G. L., Amatu, H. I., Blakey, R. S., & Burns, L. E. (1976). Contributions of overt instructional rehearsal and "specific insight" to the effectiveness of self-instructional training: A preliminary study. Behavior Therapy, 7, 504-511.

Varni, J. W., & Henker, B. (1979). A self-regulation approach to the treatment of three hyperactive boys. Child Behavior Therapy, 1, 171-192.

Vygotsky, L. (1962). Thought and language. Cambridge, MA: MIT Press.

Weisman, A. D., & Sobel, H. J. (1979). Coping with cancer through self-instruction: A hypothesis. Journal of Human Stress, 5, 3-8.

Whitman, T. L., Scibak, J. W., Butler, K. M., Richter, R., & Johnson, M. R. (1982). Improving classroom behavior in mentally retarded children through correspondence training.

Journal of Applied Behavior Analysis, 15, 545 564.

Wilson, R. (1984). A Review of self-contro treatments for aggressive behavior. Behavioral Disorders, 9, 131-140.

## Appendices

A. Definitions of Mentally Retarded

B. Interval Recording Sheet

C. Production Formula

D. Raw Data Sheet

E. Reliability Formulas

Appendix A

Definitions of Mentally Retarded

The following definitions of mentally retarded were those by which clients previously had been identified for placement in the sheltered workshop at which the study was conducted:

"Mentally retarded means significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested during the developmental period, which adversely affects a child's educational performance" (Office of Public Instruction, 1983, p. 3).

"Mental Retardation: The essential features are: 1) significantly subaverage general intellectual functioning, 2) resulting in, or associated with, deficits or impairments in adaptive behavior, 3) with onset before the age of 18. The diagnosis is made regardless of whether or not there is a coexisting mental or physical disorder" (American Psychiatric Association, 1980, p. 36).

There are four subtypes of mental retardation, reflecting the degree of intellectual impairment and designated as Mild, Moderate, Severe and Profound. IQ levels to be used as guides for distinguishing the four sybtypes are given below:

| Subtypes of Mental Retardation | IQ Levels |
|---|---|
| Mild | 50-70 |
| Moderate | 35-49 |

Appendix A (Continued)

| | |
|---|---|
| Severe | 20-34 |
| Profound | Below 20 |

Mild Mental Retardation

Mild Mental Retardation is roughly equivalent to the educational category "educable." This group makes up the largest segment of those with the disorder--about 80%. Individuals with this level of Mental Retardation can develop social and communication skills during the preschool period (ages 0-5), have minimal impairment in sensorimotor areas, and often are not distinguishable from normal children until a later age. By their late teens they can learn academic skills up to approximately the sixth-grade level; and during the adult years, they can usually achieve social and vocational skills adequate for minimum self-support, but may need guidance and assistance when under unusual social or economic stress.

Moderate Mental Retardation

Moderate Mental Retardation is roughly equivalent to the educational category of "trainable." This group makes up 12% of the entire population of individuals with Mental Retardation. Those with this level of Mental Retardation during the preschool period can talk or learn to communicate, but they have only poor awareness of social convention. They may profit from vocational training and can take care of themselves with moderate supervision.

Appendix A (Continued)

During the school-age period, they can profit from training in social and occupational skills, but are unlikely to progress beyond the second-grade level in academic subjects. They may learn to travel alone in familiar places. During their adult years they may be able to contribute to their own support by performing unskilled or semiskilled work under close supervision in sheltered workshops. They need supervision and guidance when under mild social or economic stress.

Severe Mental Retardation

This group makes up 7% of individuals with Mental Retardation. During the preschool period there is evidence of poor motor development and minimal speech, and they develop little or no communicative speech. During the school-age period, they may learn to talk and can be trained in elementary hygiene skills. They are generally unable to profit from vocational training. During their adult years they may be able to perform simple work tasks under close supervision.

Profound Mental Retardation

This group constitutes less than 1% of individuals with Mental Retardation. During the preschool period these children display minimal capacity for sensorimotor functioning. A highly structured environment, with constant aid and supervision, is required. During the school-age period, some further motor

Appendix A (Continued)

development may occur and the children may respond to minimal or limited training in self-care. Some speech and further motor development may take place during the adult years, and very limited self-care may be possible, in a highly structured environment with constant aid and supervision. (American Psychiatric Association, 1980, p. 38-4[illegible]).

## Appendix B

### Interval Recording Sheet

10-second intervals

| Minutes | Observe A | Record A | Observe B | Record B | Observe C | Record C | Observe D | Record D |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| 4 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 8 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 12 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 16 | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| 20 | | | | | | | | |

Subject____________________

Date____________________

Observer____________________

Time Start____________________

Time End____________________

Behavior ___On-task__________

Note occurrence within the 10-second interval

X = occurrence

0 = nonoccurrence

T = trainer interaction

Behavioral definitions:

On-task: Engaging in motor task-related actions (e.g. stuffing envelopes, sorting mail, trimming strapping) for entire 10-second interval

Off-task: Engaging in any unassigned activity: leaving work area, remaining idle, playing with task materials, talking, shouting, fighting, kicking, or looking away for more than a 5-second duration from the assigned task

## Appendix C

### Production Formula

The subject's rate of production was calculated based on the production formula used by the sheltered workshop at which the study was conducted:

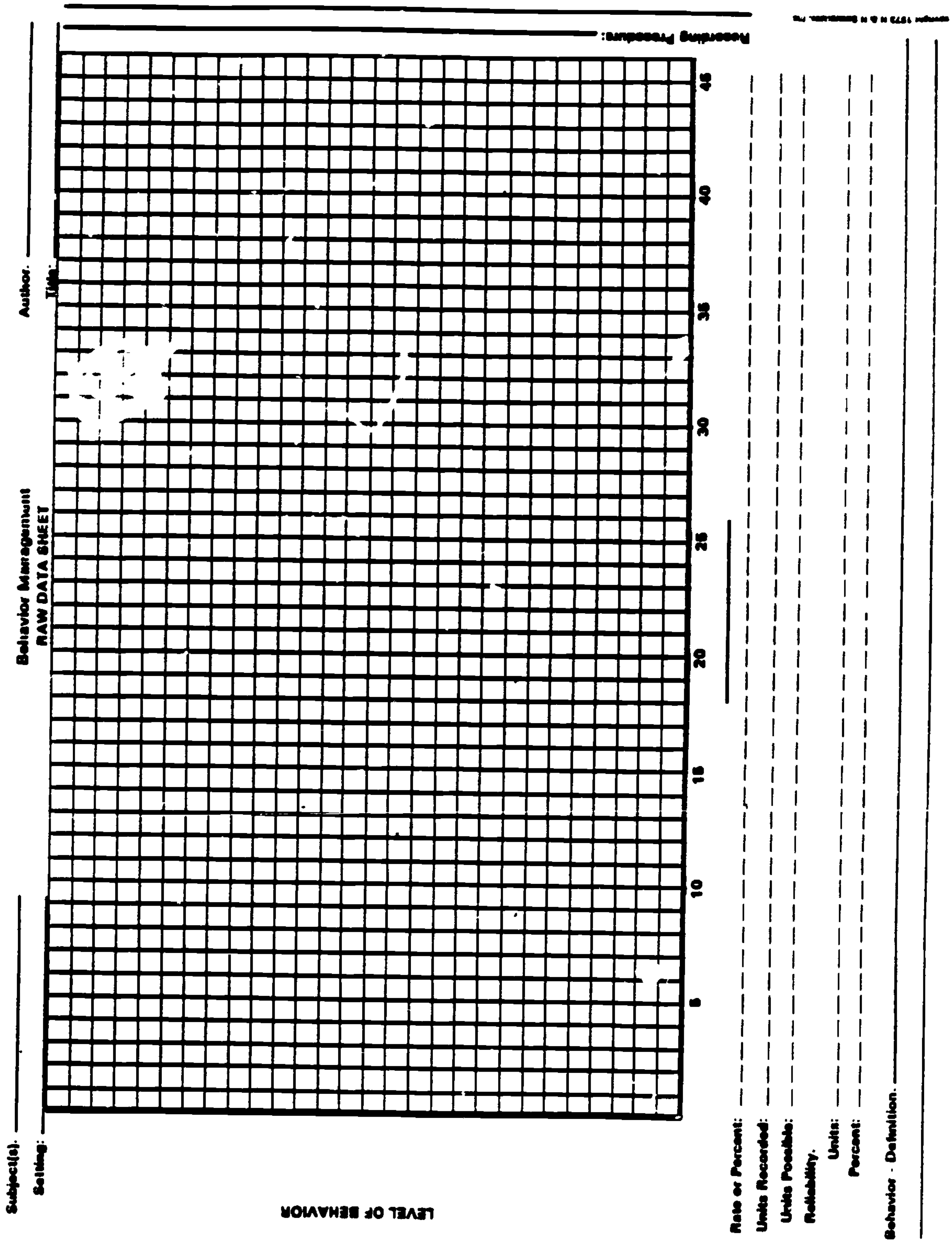
Quantity ÷ Time x 50 ÷ Industrial Standard x 100 = Rate of Production

where

| | | |
|---|---|---|
| Quantity | = | pieces completed |
| Time | = | total time |
| 50 | = | standard hour (based on Department of Labor guidelines |
| Industrial Standard | = | performance of non-handicapped persons as calculated by averaging current rates of production of 3 random non-handicapped workshop employees (e.g. janitor, director, secretary) on individual tasks |
| Rate of Production | = | percent at which client is performing compared to the Industrial Standard (100%) |

## Appendix D

Raw Data Sheet



## Appendix E

### Reliability Formulas

Much research involving applied behavior analyses employs data collected by observers who record the occurrence of responses during short time intervals. Such research assesses the reliability of observations by having two observers simultaneously record the same responses. The two records are compared interval-by-interval to determine the percentage of intervals in which the two observers agree that the behavior did or did not occur. This index might be called overall reliability and is defined by:

$$\text{Overall reliability} = \frac{O_{1\&2} + N_{1\&2}}{T} \times 100$$

where

$O_{1\&2}$ = the number of intervals in which both Observer 1 and Observer 2 record the response as occurring;

$N_{1\&2}$ = the number of intervals in which both Observer 1 and Observer 2 record the response as not occurring; and

$T$ = the total number of intervals for which the two observers' records are compared.

The above index of reliability may be difficult to interpret whenever responses are recorded as occurring in either a large percentage or a small percentage of intervals. The observers

Appendix E (Continued)

might be recording two entirely different but relatively high- or low-rate behaviors, and interval-by-interval comparison of their records would yield many intervals of agreement simply because both are recording some response as occurring or not occurring in most intervals.

Because of these problems, it is recommended that an index of occurrence reliability be computed for very low-rate behaviors and an index of nonoccurrence reliability for high-rate behaviors. The calculation definitions for these indices are:

$$\text{Occurrence reliability} = \frac{O_{1\&2}}{T} \times 100$$

$$\text{Nonoccurrence reliability} = \frac{N_{1\&2}}{T} \times 100$$

Routine methods are available to compare obtained percentages of agreement to agreement that would be expected by a random-chance model. The chance model assumes that the two observers record the response as occurring in the same number of intervals as it is empirically determined to occur. However, the model further assumes that the recording of instances of the response are randomly distributed over intervals. It is then possible to determine whether the empirically determined reliability as obtained by two actual observers is superior to reliability that might be obtained

Appendix E (Continued)

by chance.

Computation formulas for these chance-reliability indices can be deduced from the basic theorems of probability theory for independent events. They are:

$$\text{Chance overall reliability} = \frac{(O_1 \times O_2) + (N_1 \times N_2)}{(T)^2} \times 100$$

$$\text{Chance occurrence reliability} = \frac{O_1 \times O_2}{(T)^2} \times 100$$

$$\text{Chance nonoccurrence reliability} = \frac{N_1 \times N_2}{(T)^2} \times 100$$

where

$O_1$ = the number of intervals in which Observer 1 records the response as occurring;

$O_2$ = the number of intervals in which Observer 2 records the response as occurring;

$N_1$ = the number of intervals in which Observer 1 records the response as not occurring;

$N_2$ = the number of intervals in which Observer 2 records the response as not occurring;

Append. E (Continued)

T = the total number of intervals for which the two observers' records are compared (Hopkins & Hermann, 1977, p. 121-123).