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The Use of Self-Control Procedures with Pre~Adolescents Classified as Educable Mentally Retarded

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THE USE OF SELF-CONTROL PROCEDURES WITH PRE-ADOLESCENTS CLASSIFIED AS EDUCABLE MENTALLY RETARDED

by

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ABSTRACT

The Use of Self-Control Procedures with
Pre-Adolescents Classified as
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by

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The effectiveness of self-recording and self-reinforcement procedures implemented in the classroom setting with six pre-adolescent children classified as Educable Mentally Retarded was determined relative to changes in on-task behavior. A multiple baseline design was used and each subject was exposed to both a self-recording procedure and a self-reinforcement procedure. After an initial baseline period, three subjects were exposed to self-recording first, and three subjects went through self-reinforcement first. Contingent reinforcement was not provided for accuracy in either self-recording or self-reinforcement patterns. Observations were conducted to investigate generalization effects of each procedure, and two weeks of follow-up observations were conducted to determine durability effects. The findings indicated that for five of the subjects the self-recording procedure and the self-reinforcement procedure were

effective in fostering significant positive increases in on-task behavior. Regarding accuracy, without contingent reinforcement, three of the subjects demonstrated at least 70% agreement with observer recordings during self-recording phases, and four subjects demonstrated at least 70% agreement with observer recordings in their self-reinforcement pattern. Generalization effects were found with two of the subjects, and maintenance effects were evident with one subject. A combined treatment approach, presenting both procedures simultaneously, was implemented with three of the subjects after the study was completed. These results indicated that the combined approach was not more effective than the singular presentation approach taken in the main study. Suggestions were made for future refinements in self-control procedures to increase applicability with special population.

(156 pages)

INTRODUCTION

The success of implementing behavior modification techniques which focus on the use of external agents in special education classrooms has been well documented (Kurtz & Neisworth, 1976). The external agents generally define the target behaviors and control and dispense the reinforcement contingencies. Bandura (1971) suggests that the emphasis on external control appears to be extrapolated from procedures used in infrahuman research which, out of necessity, rely on external agents. In the literature, the implementation of self-control procedures has received emphasis as a viable behavioral control technique only in recent years (McLaughlin, 1976).

Kazdin (1975) has discussed disadvantages of using external agents to control behavioral contingencies, such as: (a) in group settings, the accuracy of observing the behavior and correctly dispensing reinforcement often suffers because of the time expenditures necessary for other participating group members; (b) the individual dispensing the contingencies may become a discriminative stimulus for desirable performance, and, therefore, the target child may not emit the desired behavior when the specific agent is absent; and (c) the child may discriminate the presence and absence of different contingencies and behave accordingly.

In proposing an alternative to the use of external agents, Kazdin (1975) suggests that the goal of behavior modification should be to teach the individual to control his/her behavior. Thorensen and Coates (1976) state that self-control should be a goal not only of behavior modification techniques, but also of education and the end product of the socialization process.

Cautela (1969) discussed advantages of teaching self-control procedures, which included the following: (a) more trials can occur with self-control procedures within a given time period because of the shorter time needed for the subject to go through the procedures himself rather than relying on an external agent to implement the procedures, thereby allowing for more rapid acquisition of desirable behaviors and decreasing the probability that undesirable behaviors will occur; (b) the individual's perception of his ability to cope with his environment becomes more positive because of the increased number of responses he has learned; (c) self-control techniques can be taught to a large number of individuals at one time in a group; (d) any reoccurrence of the undesirable behavior(s) can be quickly recovered, if the individual initiates self-controlling responses; and (e) self-control behavior is likely to be maintained in the natural environment. Furthermore, Lovitt and Curtiss (1969) suggest that the individual will tend to perform the positive target behavior more frequently when he has played an active role in implementing and carrying out the program.

As discussed by Cautela (1969) the major disadvantage of implementing self-control procedures is that the individual may reinforce himself for emitting inappropriate behaviors. Therefore, undesirable behavior patterns could emerge.

Bandura and Perloff (1967), Glynn, Thomas and Shee (1973), and McLaughlin (1976) specify four major components of self-control behavior. The first component, self-assessment, refers to the individual's decision as to whether or not he has performed a specific behavior that has previously been selected. In self-recording, the second component, the individual objectively records the frequency of his performance of the specific behavior. In the third component, self-determination of reinforcement, the individual determines the type and amount of reinforcement he should receive contingent upon his performance of the behavior. Finally, in the self-reinforcement component, the individual dispenses his/her own reinforcement (which may or may not be self-determined) contingent upon his/her performance of the specific behavior.

As McLaughlin concludes, the research in the area uses any one or more of these components when implementing self-control procedures. However, it appears that the components could be combined for simplification purposes. For example, the definition of self-recording encompasses an assumption of some type of self-assessment, and it would, therefore, be expedient to include self-assessment in the self-record component. With regards to self-determination of reinforcement, as will be clarified in the review of studies in this paper, the

experimenters have generally defined the type of reinforcers available to the subjects, and characteristically placed limits on the total amount of reinforcement available during a given session. Therefore, self-determination of reinforcement does not appear to be distinctive from the self-reinforcement process. In this study and in the studies reviewed in the literature, self-recording and self-reinforcement will be considered the two major components of self-control behavior.

The population of the study included pre-adolescents classified as Educable Mentally Retarded. Therefore, the research papers reviewed implemented self-control procedures with individuals (identified as intellectually and/or emotionally handicapped) and/or individuals from preschool age through adolescence.

Many of the studies reviewed implemented self-control procedures only after the subjects had been initially exposed to external behavioral control procedures. Also, few of these studies implemented both the self-record and self-reinforcement components of self-control with the same subjects. For example, in studies by Bolstad and Johnson (1972), Fixsen, Phillips and Wolf (1972), Santogrossi, O'Leary, Romanczyk, and Kaufman and O'Leary (1972), only the self-record component was used. Generally, significant positive behavior changes were obtained using the self-record component. Glynn (1970), Johnson (1970), Lovitt and Curtiss (1969) and Masters (1972) used self-reinforcement procedures to demonstrate the efficacy of self-control procedures. The findings indicated that self-reinforcement procedures produced significant

behavior changes. Of the few studies implementing both components (Glynn, Thomas & Shee, 1973); McLaughlin & Malaby (1974), self-recording was introduced initially before adding the self-reinforcement component, therefore resulting in a combined presentation approach. Therefore, the results obtained with these studies were confounded by the use of both components implemented simultaneously.

It appears that using either the self-record or the self-reinforcement component, or a combined presentation approach following the implementation of external control procedures, can significantly effect behavior changes. The research reviewed has not addressed the question of whether self-recording or self-reinforcement implemented with the same subject is more effective in promoting changes in behavior in terms of the time needed for acquisition and regarding the durability of the behavior changes.

Broden, Hall and Mitts (1971), Felixbrod and O'Leary (1973), Glynn (1970), Glynn and Thomas (1974), Kunzelmann (1970) and Spates and Kanfer (1977) used either one or both components of self-control presented in a combined fashion without introducing the subjects initial to an external control system. The results obtained in these studies indicated that self-control procedures were effective in fostering positive behavior changes with "normal" subjects ranging in age from six to 15 years. Also, Bandura and Kupers (1964) and Liebert and Ora (1968) implemented the self-reinforcement component of self-control

without the prior use of external control, but rather used adult models in an attempt to influence subject self-reinforcement practices. Their results indicated that modeling had a facilitative effect on the acquisition of various self-reinforcement patterns.

Glynn and Thomas (1974) appeared to be the only authors who expressed concern regarding the durability and generalization of the behavior changes that occurred as a result of implementing self-control procedures. Although they did not plan follow-up observations to check durability effects, nor did they probe for generalization effects, they suggested that durability and generalization observations be undertaken in subsequent research.

There is a dearth of self-control research concerned with implementing self-control procedures with persons classified as mentally retarded (Kurtz & Neisworth, 1976). According to Mahoney and Mahoney (1976), mentally retarded individuals are generally dependent on other adults, especially parents and professionals, to help them conduct many of their routine daily activities. This is costly in both time and money expenditures, and encourages further dependency of the individual on external agents. Mahoney and Mahoney speculate that implementing self-control techniques with mentally retarded individuals may help decrease the dependency relationship and increase the probability of mainstreaming these individuals into various areas of "normal" living, although this has remained a relatively unexplored area of research (Kurtz & Neisworth, 1976; Lawrence & Winschel, 1975).

Fagen and Long (1976) state that the emphasis in special education should be on preventative programs rather than crisis intervention, which has been the focus of many existing special education programs. Fagen and Long suggest that one of the primary ways to foster the prevention of behaviors which are handicapping, including dependent and inappropriate behaviors, is to develop curriculum in which the main impetus is teaching the retarded individual self-control techniques. In this type of educational environment, according to Lawrence and Winschel (1975), the opportunities for success and failure would be realistically available rather than artificially contrived and controlled. The individual would perceive that his expenditure of effort, rather than the effort of outside others, is directly responsible for the results obtained, thereby facilitating adjustments to the "normal" environment.

Of the studies reviewed, only Knapczyk and Livingston (1973) and Nelson, Lipinski and Black (1976) used subjects classified as mentally retarded. Both studies used the self-record component of self-control. Knapczyk and Livingston's 13 subjects were 12 to 14-year-old individuals classified within the Educable Mentally Retarded range. Nelson, et al. conducted two separate experiments with 27 adolescents and adults who ranged intellectually from the lower end of the trainable mentally retarded range to the upper limits of the educable mentally retarded range.

In the Knapczyk and Livingston study, the subjects received teacher-determined reinforcement contingent upon their self-recordings of the accuracy with which they completed reading assignments. The results indicated that the combination of teacher-determined reinforcement and self-recording resulted in high rates of reading performance. Also, educational activities appeared to be reinforcing for the subjects in this study. Unfortunately, the authors did not use the self-record component in isolation to determine if self-recording alone could have a positive effect on behavior without the use of external controls.

Nelson et al. implemented the self-recording component in isolation in both of their experiments. The results of these experiments indicated that self-recording significantly increased the frequency of a positively defined behavior. The authors also compared the reliability of subject self-recordings in both experiments with the relaibility of "normal" subject self-recordings in previous studies they conducted. The subjects proved to be as accurate in their self-recordings as the "normal" subjects. However, Nelson, et al. did not clearly specify their one session self-record training procedures, which included modeling and providing feedback to the subjects, therefore making examination and replication of the training procedures impossible.

Although the results of the Knapczyk and Livingston and Nelson et al. studies were optimistic, in that individuals classified as mentally retarded were successfully taught self-recording procedures

with a resulting significant increase in desirable behaviors, their findings are only preliminary in light of the limited number of self-control studies conducted with this special population, the diversity of the intellectual abilities of the subjects who participated in the studies, and the use of only older subjects in both studies. Also, the effectiveness of implementing self-reinforcement procedures has not been successfully demonstrated.

Statement of the Problem

It has been postulated that self-control procedures have many practical advantages over the use of externally controlled techniques in effecting behavioral changes. The two major components of self-control appear to be self-recording and self-reinforcement. A number of studies have demonstrated that implementing one of these components can result in significant behavior changes. A few of the studies reviewed used both components of self-control in their research. These studies combined the components during implementation to demonstrate the efficacy of the procedures. One study (Spates & Kanfer 1977) demonstrated that adding the self-reinforcement component to self-recording did not significantly effect the behavior changes already obtained by introducing self-recording alone. Therefore, in the research reviewed, a systematic attempt was not undertaken to introduce the two components separately to the same subject(s). Doing so could prove to be an efficient way to collect data on each major self-control technique. Also, from such data it might be possible to determine

which of these techniques was more effective in producing behavior changes with the same subject.

Many of the studies cited exposed the subjects to externally controlled procedures before implementing self-control procedures. Self-control procedures were used successfully by only a few researchers without the prior introduction of externally controlled techniques.

Systematic observations for durability or maintenance effects resulting from the implementation of self-control procedures were not undertaken in the studies reviewed in this paper. Neither were there observations conducted to determine possible generalization effects of the established behavior changes to other situations outside of the experimental setting. Information relative to durability and maintenance effects could be readily gathered by planning systematic observations as a part of the experiment.

As has been suggested by several authors, self-control procedures present a viable alternative to external control techniques with individuals who are identified as mentally retarded. Of the studies presented, only two implemented self-control procedures with this special population, and neither study used pre-adolescents within this population.

Using pre-adolescent age persons is desirable, especially since these individuals are in classroom situations where the acquisition of self-control techniques would be useful during times in

the school day when they are requested to work independently and cannot receive individualized attention. Furthermore, it may be that learning self-control techniques early in life can positively alter work habits and may have a positive effect in terms of the individual's feelings of independence.

In one study cited using mentally retarded individuals, self-recording procedures were combined with the use of externally controlled contingencies. In the other study using this population, the self-recording training procedures were ambiguously presented, therefore not allowing for replication. From the literature reviewed, it became apparent that self-reinforcement procedures have not been systematically implemented with mentally retarded individuals. Therefore, from the literature reviewed, it became apparent that the next logical direction of self-control research would be to implement these procedures with pre-adolescents classified as mentally retarded. The implementation of both self-recording and self-reinforcement procedures introduced separately with the same subject would provide information relative to the efficacy of each procedure. Finally, the investigation of durability and generalization effects would appear to be useful especially in considering critical components of these procedures that may foster these effects.

Purpose

The purposes of this study were to determine whether pre-adolescents classified as Educable Mentally Retarded:

1. Could be taught to self-record their behavior, as measured by an increase in the defined target behavior, and whether these individuals were accurate in their self-recordings as measured by the overall percent agreement between the recordings of the subjects and recordings of the observers.
2. Could be taught a self-reinforcement procedure as measured by an increase in the defined target behavior, and the percent agreement between the occurrence of the target behavior as recorded by the observers and the subject's self-reinforcement behavior during each recording interval of every self-reinforcement session.
3. Demonstrated differences between and across subjects in the occurrence of the target behavior after exposure to self-recording and self-reinforcement procedures, as measured by by the occurrence of the target behavior during each treatment phase.
4. Maintain the behavior changes established during treatment implementation after being taught self-control procedures, as measured by the occurrence of the target behavior during systematic observations conducted for each subject after the procedures have been terminated.
5. Generalize the behavior changes established during treatment implementation after being taught self-control procedures, as measured by data obtained from systematic observations conducted

during times other than experimental session times, noting the occurrence of the target behavior.

REVIEW OF RELATED LITERATURE

The review of literature which follows has been limited to provide information directly relevant to the use of self-recording and self-reinforcement procedures with young and/or special individuals identified as intellectually or emotionally handicapped. This review will provide a synopsis of self-control procedures within this framework, considering theoretical and methodological issues of definition and treatment.

Definition of Self-Control Behavior

Skinner (1953, 1974) defines self-control as "a procedure in which an individual makes a controlling response that alters the probability of the occurrence of another controlled response." Cautela (1970) defines self-control as an example of self-imposed behavior modification. More specifically, Powers and Osborne (1976) state that self-control occurs when the subject responds to his own behavior in a systematic manner, thereby producing changes in that behavior. Therefore, at the present time the definitions of self-control behaviors appear to be very broad and encompass almost any response that the individual emits. The definition by Powers and Osborne appears to be the most inclusive, and will, therefore, be adopted as the major definition of self-control in this paper.

According to Goldiamond (1976) attributing change to self-control alone may neglect the impact of external factors that may be influential

in the procedure. Kanfer and Karoly (1972), Mahoney (1976) and Thorensen and Wilbur (1976) point out that self-controlled behaviors do indeed exist, even though the relative influences of self and environmental control factors in behavioral change are difficult to discriminate.

Self-control behaviors can occur in the following contexts: (a) situations where reward is delayed (Bandura & Walters, 1963; Kanfer, 1970b; Kazdin, 1975; Lopatto & Williams, 1976; Premack & Anglin, 1973); (b) situations where a desired goal is not accessible (Bandura & Walters, 1963); (c) situations where temptation exists to engage in undesirable behaviors (Bandura & Walters, 1963; Kanfer, 1970; Lopatto, 1976; Premack & Angline, 1973); and (d) situations in which the individual sets his own performance standards and rewards himself contingently (Bandura & Walters, 1963). In the study proposed in this paper, self-control techniques will be examined in situations in which temptation exists and where the individual sets his/her own performance standards and rewards himself/herself contingently.

The Use of Self-Control Procedures with Other Reinforcement Techniques

Many of the studies conducted in the self-control area have implemented the self-record and/or the self-reinforcement component(s) of self-control after the subjects have been exposed to externally controlled behavior modification techniques. In these studies, the contingencies were externally controlled initially and these controls were either systematically faded until independent self-control was

obtained as suggested by Homme (1976), or external control conditions were alternated with phases in which the subjects engaged in self-recording and/or self-reinforcing.

Of the studies reviewed that implemented external control procedures first, several used only one of the two major components of self-control. For example, Johnson (1970) studied self-reinforcement procedures with first and second grade children. Externally controlled reinforcement procedures were used initially to increase the frequency of attending skills with all subjects. One group of subjects was then taught the self-reinforcement procedures. The other group of subjects continued with the externally controlled reinforcement procedures and were not exposed to self-control procedures. The exact self-reinforcement training procedures given to the one group were not presented clearly in the paper. The subjects were simply told to reward themselves, if they felt it was appropriate, when they heard an auditory signal. The results indicated that the self-reinforcement procedures maintained the levels of desirable behavior (academic performance) established under external contingency control. Both the self-reinforcement group and the external control group were approximately equivalent in terms of academic performance.

Lovitt and Curtiss (1969) alternated the use of teacher-imposed and self-imposed reinforcement contingencies with one 12-year-old subject who was enrolled in a class for emotionally disturbed children. In both

conditions, points were used that were later traded for tangible reinforcers. The precise self-reinforcement procedures were not specified in their paper. The results indicated that during self-imposed contingency phases the subject demonstrated higher rates of academic performance than under the teacher-determined phases. This difference occurred even in later phases when the teacher imposed reinforcement criteria matching the criteria chosen by the subject. The contingency manager, rather than the actual contingencies, appeared to be the critical manipulation. Therefore, in the two studies cited, self-reinforcement procedures were effective in maintaining the behavioral gains achieved with external contingency control.

Liebert and Ora (1968) studied the effects of modeling and altering the desirability of external reinforcers on self-reinforcement standards with 8 to 10-year-old subjects. The procedures involved exposure to various self-reinforcement standards as demonstrated by the adult model, and the use of highly desirable or less desirable reinforcers. Therefore, the subjects initially observed the model rewarding himself with tokens to buy various reinforcers, and then rewarded themselves for their own behavior in a similar manner. The results indicated that as the desirability of the reinforcers increased, the adherence to modeled standards of self-reinforcement increased. Therefore, modeling and the desirability of the reinforcers appeared to facilitate the acquisition of self-reinforcement behavior.

Bandura and Kupers (1964) also studied the acquisition patterns of self-reinforcement practices via the imitation of modeled criteria. Their study employed both adult and child models with 7 to 9-year-old subjects. In addition to modeling reinforcement criteria, the models also demonstrated self-evaluative verbal statements (positive or negative statements about their performance). The results of this study indicated that patterns of self-reinforcement were acquired through modeling with and without the use of reinforcement from external gains. That is, the children in this study closely copied both the extrinsic and covert reinforcement patterns of the model, especially the adult models. From both studies cited, it appears that modeling procedures combined with extrinsically controlled tangible or covert reinforcement practices facilitated the acquisition of self-reinforcement behavior in young subjects.

Bolstad and Johnson (1972) investigated the effects of external control and self-recording on the disruptive behavior of 6 to 8-year-old children. The subjects were initially exposed to a token economy system to decrease the rate of their disruptive behaviors as identified by their teachers. Some of the subjects were then taught to record their own disruptive behaviors. The self-record training phase continued until 75% agreement was reached between the recordings of the subject and the recordings of a trained observer. The teacher explained the definition of the disruptive behaviors to each of the subjects. Self-recordings were compared to recordings made unobtrusively

by the observers to compute accuracy. Points were distributed, contingent upon the accuracy of the self-recordings. Accuracy checks were faded and points were distributed solely on the basis of the data obtained from the self-recordings by the end of the experiment. The results indicated that the self-record group tended to be more successful than the externally regulated group in decreasing the frequency of disruptive behaviors. During an extinction phase, the self-record group demonstrated the smallest increase in disruptive behaviors. The authors also found that first and second grade children were accurate in recording their own behaviors with a minimal amount of training, even after the contingency fading procedure. The self-record group did impose less stringent performance criteria for reinforcement than the criteria selected for the external control group, which may have influenced the results obtained.

Santogrossi et al., (1973) also combined the use of a token economy system with the later introduction of self-recording procedures. They used nine subjects, all of whom resided in a psychiatric hospital setting. The rules of the classroom were posted in the front of the room. The teacher discussed the positive merits of self-recording with the subjects. After the experimental session, each subject was required to announce the results of his/her self-recordings to the other class members. The results indicated that during the self-recording phase the subjects tended to overrate their performance, and the frequency of the desired positive behaviors previously established with the token

economy system decreased significantly. The token system had to be reintroduced in order to establish the behavioral gains previously made. Therefore, the self-recording procedures were not as effective as in the Bolstad and Johnson (1972) study in maintaining obtained behavior changes. The authors suggested reasons for the failure of their study to produce successful results: (a) the subject's knowledge that in the self-record phase tangible reinforcers would be received, even though inaccurate ratings occurred; and (b) the subjects indicated that they were generally unwilling, and therefore unmotivated, to participate in the self-recording phase of the experiment.

Two studies used both major components of self-control after introducing the subjects to external control procedures. Kaufman and O'Leary (1972) initiated self-control procedures which involved both self-recording and a self-behavioral rating. The subjects of this study were adolescent patients of a psychiatric residential treatment facility. The resulting data were exchanged with the teacher for tokens. The self-control procedures were implemented directly after the teacher-controlled token economy. The results obtained indicated that self-recording and self-reinforcement procedures maintained the rate of desirable behaviors achieved when the token economy was used. Therefore, both components of self-control were successfully used with contingent tangible reinforcers to prevent the cessation of desirable behaviors as a result of withdrawing externally controlled contingencies.

McLaughlin and Malaby (1974) conducted a study with sixth grade children in which a token economy system was initially implemented to increase assignment completion. During the next experimental phase, all subjects were required to record their own behaviors and to award themselves privileges contingent upon their recorded behavior. The results indicated that self-recording and self-reinforcement procedures were effective in maintaining the rate of assignment completion established with the token system.

Glynn et al., (1973) used both major components of self-control with 6 to 8-year-old subjects after the subjects were exposed to external contingencies. During self-recording, the teacher gave brief instructions to the subjects and also described the on-task behaviors. The subjects recorded the presence or absence of on-task behaviors on a data recording card. An auditory signal every ten seconds signalled recording time to the subjects. The subjects were told by the teacher to reward themselves with points on the basis of the self-recording, with each point being worth one minute of free time. Overall, both external and self-control procedures were successful in effecting high rates of on-task behaviors. However, when the authors examined individual subject data they found that for almost half of the subjects, self-control tended not to be as effective as external control. Therefore, under the self-control phases on-task behaviors were somewhat less frequent than under external control phases for some of the subjects.

The results of the studies reviewed in this section generally indicate that the initial use of external control contingencies with the later introduction of one or both of the major components of self-control is effective in maintaining the behavior changes that have been established.

In the studies cited that implemented both self-recording and self-reinforcement procedures, the procedures were presented in combination. Therefore, statements regarding which component is more effective or efficient cannot be made from the research reviewed. The question of whether self-control procedures can be effective when introduced without external control techniques will be discussed in the next section of this paper.

The Use of Self-Control Procedures as the Primary Reinforcement Technique

There has been little research in classroom settings examining the usefulness of self-control as the primary behavioral control technique. Glynn (1970) compared self, experimenter and chance determined token reinforcement groups of 15-year-old subjects to a control group to increase academic performance. The subjects in the self-determined reinforcement group were told to decide how many tokens they had earned during the experimental session and to reward themselves accordingly, with a limit of five tokens possible during a given session. The subjects placed the tokens in an envelope so that the tokens were dispensed in

secrecy. In the other groups, either the experimenter determined the number of tokens, a random number of tokens were assigned, or no tokens were distributed. Tokens were exchanged for prizes at the end of each session. The results indicated that the self-determined and experimenter-determined conditions were equally effective in increasing academic performance, as measured by the results of a pre and posttest in the academic areas. When the tokens were withdrawn, the three treatment groups performed better than the control group. The superiority of self-determined and experimenter-determined reinforcement systems over chance and no-token conditions was demonstrated.

Broden et al. (1971) implemented self-control procedures without the prior exposure to externally controlled reinforcement. Two experiments were conducted in the classroom. In Experiment I, the effects of self-recording on the study behavior of an eighth grade girl were examined. The subject was given directions on how to use a tally sheet to record the frequency of both her disruptive behaviors and her on-task behaviors. Self-recording was effective in significantly increasing this subject's on-task classroom study behaviors, as supported by observations by a hidden observer. It was noted that although subject and observer agreement on the occurrence of the disruptive behaviors was generally high, the agreement between self and observer recordings of on-task behaviors was comparatively low, although the on-task behaviors occurred at a high rate for the subject. Teacher praise for appropriate study behavior was later introduced with the same subject

after self-recording was discontinued. Teacher praise was found to be as effective as self-recording in terms of an increase in on-task behaviors. The authors noted that the subject verbalized a strong desire to increase her study behavior at the onset of the experiment, and her positive motivation may have fostered the positive results obtained.

In a second experiment, Broden et al. used another eighth grade subject. This subject appeared to be significantly less motivated to change his behavior as indicated by negative verbalizations. The subject was instructed to record the frequency of talking-out. Teacher praise was not used with each subject. The results indicated that self-recording was initially successful in decreasing talking-out behavior with this subject, however, after a reversal procedure the behavior did not recover to its previously established level. The treatment phases of this experiment were relatively short (less than ten sessions) and longer exposure to each of the conditions (self-recording and extinction) may have produced more positive results. Also, the poor motivation of the subject to change may have adversely effected the results.

Felixbrod and O'Leary (1973) compared the use of self-determined and externally imposed reinforcement standards with second grade children. The self-dtermined reinforcement and externally controlled reinforcement groups were yoked in terms of the amount of reinforcement given for desirable behavior (correct computation of math problems and on-task

behaviors). That is, the externally imposed contingencies matched the contingencies selected by the self-reinforcement group. The results indicated that the two groups performed similarly and significantly better than a control group. It was noted that as the number of sessions increased, the criteria for reinforcement set by subjects in the self-reinforcement group diminished, therefore requiring decreasing levels of performance to obtain reinforcement.

Kunzelmann (1970) reported a case study in which the effects of self-recording on whining behavior were examined. Kunzelmann developed a "countoon" for use with the young subject. The "countoon" consisted of a sheet of paper on which the following components were contained: (a) pictures showing the target behavior; (b) a column of numbers from which the subject was told to circle one number each time he emitted the behavior depicted; and (c) a "what happens" column depicting what would happen as a consequence when the behavior occurs. Although the results indicated that the self-recording procedure, using the "countoon", as the simplistic data sheet, was successful in completely eliminating whining behavior in a relatively short time. Reversal procedures were not used, and therefore the results obtained are tentative. In an attempt to simplify the "countoon", the "what happens" consequence column could possibly be eliminated so that only the picture of the defined target behavior and the column of numbers denoting the occurrence of the behavior remain.

Glynn and Thomas (1974) investigated the effectiveness of self-control procedures using third grade children, identified by their teacher as having poor attending skills. The study implemented both self-recording and self-reinforcement procedures. The subjects received verbal instructions from the teacher regarding the procedures and the definitions of on-task behaviors. The children were periodically presented with an auditory "beep" which signalled the time at which each subject was to record whether he/she was on task. As a cueing device, a brief written description of the defined on-task behaviors was posted in the front of the classroom on a large chart in a later phase of the experiment. The subjects in the study worked for external reinforcers (points that could be traded for free time), although the precise contingencies were under subject control. The results obtained indicated that when self-recording procedures were supplemented with continuous cueing from the posted chart describing the behaviors, high stable rates of on-task behavior were achieved. Therefore, with this limited population, a demonstration of the successful acquisition of self-recording procedures was achieved without previous experience experimentally with external reinforcement procedures. The teacher discontinued the self-recording after the experiment was terminated. Although a systematic follow-up observation was not undertaken, during an informal classroom observation taken two weeks after the experiment was concluded, on-task behaviors appeared to have decreased dramatically in all of the participating subjects. According

to informal observations, generalization effects were not found with on-task behaviors to situations or times outside of the experimental session.

Spates and Kanfer (1977) presented the only study reviewed in which the two major components of self-control were not implemented simultaneously, therefore allowing for some comparison of the efficacy of the components. The subjects in the study were six to seven years of age, and the purpose of instituting the procedures was to increase mathematics performance. During self-recording phases, participating subjects were told by the experimenter that as they worked each math problem they were to announce what numbers they were working with. The subjects who were assigned to the self-reinforcement group were told to simply announce whether their answer was correct or incorrect (the paper did not discuss how this was determined). For some of the subjects, a criterion setting component was added to self-recording or self-reinforcement. These subjects were given either the self-record or self-reinforcement instructions and were then told to say aloud exactly how they were working through each problem; for example, which numbers they were to add first, etc.. The results obtained indicated that only when the criterion setting component was introduced, a difference occurred in the performance of the self-recording or self-reinforcement group compared to a no-treatment control group. Since the criterion component was the critical variable, and not the self-control technique, there was no statement made relative to whether

and provided a rationale to the subjects as to why it would be desirable to change their behaviors. Modeling, practice, and verbal feedback were used during self-recording training. The specifics of the training procedures were not discussed. The subjects recorded their behaviors on index cards and were told that reinforcers would be given for accuracy in their recordings. The subjects recorded the frequency of three target behaviors; one defined as being a positive behavior, which the subjects were told that it would be desirable to increase; one neutral behavior; and one negative behavior, which they were told would be desirable to decrease in frequency. The subjects received social reinforcement from the teacher for accuracy in their recordings, in addition to tangible reinforcers for accuracy. Accuracy was determined by comparing self-recordings with observer recordings. The results indicated that the positively defined behavior increased in frequency as a result of self-recording, the neutral behavior decreased in frequency, and the behavior defined with a negative value was unchanged. Therefore, self-recording did not produce consistent effects with the various target behaviors. The authors noted that when compared with reliability rates obtained in several studies using "normal" adolescents and young adults, the subjects in their study were as accurate in their self-recordings. They conclude that using self-recording procedures was feasible and effective with special individuals.

In a second experiment, Nelson et al. used a different population of adults similarly classified as mentally handicapped. The experimental

phases alternated for each subject between an externally controlled token economy system and a self-recording procedure. Specific training techniques were not discussed in the paper. Self-recording introduced alone significantly changed the three target behaviors (similar to the procedure used in the first experiment) in the desired direction, in fact more effectively than the externally controlled token system.

Knapczyk and Livingston (1973) examined the effectiveness of using self-recording procedures with adolescents classified as educable mentally retarded. The purpose of the procedures was to increase the subjects' reading performance. Initially a token economy system was implemented to increase reading performance. The subjects were then instructed by the teacher to enter their performance (percentage of correct responses) in a record book. They were also told that they would earn free time with various educational activities based upon these self-recordings. The results indicated that self-recording was effective in maintaining the increased reading performance rates achieved with the token economy system. Furthermore, educational activities were found to be reinforcing with these subjects.

Therefore, the results of the studies by Knapczyk and Livingston, and Nelson et al., using subjects classified as mentally retarded, were optimistic regarding the implications for implementing self-recording procedures effectively with special populations. The question of whether self-reinforcement would be effective with this population remains to be answered in the research. More studies are warranted

in this area, especially research in which training procedures are clearly stated so that replication can occur and revisions made in the procedures. The studies cited used subjects who were either adolescents or young adults, seriously limiting statements that can be made from the findings regarding the efficacy of teaching self-control procedures to younger subjects classified as mentally retarded. Therefore, the feasibility of using self-control procedures with young individuals classified as mentally retarded has remained a relatively unexplored area of investigation.

Accuracy of Self-Recording Behavior

Nelson et al. (1974) have pointed out that self-recording implemented alone may result in desired behavior changes, which has been demonstrated in some of the findings discussed in this paper. McLaughlin (1976) emphasizes the need for developing clear and simplistic behavioral definitions and self-recording procedures to facilitate the positive effects of implementing self-recording.

Kanfer (1970a) states that the accuracy of subject self-recordings depends upon one or more of the following factors: (a) the subject's motivation and commitment to change; (b) the availability of reinforcement for accurate self-recording; and (c) the subject's skill level in self-recording, which is dependent at least partially on the simplicity of the self-recording task and the clarity of the training procedures.

Lipinski and Nelson (1974) examined the accuracy of self-observations with college students. Self-recordings were compared during phases in which the subjects were aware that their recordings were being checked for accuracy by trained observers, and phases when they were unaware that they were being monitored by observers. The results indicated a significant decrease in the accuracy of subject self-recordings during the phase when they were unaware of accuracy checks.

Fixen et al. (1972) studied the accuracy of 14-year-old boys in recording their behaviors compared to recordings made by a peer regarding the subject's behavior. Observers checked the accuracy of both self and peer recordings. The results indicated that neither self nor peer recordings were accurate when compared to the observations made by the observers. Furthermore, neither self nor peer recordings had any observable effects upon changing the subjects' behaviors. In a second experiment by these authors with the same subjects, points were distributed contingent upon accuracy between self and peer recordings. The points were traded for tangible reinforcers. This tactic significantly increased the accuracy of both the self and the peer recordings, however, no systematic changes were observed in the subjects' behaviors.

Epstein and Miller (1976) used self-recording techniques with adults and found that the accuracy of self-recordings significantly decreased when the subjects were asked to engage in a concurrent task

that required their attention. These results suggest the importance of having minimal outside distractions while the subject is involved in self-recording.

The studies reviewed indicate that the accuracy of self-recordings may not be related to the success of the behavior changes that occur. It has been documented that behavior changes occur even though subject self-recordings were inaccurate. Also, even when the recordings are accurate, the target behavior may not change. Therefore, the role of accurate self-recording in behavioral change remains ambiguous and has not been clearly established.

Durability and Generalization of Self-Control Behavior

In the studies reviewed earlier in this paper, the durability of the behavior changes achieved by implementing self-control techniques has not been systematically examined. The study cited by Glynn and Thomas (1974) appears to be one of the only studies to address the question of behavioral durability. The results of an informal two-week follow-up observation by Glynn and Thomas indicated that the changes that occurred during the self-recording phase of the experiment had all but disappeared when the procedures were terminated. Glynn and Thomas point to the need for planned systematic follow-up observations in future research. Also, in the numerous studies reviewed, generalization probes were not undertaken. Therefore, data did not exist relative to the question of whether the behavioral changes achieved generalized to situations/times outside of the experimental setting.

METHOD

Subjects

Six pre-adolescent-age individuals classified as Educable Mentally Retarded according to Utah State guidelines (see Appendix A) on the basis of an educational/psychological evaluation served as subjects. The children selected for inclusion in the study had all been given standardized intelligence tests by school psychologists. Although specific test scores were not reported for three subjects, the range of intelligence quotients reported for the other three subjects were from 70 to 73. The subjects ranged in age from 7.7 to 9.8 years when the study began, and were generally from middle class rural families.

All participating subjects were selected from an Educable Mentally Retarded classroom containing a total of 11 children in Cache County, Utah. This classroom was selected after preliminary investigation by the investigator because, in comparison to other Educable Mentally Retarded classrooms in the geographic area, this class had more pre-adolescent-age students, and according to teacher reports the students had not been exposed to self-recording or self-reinforcement techniques in the classroom setting previous to the study. The teacher also indicated that the students in her class were used to having "visitors" in the classroom. Therefore, it was anticipated that the presence of observers would not upset the classroom routine.

In order to participate in the study each subject had to demonstrate the defined target behavior (see Data Recording section) during no more than an average of 60% occurrence during the last three days of the baseline period. Permission to conduct the study in the chosen classroom was initially secured through school district personnel. A letter was sent to the superintendent of the school district describing the major objectives of the project (see Appendix B). A meeting was also held between the investigator and the Director of Special Education to discuss the logistics of the study.

Before the study began voluntary signed consent to participate was obtained from each subject (see Appendix C for child's consent form). The subjects were told by the experimenter:

> During the next several weeks some of you can have a chance to learn how to keep track of your own behaviors. I think that you will find this fun and easy to do, so I would like to have you sign your name at the bottom of these papers, if you would like to be in the study. Because this is a study, I cannot now give you more information, but I can explain more to you after we have finished.

A letter describing the project, and parental permission forms were sent to the parents of each subject. (A copy of these materials can be found in Appendix D.) All parents gave permission for their child to participate. The Human Subjects Research Committee at Utah State University gave their approval for the study.

Experimental Setting

The study was conducted in the subjects' regular classroom, which contained student desk area, a free-time area, and two group instruction

areas. The subjects had individual desks. (Appendix E indicates the seating plan.) The classroom arrangement was not changed by the experimenter to insure minimal disruption of classroom routine. The free-time area contained numerous objects and activities appropriate for the subjects, as selected by the teacher. For example, there was a painting area with supplies of paper, glue and paint; a phonograph with earphones and a generous supply of story-telling and popular records; a cassette tape recorder with children's stories; and various books and games. Therefore, it would appear from the selection available that among the diversity of the materials each subject would find find an activity that was enjoyable.

The study was conducted between approximately 10:00 a.m. and 11:30 a.m. each day of the school week. This was the standard time during the day in which the subjects' worked on individual seat work, and the teacher was working on lesson plans or correcting papers.

According to the teacher's usual external behavior control system, for completing his/her morning seat work, the student was allowed to go to lunch on time, rather than working half-way through lunch and going late. If morning work was completed, the student was also allowed an approximate 20 minute period in the free-time area after lunch. The experimenter instructed the teacher to maintain these external contingencies, since if they were withdrawn, it would most likely artificially inflate the subject's reactions to the self-control procedures being implemented in the study.

Design

A multiple baseline design (Baer, Wolf and Risley, 1968) suitable for a small subject sample was used in this study. This design requires continuous recording of the dependent variable of several subjects during all baseline and experimental conditions. The independent variables are introduced to each of the subjects at different points in time during baseline. By virtue of this design, if changes in the dependent variable are due to the presentation of the particular independent variable, the changes will occur sequentially upon the presentation of the independent variable to the subject.

In this study the dependent variable was the occurrence of the experimenter designated overt target behavior for each subject as recorded for each subject throughout the entire procedure. There were two independent variables (self-recording and self-reinforcement) introduced separately and in a different presentation order for each subject.

Behavioral Definitions

During four pre-experimental observations conducted by the experimenter, it became evident that most of the children's inappropriate behaviors could be classified overall as off-task behaviors, including being out of seat and not looking at his/her paper. Therefore, the target behavior for all subjects was on-task behavior, including the two components of being in seat and looking at paper. The following

definitions were developed:

In-Seat: This includes any situation in which the "normal" seating surface of the buttock is in direct contact with the desk seat. The subject's body (legs and/or torso) must not be turned in excess of 90 degrees, using the desk as a reference point.

A. If the subject is out of his/her seat with a bathroom card, a question card, or his/her work folder, he/she will be considered to be in his/her seat.

B. If the subject is sitting on one or both feet, he/she will be considered out of seat.

C. If the subject has one foot tucked up against the opposing leg, but the buttock is in direct contact with the seat, he/she will be considered to be in seat. The subject must have at least one foot making contact with the floor to be considered in seat.

D. If the subject is out of his/her seat with a bathroom or question card or with his/her work folders, but is talking to one of the other children in the room rather than talking to the teacher or teacher aide or going directly to and from the bathroom, he/she will be considered out of seat.

Looking at Paper: The subject will make and maintain full eye contact with the paper and/or workbook on his/her desk.

A. If the subject looks away at all from his/her paper to count on his/her fingers, he/she will be considered to be looking at the paper.

B. Any other time when the subject looks away at all from the paper and/or workbook on his/her desk, such as to look at the teacher, the other students, around the room, or at the clock, he/she will be considered to be not looking at his/her paper.

Examples: Out of Seat - standing in front of desk or beside the desk chair; standing with one knee on the chair; turning around backwards; both feet off of the floor; leaving seat without appropriate card; kneeling on the chair.

> Not Looking at Paper - head turned and eyes not directed towards the paper; subject looking at the floor/ceiling; subject staring into space; subject looking at another student walking by.

During the four pre-experiment observations, the experimenter compiled a list of the teacher's statements to the students. These statements were later classified as either being positive or negative in message. The following were developed as specific definitions of positive and negative teacher comments:

> Positive Statements: Statements made by the teacher to the student regarding the good quality of his/her work or his/her behavior, such as: "You did a good job." "You really understand this now." "OK, that looks fine, now go on to this page (with encouraging voice)." "I like the way you are working." "Try and finish before lunch." and, "That's good."
>
> Negative Statements: Statements made by the teacher to the student pointing out undesirable aspects of his/her work or his/her behavior, such as: "Get back in your seat." "No, you did this wrong." "Listen to my instructions." "Do you have a question card?" "You won't go to lunch until you finish your papers." and, "Get back to work."

General Procedures

Each subject was exposed to three conditions in different presentation orders (see Table 1) during one 20-minute session conducted each day:.

Baseline. During the baseline period the subject was not exposed to either treatment condition (self-recording or self-reinforcement). The subject went about his/her "usual" classroom business, which was to work on independent seat work. A trained observer unobtrusively recorded data regarding the occurrence or non-occurrence of on-task

Table 1

Design of the Study

Subject	Baseline	Self-Recording	Self-Reinforcement
1	3 days*	12 days	12 days
2	6 days*	12 days	12 days
3	9 days*	12 days	12 days
Subject	Baseline	Self-Recording	Self-Reinforcement
4	3 days*	12 days	12 days
5	6 days*	12 days	12 days
6	9 days*	12 days	12 days

*Baseline was to last for a minimum of three days for Subjects 1 and 4. However, additional sessions were conducted so that a 20% stability criteria was achieved for three consecutive days. An additional minimum three days of baseline were added onto the number of sessions required for Subjects 1 and 4, and until the 20% stability criteria or downward trend was achieved for Subjects 2 and 5. A minimum of six days were added onto the number of sessions required for Subjects 1 and 4, for Subjects 3 and 6, and these data had to meet the 20% criteria or represent a downward trend.

behavior for the subject according to a variable interval (VI) one-minute schedule. Throughout baseline, self-recording, and self-reinforcement conditions, the experimenter recorded the teacher's positive and negative comments to the subject, collecting frequency data and noting what was said, for the positive and negative categories.

Before the baseline period terminated, the subject had to demonstrate less than an average 60% occurrence of on-task behavior during the last three sessions (also see Results section). The averages were determined by adding the daily percentage of occurrence rates for the three last baseline sessions and dividing these by three, therefore deriving an average percentage rate. Also, before treatment was implemented there had to be either a 20% or less difference between the occurrence of the on-task behavior between three consecutive sessions or a decided downward trend had to be indicated by the data points. As can be seen in Table 1, baseline length varied across subjects to comply with a multiple baseline design and in accordance with these criteria.

After the last baseline session the experimenter took a picture of the subject performing the on-task behavior, as previously defined. Before taking the picture, the experimenter told each subject that when the picture was taken he/she was to be doing two things, sitting flat on his/her chair facing forward, and looking at and working on his/her worksheet paper. Then to assure that the subject understood and could perform the on-task behaviors, the experimenter spent a few

minutes to repeatedly ask the subject to "show me and tell me what you were doing when we took the picture." When the subject demonstrated both components of the on-task behaviors three times upon request without any prompting, then he/she was considered able to perform the behavior adequately. The picture was taken outside of the classroom with the subject in a regulation school desk, with a pencil and work-sheet available. The picture was displayed on the subject's desk during both the self-recording and self-reinforcement phases of the study.

Self-Recording. Before each self-recording treatment session the subject was provided with a self-record data sheet (Appendix G) and a picture taken of them earlier, both placed on a stand on the corner of the desk. Standard instructions were presented to each subject. The experimenter tape-recorded the instructions and the subject listened to these instructions outside of the classroom. The instructions were:

> For the next several days at this time you will find this paper and the picture that I took of you earlier on the stand on your desk. (E shows sample countoon to subject.) Take out a pencil. Every so often, while you are doing your work, you will hear a "beep" sound from the tape recorder over there. (E points to the other tape recorder.) The "beep" will be followed by a number like this: "beep-one." When you hear this, first look at the picture of you that we took together. Then find the box on the paper with the same number on it that was said following the "beep" sound. (E points to box 1 on the sample countoon.) If, when you hear the "beep" you think that you are doing like you were when we took the picture, place an "X" mark over the word "yes" in the box, like this (E marks sample countoon). If, when you hear the beep you are not behaving like you were in the picture, place an "X" mark over the word "no" like this (E marks sample countoon). After you have made the mark over either the "yes" or the "no", go back to what you were doing. When you hear

> the "beep" again, followed by another number, like "two", again look at the picture. Then go to box two and mark "yes" or "no" in box two. Remember, if you are doing as you were in the picture, mark "no." Keep doing this each time you hear the "beep" and the number. Notice that the boxes are numbered in order, and you will end up with all of the boxes filled, going from box 1 to 2 to 3 to 4, until you reach box 20. When you have filled all the boxes, I will collect the paper from your desk.

Self-Reinforcement. At the beginning of self-reinforcement sessions, the subject was provided with two cups, one with 20 tokens and one that was empty, with his/her name on it. The experimenter also placed the picture of the subject on the stand demonstrating on-task behavior. The following standard instructions were presented by a tape-recording to the subject:

> For a few days at this time you will find the picture that we took of you earlier on the stand on your desk. (E points to the picture.) You will also see two cups on your desk, one with tokens and one with your name on it. Every so often while you are doing your work you will hear a "beep" sound ("beep" sound from recorder) from the tape recorder placed over there (E points to the other tape recorder). When you hear the "beep" look at the picture of you that we took together. If when you hear the "beep", you were doing like you were in the picture, put one token in the cup with your name on it. You can only take one token after each "beep." If, when you hear the "beep" you were not doing like you were in the picture, do not take a token. So, each time you hear a "beep", if you are doing like you were in the picture, take one token. If you were not doing what you were in the picture, don't take any tokens. Go back to your regular work after you have decided whether to give yourself a token. When I tell you, you can take the tokens to Mrs. Gallery and buy time in the free-time area. Each token will buy you one minute in the free-time area, after the session is over. I will tell you when it is time to trade in your tokens.

During self-reinforcement and self-recording phases the observers recorded the occurrence or non-occurrence of on-task behaviors for the subject in accordance with the prescribed VI one-minute recording schedule (see Data Recording section).

Initial baseline data was used to reveal which pair of subjects were ready to begin treatment, after either meeting the 20% stability criteria or demonstrating a downward trend in the occurrence of on-task behavior. By random assignment, one of the pair was designated to proceed through the self-recording treatment phase first, and the other subject was assigned to go through self-reinforcement first. This pair of subjects were then randomly assigned to one of three possible daily 20-minute session times, ranging between 10:00 a.m. and 11:30 a.m. This assigned session time remained constant for each subject throughout all phases of the experiment. This procedure was repeated for the second and third pairs of subjects, and in this way, order of treatment presentation and length of baseline was determined.

In reviewing studies that implemented self-control procedures with young individuals classified as normal or emotionally and/or intellectually handicapped, those that conducted fewer than ten experimental sessions for each experimental phase obtained generally nonsignificant or variable results (Bolstad and Johnson, 1972; Broden et al., 1971; Felixbrod and O'Leary, 1973; Kaufman and O'Leary, 1972; Santogrossi et al., 1973). Of the studies reviewed that exposed the subjects to ten or more sessions during treatment phases (Glynn, 1970; Glynn and Thomas, 1974; Glynn et al., 1973; Nelson et al., 1976) the results produced were consistently positive in terms of demonstrating the effectiveness of implementing self-control procedures with the young and/or special population. Therefore, in the proposed study the subjects

were exposed to 12 sessions during treatment phases, to assure that the results obtained provided a clear demonstration of these two procedures.

Self-Recording Training

The instructions given to the subject were designed to provide a simplistic standardized training procedure. To insure that the subject comprehended the instructions, on the first three days of the self-recording phase after the subject has listened to the instructions, he/she was asked to repeat what the experimenter had instructed him/her to do. The subject had to verbalize all of the following components of instruction: (a) the "beep" denoted the time when he/she was to look at the picture and decide if his/her behavior matched the behavior shown in the picture; (b) this decision was recorded by marking the "yes" or "no" in the box corresponding to the number following the "beep"; and (c) the subject was to mark the correctly numbered box after each "beep." Misunderstandings were clarified by the experimenter to assure that the procedures were clear. After three days of this feedback method, if a subject was still unclear as to the procedure, revisions would have been made in the standard instructions for all subjects. If revisions were made, the three-day feedback method would have been repeated with each subject. If, after these three days, the subject demonstrated comprehension, the instructions were not presented again during the particular treatment phase. The data

graphed for the self-recording phase commenced on the first day in which the subject demonstrated a complete comprehension of the procedures, as indicated by the subject correctly verbalizing all of the three major instruction points.

Self-Reinforcement Training

For the first three days of the self-reinforcement phase, after the instructions had been presented, the subject was asked to tell the experimenter what he/she was instructed to do. To demonstrate that he/she understood the instructions, the subject had to verbalize all of the following information: (a) the "beep" denoted the time when he/she was to look at the picture and decide if his/her behavior matched the behavior shown in the picture; and (b) depending upon this decision, the subject decided whether to reward himself/herself with a token, taking only one token at a time. Misunderstandings were to be clarified by the experimenter. If the subject, after three days, was unclear as to the procedure, revisions would have been made in the instructions for all subjects. If revisions were made, the three-day feedback method was to be repeated for each subject. If comprehension was evident after three presentations, the instructions were not presented again during the self-reinforcement phase. The data graphed for the self-reinforcement phase commended on the first day in which the subject demonstrated a complete comprehension of the procedures as indicated by correctly verbalizing the two major instruction points.

Data Recording

Three trained observers participated in the study. The observers were secured by offering college credit to undergraduate students at Utah State University. The observers were in the classroom for a total of approximately 90 minutes daily, considering the three 20-minute sessions and the time in between for organization. Every other day of the experiment, generalization data was gathered (see Generalization and Durability section). Therefore, on the days when generalization data was collected, one observer observed the two subjects proceeding through the regular experimental session, and the other observer collected generalization data on a different pair of subjects. Therefore, each observer collected data approximately three to four days each week.

To determine if the teacher's behavior changed towards a subject throughout any phase of the experiment, the experimenter recorded frequency data regarding the occurrences of positive or negative teacher statements. The experimenter also noted the precise wording used by the teacher in each of her comments to the student.

Glynn and Thomas (1974) used four and five-minute recording intervals in implementing self-recording and self-reinforcement techniques with 7 and 8-year-old children identified as having behavior problems. The observers reported that these intervals were too long, since frequently a subject would be observed to be on task for two minutes or so, and would become inattentive by the time that signal

occurred. Therefore, these subjects were not receiving sufficient opportunities for reinforcement for the proportion of on-task behavior they performed. Therefore, following the findings of Glynn and Thomas, this study employed a variable interval (VI) one-minute recording schedule. The use of a variable interval schedule allowed for the unpredictability of when recording intervals occurred, thereby promoting recordings of realistic behavior by the subjects. Four VI one-minute schedule tapes were prepared for the study, one of which was randomly selected for use at the beginning of each session. The end of an interval, signaling observation and recording times, was characterized by a mechanical "beep" sound and followed by a number, in consecutive order from 1 to 20, for each of the recording intervals. The length of each interval ranged from ten seconds to 110 seconds, with a mean length of 60 seconds. There were 20 intervals during each session and assignment of the length of each interval was randomly assigned by the experimenter for each tape. With four tapes, it was assumed that neither the subjects nor the observers would be able to anticipate recording times.

The experimenter developed data sheets for the observers (see Appendix F). The data sheets contained 20 boxes, each divided in half, so that the observer could readily record the data on both subjects being observed in the pair during a given session (i.e., the letters "a" and "b" on the data sheet signify the two subjects). The letter "S" in each box represents in seat behavior, and the observers were

instructed to circle "S" if the subject was in his/her seat, or to place a check mark next to the "S" if the subject was out of seat, in accordance with the behavioral definitions. The letter "P" in each box represented looking at paper behavior, and the observers were instructed similarly to either circle the letter or place a check mark next to it, depending on the subject's behavior relative to the definitions. For the subject to be considered on-task, positive recordings had to be made on both letters "S" and "P". Therefore, the subject had to be both in-seat and looking at his/her paper. During self-reinforcement phases, the observers recorded whether or not the subject took a token by either circling (yes) or placing a check mark (no) next to the letter "R" in the box on the data sheet. If the subject took more than one chip during any given interval, the observers were told to indicate this when it was observed in the interval box on the data sheet. Data was thereby collected on the accuracy of the subjects in terms of self-reinforcement patterns.

During self-recording phases, a modified version of the "countoon" suggested by Kunzelmann (1970) was developed by the experimenter and was provided to the subject to be used as his/her self-recording sheet (see Appendix G). The data sheet contained one box, numbered, corresponding to each of the 20 recording intervals occurring within one session. These numbers provided a way for the subject and the observers to make sure the correct box was being marked. As per the standard

instructions, if the subject was engaged in on-task behavior (both components as indicated by the picture), when the auditory "beep" signal occurred, he/she was instructed to place an "X" over the word "Yes" in the appropriate box in accordance to the number read following the "beep". If the subject was not engaged in on-task behavior, he/she was to place an "X" over the word "no."

Observer Training Procedure

Since there were rules unique to the particular classroom situation, such as being allowed to be out of seat with question cards or bathroom cards, to best simulate the actual classroom setting, training was conducted with specially prepared videotapes. The experimenter secured a child enrolled in elementary school and instructed her to behave in certain ways, corresponding to the behavioral definitions of on-task behavior, throughout four videotaped 20-minute sessions. By using a non-subject for observer training, the presentation of these tapes to the observers would not contaminate the experimental observations. Videotaping allowed for playback and discussion of various behavioral sequences and provided examples and non-examples of the behavioral definition. After the definition of the on-task behavior was developed by the teacher and the experimenter, the three observers were provided with a typed sheet containing the behavioral definitions. The observers met with the experimenter to discuss the behavioral definitions and the experimenter demonstrated examples and non-examples of on-task

behavior to the observers, asking them to record these behaviors in terms of the definitions on the observer data sheet. The observers were later shown a 20-minute training tape which the experimenter frequently stopped, asking the observers to verbally indicate their recordings of the behaviors depicted.

During later training sessions, the observers were provided with data sheets, the VI schedule tape was played, and they were asked to make independent recordings of several different 20-minute taped sessions. These sessions continued until there was at least 90% agreement achieved between the recordings of the three observers during two sessions. The experiment began within one week of when training was completed.

Reliability

To assure that the two main observers and the experimenter maintained accurate recordings, a third observer performed reliability checks on the observers and the experimenter. During each week the two observers and the experimenter were checked during one of their observation sessions with each of the six subjects. There would, therefore, be 18 reliability observations conducted each week (six during experimental sessions, six during generalization, and six for teacher behavior observations). The occurrence of these observations was randomly determined by the experimenter and, therefore, the observers did not know when their recordings were being checked. To insure that the experimenter was unaware that reliability checks were being conducted on teacher behavior data, the experimenter simply

instructed the reliability observer to check the observations of teacher comments once every week for each of the six subjects.

Reliability was computed by making a block by block comparison of the recordings. The recordings for both in-seat and looking at paper behaviors had to be in agreement for the blocks to be rated as an agreement. The following formula was used to compute reliability:

$$\frac{\text{agreements}}{\text{agreements + disagreements}} \times 100$$

The reliability of each subject in recording his/her on-task behavior during self-recording phases and the accuracy of self-reinforcement patterns were assessed on a daily basis. The comparison was made by comparing subject recordings and observer recordings of on-task in each block. An agreement was considered to exist if (a) the subject marked the word "yes" during self-recording, or gave himself/herself a token during self-reinforcement, and both in-seat and looking at paper were recorded positively by the observer; or (b) the subject marked the word "no" during self-recording or did not give himself/herself a token during self-reinforcement, and the non-occurrence of either one or both in-seat and looking at paper behaviors was recorded by the observer. Subject-Observer reliability was computed by the previously stated formula.

Generalization and Durability

In order to determine if the implementation of self-recording or self-reinforcement procedures had an effect on the frequency of the

subject's on-task behaviors in situations and times outside of the experimental sessions, observations were undertaken throughout the experiment and for ten sessions following the cessation of the last experimental treatment phase for each subject to investigate generalization and durability effects. Generalization baseline data was initially collected so generalization effects might be clearly demonstrated.

Generalization. To investigate generalization effects of treatment implementation, observations were conducted on each subject by an observer every second session during baseline, self-recording, and self-reinforcement treatment phases, and during the durability sessions. These observations occurred during a 20-minute session, different in time from the experimental session, and were in accordance with the VI one-minute schedule. For consistency with regular experimental sessions, the subject worked on independent seat work during generalization sessions. Neither the "countoon" data sheets nor the subject picture were available to the subject during generalization observations, since the concern was whether or not the procedures fostered behavioral changes with the subject outside of the session time when the specific procedures were not in operation. The observer, who collected data on two subjects simultaneously, recorded the occurrence or nonoccurrence of on-task behavior. Reliability data was collected during generalization observations, at the rate of approximately one check on the data collected for each subject every week of the experiment.

Durability. Observation procedures regarding the data recording methods was identical to the procedures employed during the experimental sessions. Data was collected by the observers with each observer recording data on two subjects simultaneously, for a period of ten sessions following the cessation of the last treatment phase for each subject. For three subjects this followed self-recording, and for three subjects this followed self-reinforcement sessions. These observations occurred during the regular experimental session time for each subject, corresponding, therefore, to the specific time that the procedures were implemented. Reliability observations were conducted during the ten session durability observations by the third observer, so that there was one check for each main observer every week during one of the observations made for each of the six subjects.

Data Analysis

Each individual subject's data was graphed to aid in the data analysis. The mean percentage of occurrence of on-task behavior for each subject during the last three days of baseline before treatment was the criteria against which the treatment data was compared. For a subject to be considered on-task during any given interval, both in-seat and looking at paper had to receive a positive scoring by the observer. A change of at least 20% occurrence of on-task behavior, as a result of computing the mean percentage of occurrence during the last three days of each main treatment phase, and the durability phase,

compared to the mean of the last three days of baseline, was considered a significant indication of behavior change or durability. During generalization observations, the mean percentage of occurrence of the target behavior was computed for all generalization sessions, and compared to the mean percentage of occurrence during all generalization baseline sessions, again with the 20% criteria indicating behavior change. No specific criteria was defined to reflect changes in teacher comment behavior towards the subjects.

RESULTS

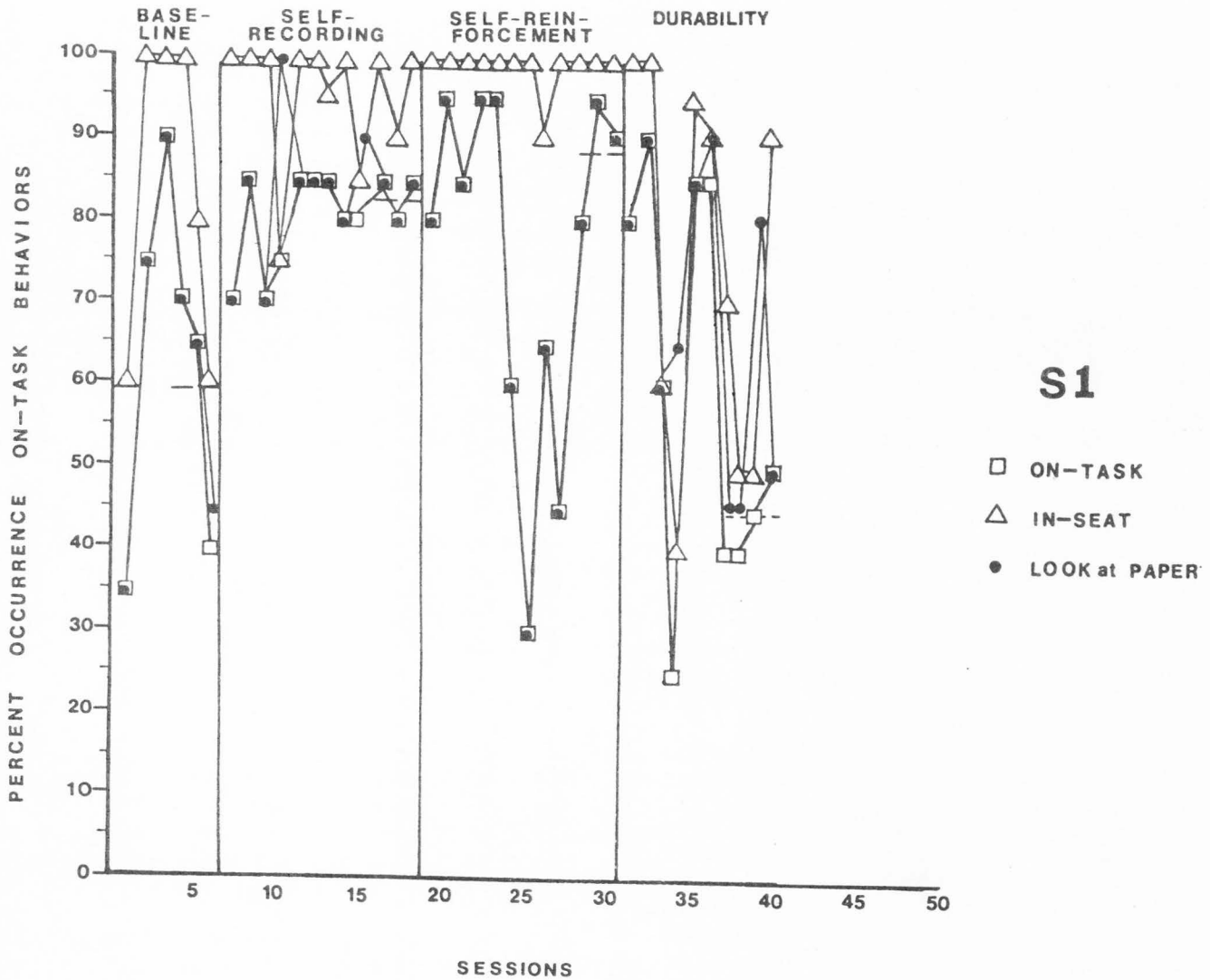
Reliability

Interobserver reliability during two pre-experimental training sessions was 95%. Overall, interobserver reliability of on-task behaviors throughout all major phases of the experiment (baseline, self-recording, self-reinforcement, generalization, and durability) was 92.6%, and ranged from 65% to 100% for all subjects. More specifically, the following were the mean reliability percentages for each major phase of this experiment (with the ranges in parenthesis): baseline, 86 (65-100); self-recording, 93 (70-100); self-reinforcement, 93 (70-100); durability, 93 (75-100), and generalization, 93 (70-100). Interobserver reliability on teacher comments to the subjects throughout all phases of the experiment was 94.5%, ranging from 50% to 100%. Finally, interobserver reliability regarding whether or not each subject took a token during each recording interval of the self-reinforcement phases was 98.7%, with percentages ranging from 95% to 100%.

Baseline

Figures 1 through 6 present the daily percent rates of on-task behaviors for each subject for each phase of the experiment. All six

Figure 1. Percent of on-task behaviors for Subject 1 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.


BASE-
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DURABILITY
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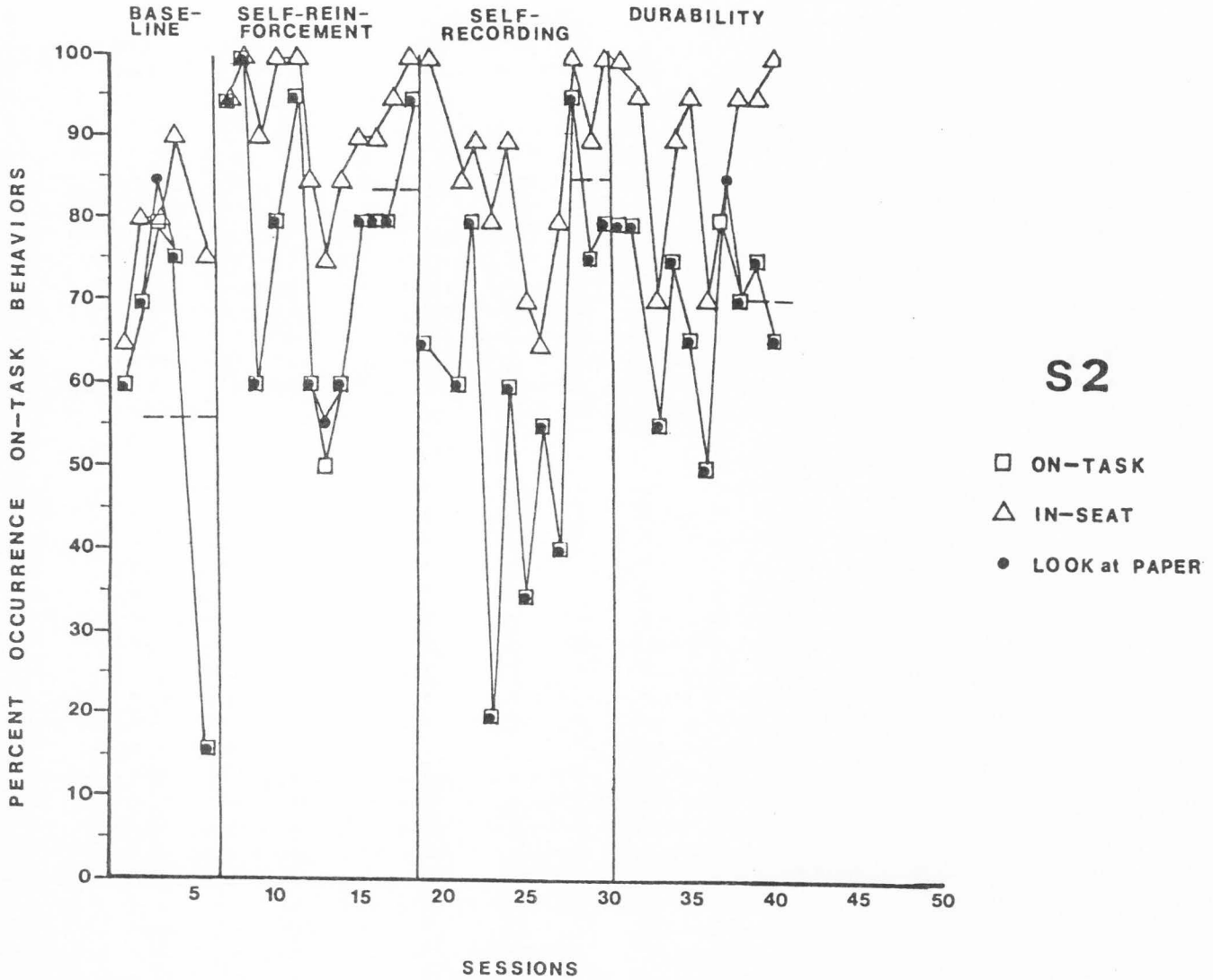
45
50
SESSIONS
S1
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 2. Percent of on-task behaviors for Subject 2 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.


BASE-LINE
SELF-REIN-FORCEMENT
SELF-RECORDING
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
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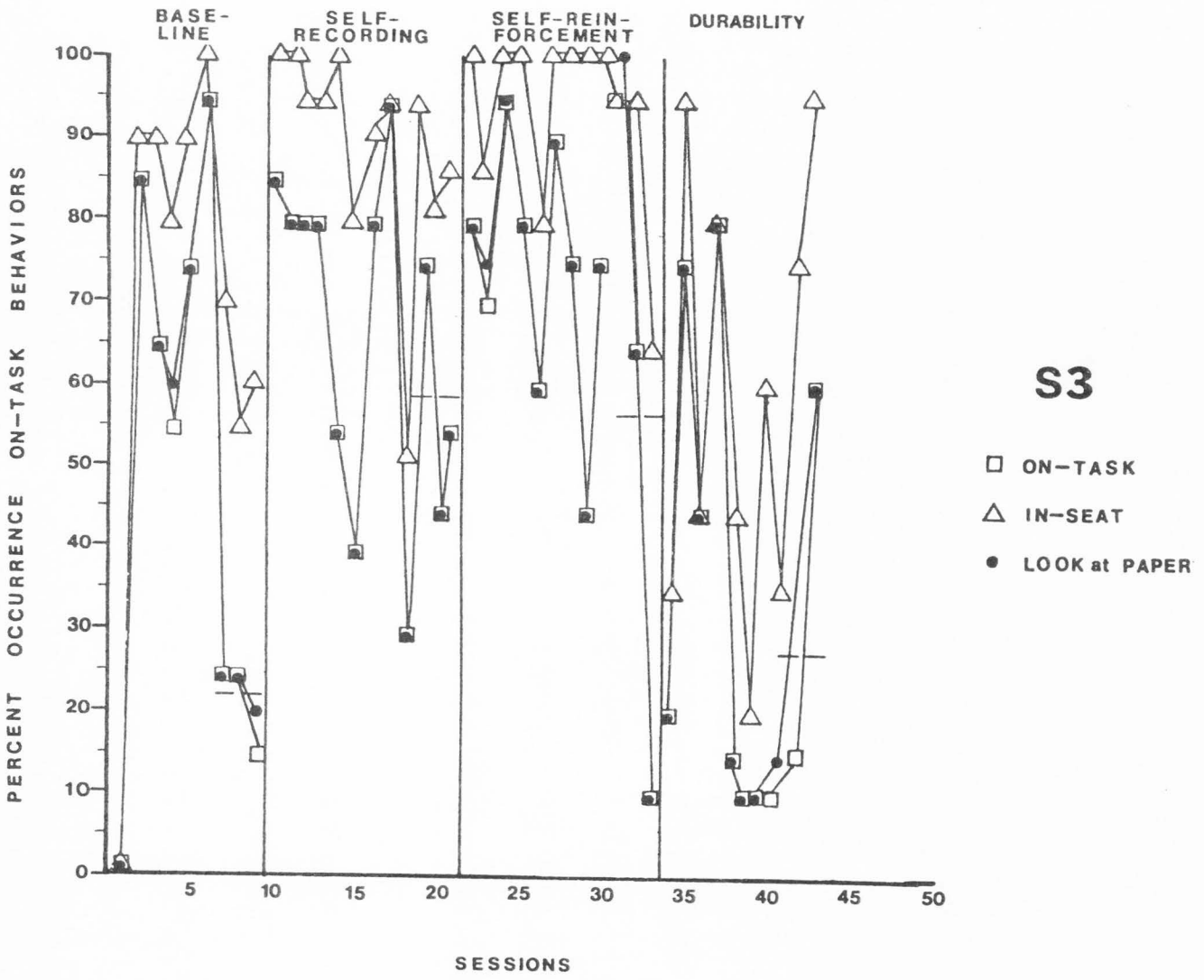
SESSIONS
S2
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 3. Percent of on-task behaviors for Subject 3 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.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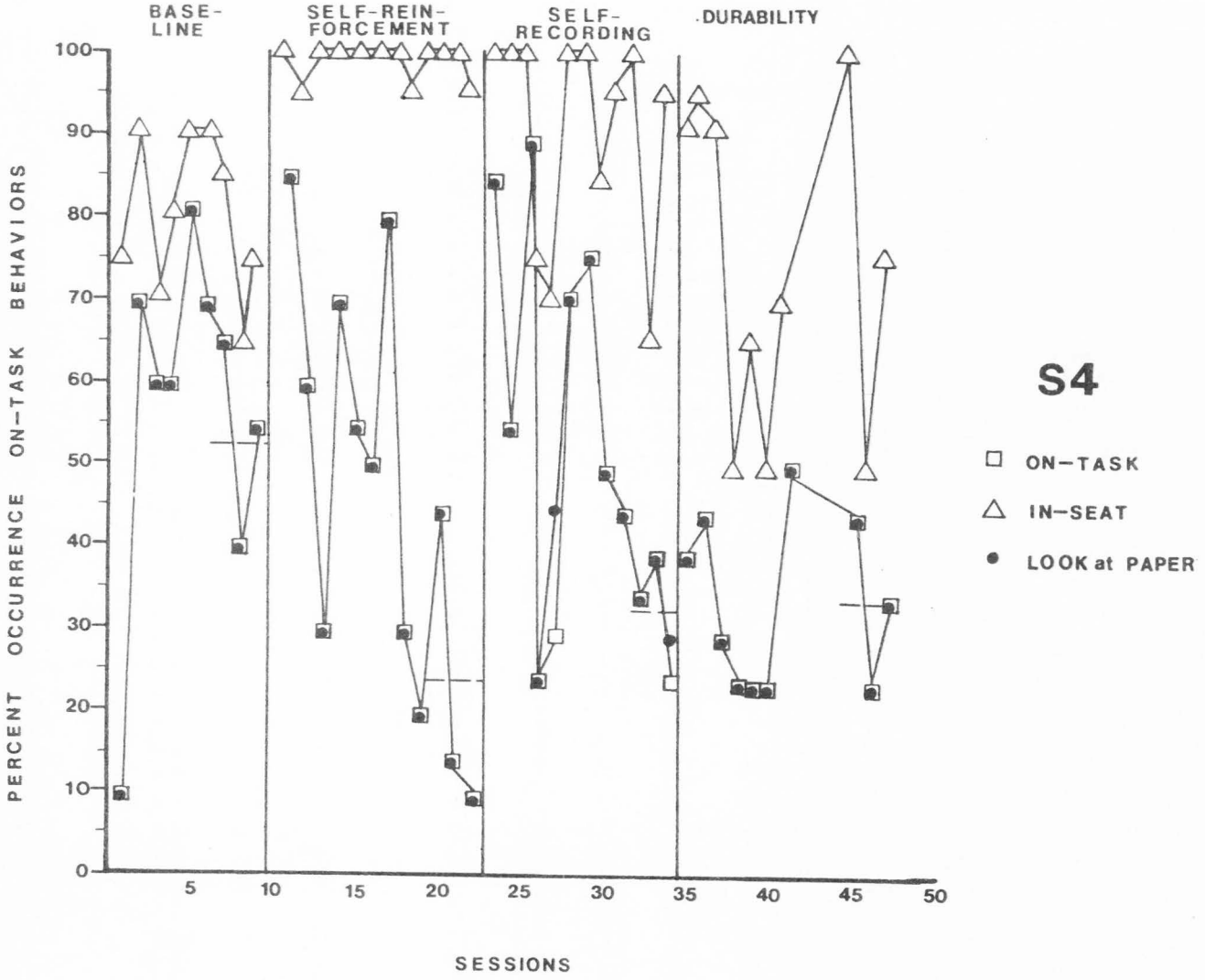
SESSIONS
S3
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 4. Percent of on-task behaviors for Subject 4 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.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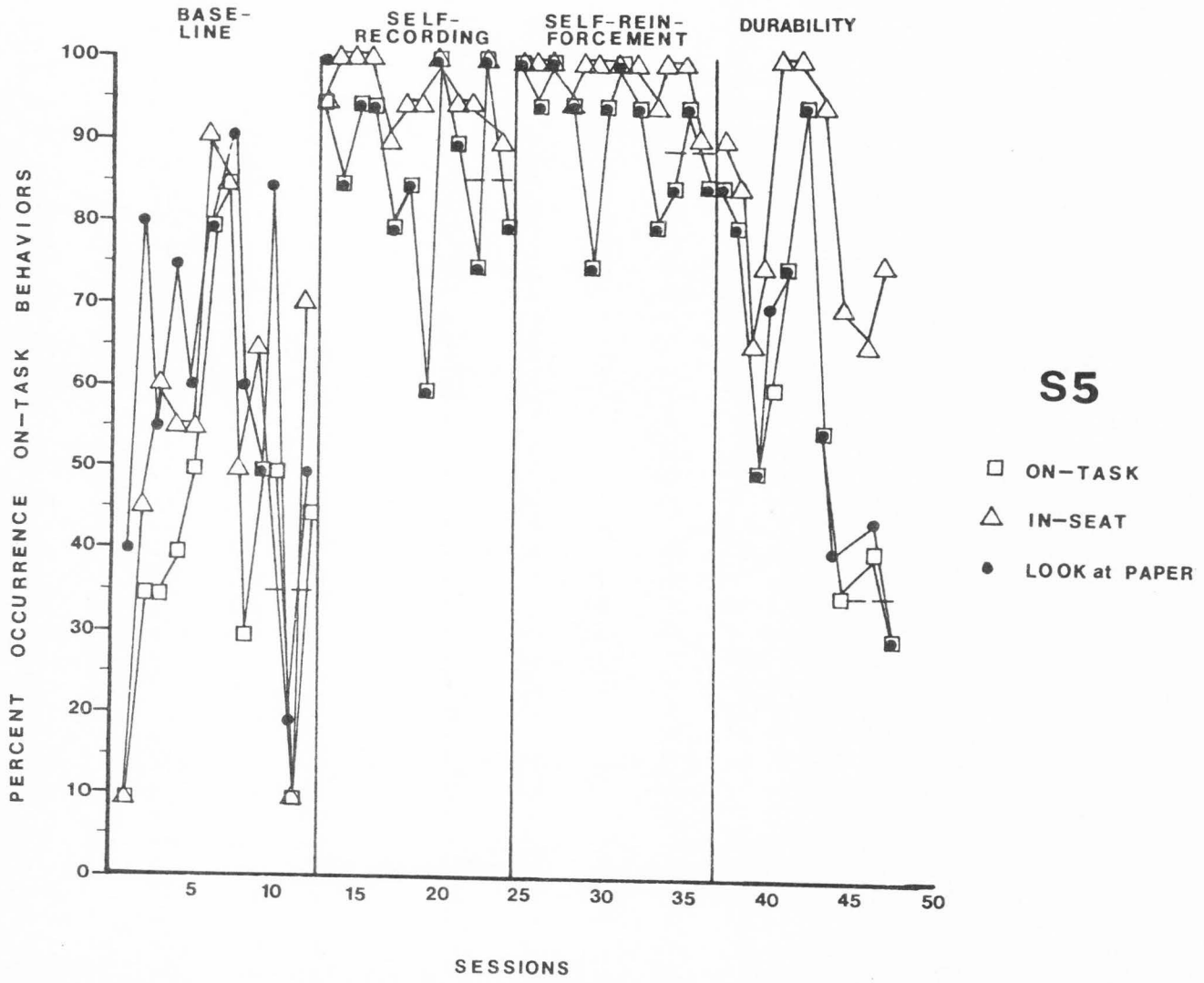
SESSIONS
S4
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 5. Percent of on-task behaviors for Subject 5 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.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DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
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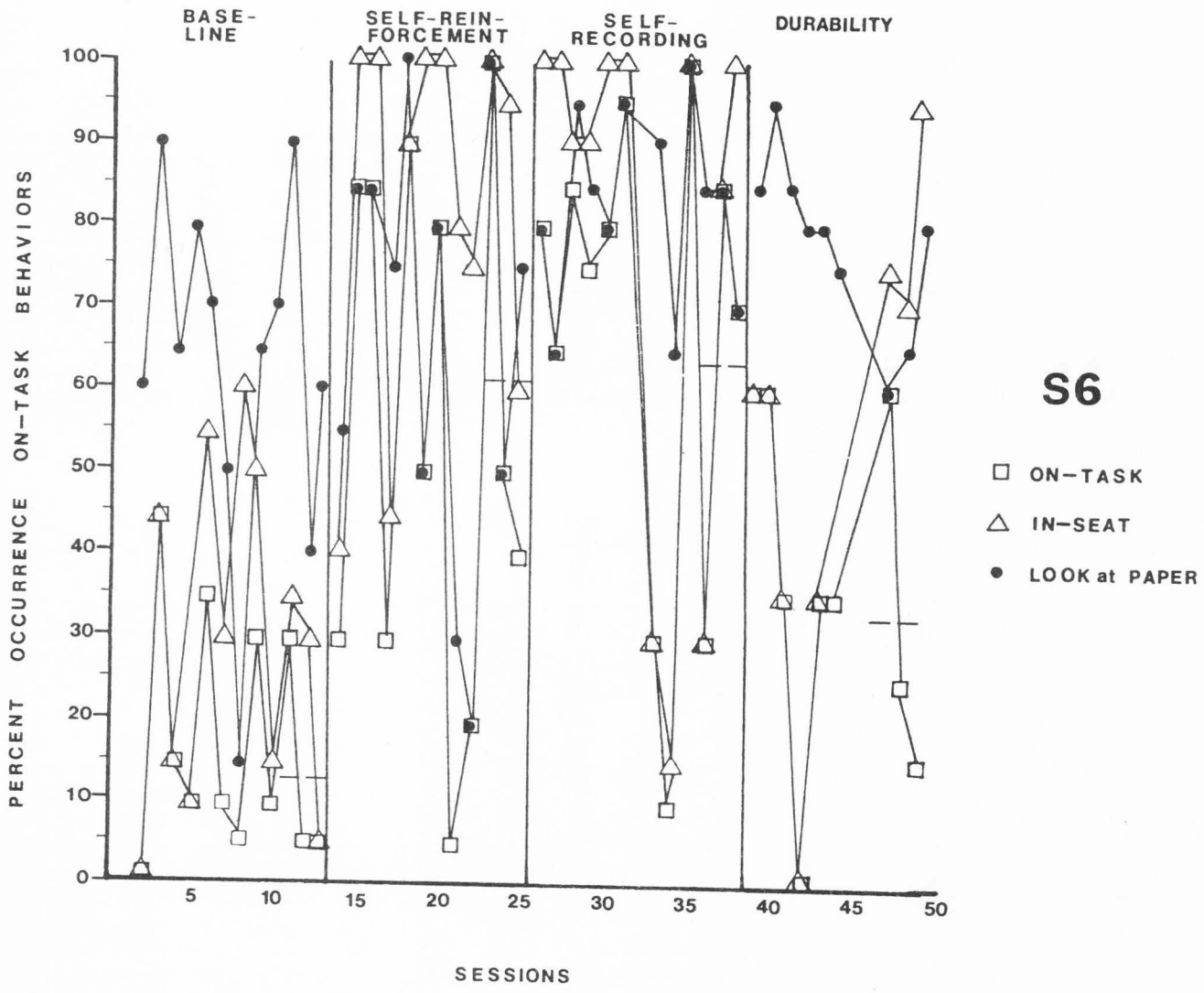
SESSIONS
S5
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 6. Percent of on-task behaviors for Subject 6 in all phases of the study. The dotted line represents the mean percent of on-task behavior during the last three sessions of the particular phase.


BASE-
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SESSIONS
S6
ON-TASK
IN-SEAT
LOOK at PAPER

subjects demonstrated on-task behaviors for a mean percent of less than 60 during the last three days of baseline. Table 2 presents the specific baseline pretreatment percentage means for each subject. Wide variability was noted for each subject between sessions during baseline, as indicated by the ranges between extreme daily scores for each subject, as presented in Table 3.

In order to simplify data presentation, Figures 7 and 8 depict on-task behavior, indicating the multiple baseline relationship between the subjects. In Figures 1 through 6 it is difficult to see the multiple baseline relationship, since data for on-task, looking at paper, and in-seat behaviors are presented, and since each subject's specific data are on separate pages.

Figure 7 presents the daily percentages of on-task behavior for Subjects 1, 3, and 5 during all experimental phases, demonstrating the multiple baseline relationship. When Subject 1 started treatment (self-recording), Subject 3's baseline rate of on-task behavior did decrease. The mean percentage of on-task behavior for Subject 3 during the six sessions before Subject 1 began treatment was 62. However, the mean percent of on-task during Subject 3's last three baseline sessions, which corresponded to the first three treatment sessions for Subject 1, was 21. Subject 5's baseline performance appeared to be unaffected by treatment implementation with either Subject 1 or Subject 3.

Table 2

Mean Percent Occurrence of On-Task Behavior During the Last Three Sessions of Each Experimental Phase

Initial Treatment Phase	Subject	Baseline	Self-Recording	Self-Reinforcement	Durability
Self-Recording	1	58	83.3 (+25.3)	88.3 (+30.3)	45 (-13.0)
	3	21.7	58.3 (+36.6)	56.7 (+35.0)	28.3 (+6.6)
	5	35	85	88.3 (+53.3)	35 (0)
Self-Reinforcement	2	56.7	85 (+28.3)	83.3 (+53.3)	70 (+13.3)
	4	53.3	33.3 (-20.0)	23.3 (-30.0)	35 (-18.3)
	6	13.3	63.3 (+50.0)	61.7 (+48.4)	33.3 (+20.0)

Note: The numbers in parenthesis represent the mean percentage of change in on-task behavior for the subject during the last three sessions of the particular experimental phase, compared to the last three sessions of Baseline.

Table 3

Percent Range Between Extreme Scores

for Each Subject During Each Experimental Phase

Initial Treatment Phase	Subject	Baseline	Self-Recording	Self-Reinforcement	Durability
Self-Recording	1	55	15	50	60
	3	95	65	50	70
	5	75	40	25	65
Self-Reinforcement	2	65	50	50	30
	4	70	75	75	25
	6	45	95	95	60

Figure 7. Percent of on-task behavior for Subjects 1, 3, and 5, who had self-recording treatment first, during all experimental phases.

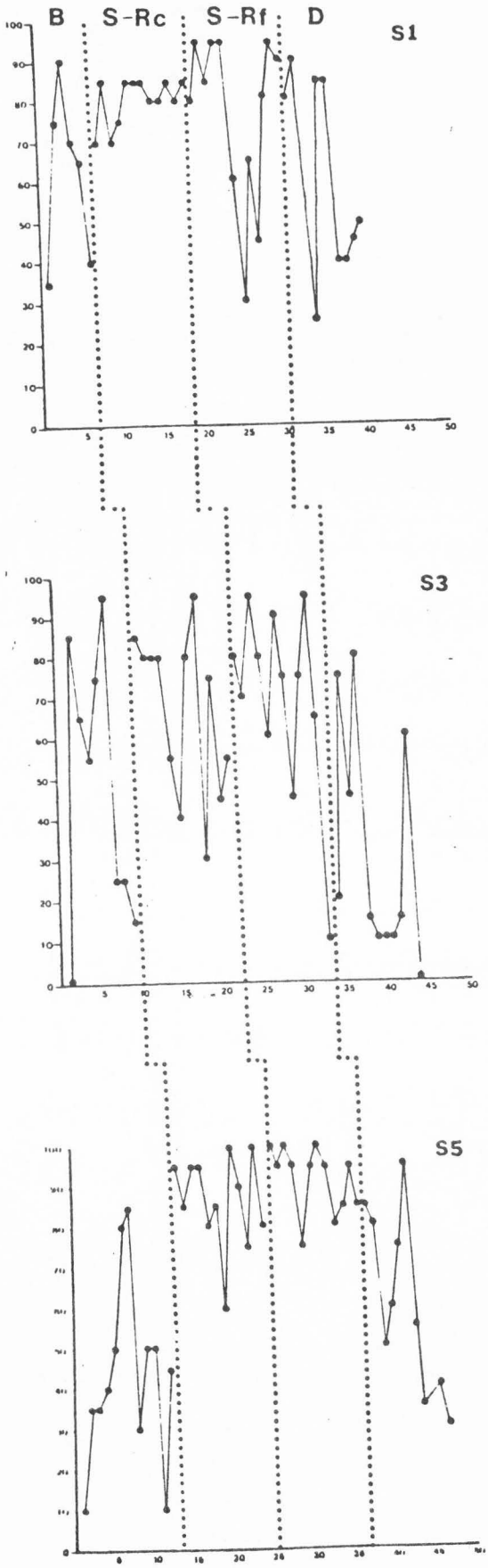

B
S-Rc
S-Rf
D
S1
S3
S5

Figure 8. Percent of on-task behavior for Subjects 2, 4, and 6, who had self-reinforcement treatment first, during all experimental phases.

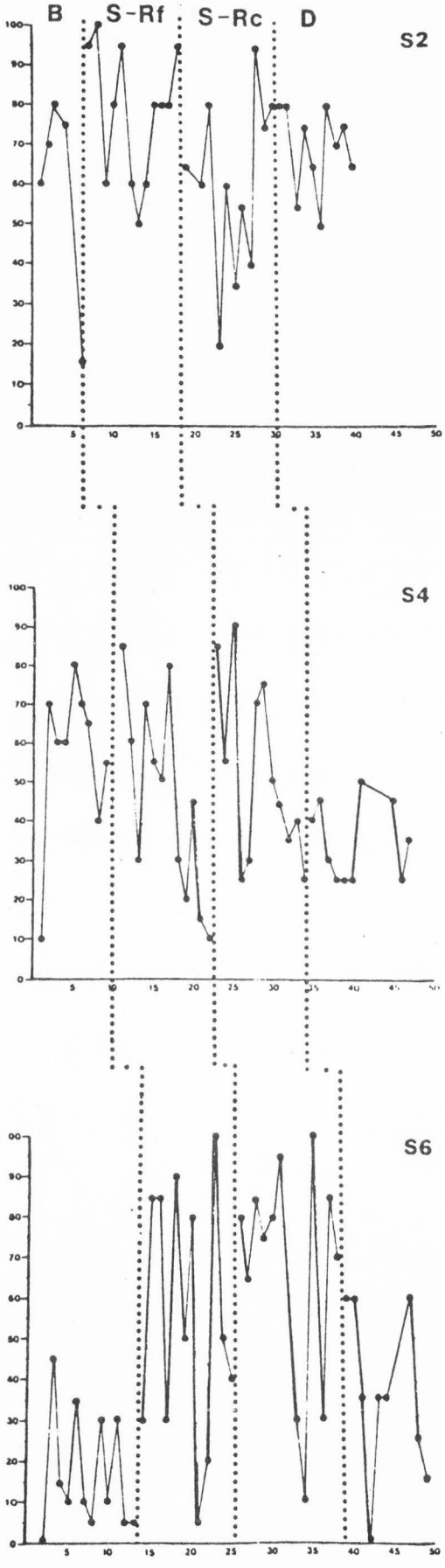

B
S-Rf
S-Rc
D
S2
S4
S6

Figure 8 presents the multiple baseline relationship between Subjects 2, 4, and 6 during all experimental phases. Baseline rates of on-task behavior appeared to be unaffected in Subjects 4 and 6 when treatment (self-reinforcement) was initiated with Subjects 2 and 4, respectively.

Self-Recording

Purpose 1 was to determine if the subjects could be successfully taught to self-record their behavior, as reflected in increases in the target behavior. Table 2 shows the mean percentage of on-task behaviors for each subject during the self-recording phase. As can be seen in Figures 1 through 8 and Table 2, except for Subject 4, the percent occurrence of on-task behavior increased 20% or more for five subjects, and was, therefore, significant on the basis of the 20% change criteria chosen for this study, which indicates that five of the six subjects were successfully taught a self-recording procedure. Subjects 1, 3, and 5 were exposed to self-recording immediately after baseline, whereas Subjects 2, 4, and 6 were exposed to self-reinforcement immediately before self-recording. The data for subjects 2, 4, and 6 are confounded by their previous exposure to self-reinforcement. The gains with the five subjects were made regardless of whether baseline or self-reinforcement directly preceded self-recording. Table 2 also presents the mean percentage of change in on-task behaviors during

all experimental phases compared to baseline rates. As can be seen, during self-recording, five subjects demonstrated positive increases ranging from 25.3% to 50%. Subject 4's on-task behaviors decreased by 20%, which reflects a significant negative change on the basis of this study's 20% change criteria. Looking at Figure 4, Subject 4's on-task behaviors throughout self-recording appeared to consistently decrease. This is verified when comparing Subject 4's mean occurrence of on-task behavior for the first three and last three session days during self-recording: 75.7% versus 33.3%. The range of scores for each subject during self-recording are presented in Table 3. Compared to the range of scores during baseline, Subjects 1, 3, and 5 demonstrated less variability in their performance during self-recording compared to variability during baseline daily percentages. Subject 6 appeared to demonstrate increased variability between scores during self-recording compared to baseline, and the remaining two subjects (Subjects 2 and 4) both indicated a trend to decrease their performance variability during the self-recording phase.

In-Seat and Looking at Paper Behaviors
During Self-Recording

Table 4 presents the mean percent occurrence of in-seat and looking at paper behaviors for each subject during all phases of the experiment. Table 4 also presents (in parenthesis) the average percentage of change during the last three treatment sessions in these

Table 4

Mean Percent Occurrence of In-Seat and Looking at

Paper Behaviors During the Last Three Sessions of Each Experimental Phase

Initial Treatment Phase	Subject	Baseline		Self-Recording		Self-Reinforcement		Durability	
		In-Seat	Paper	In-Seat	Paper	In-Seat	Paper	In-Seat	Paper
Self-Recording	1	80	60	96.7 (+16.7)	83.3 (+23.3)	100 (+20)	88.3 (+28.3)	63.3 (-16.7)	58.3 (-1.7)
	3	61.7	23.3	86.7 (+25)	58.3 (+35)	85 (+23.3)	58.3 (+35)	68.3 (+6.6)	30 (+6.7)
	5	43.3	51.7	95 (+51.7)	85 (+33.3)	96.7 (+53.4)	88.3 (+36.6)	70 (+26.7)	38.3 (+13.4)
Self-Reinforcement	2	81.6	58.3	96.7 (+15.1)	83.3 (+25)	95 (+13.4)	85 (+26.7)	96.7 (+15.1)	70 (+11.7)
	4	75	51.3	86.7 (+11.7	35 (-16.3)	98.3 (+23.3)	23.3 (-30)	75 (0)	35 (-16.3)
	6	23.3	63.3	71.7 (+48.4)	80 (+16.7)	85 (+61.7)	75 (+11.7)	80 (+56.7)	68.3 (+5)

Note: The numbers in parenthesis represent the mean percent of change in in-seat and looking at paper behaviors for the subject during the last three sessions of the particular experimental phase compared to Baseline.

behaviors compared to baseline rates. Regarding in-seat behavior, during self-recording three subjects showed a significant increase from baseline rates (Subjects 3, 5, and 6) with ranges from 25% to 51.7%. Subjects 1, 2, and 4 all showed an increase in in-seat behavior, however, these percentages were not significant.

Subjects 1, 2, 3, and 5 all demonstrated a significant increase in looking at paper behavior with ranges from 23.3% to 35%. Subject 6 showed a tendency towards increasing looking at paper behaviors, whereas Subject 4 demonstrated a tendency to decrease looking at paper behavior from baseline to self-recording.

Accuracy of Self-Recording

A component of Purpose 1 was to determine the accuracy of the subjects in self-recording, as reflected in the percentage of agreement between subject and observer recordings of on-task behavior.

Table 5 shows the mean percentage of agreement between the recordings of the subjects and the observers during the last three sessions of self-recording. (Interobserver reliability throughout self-recording was 93%.) As can be seen, three subjects (Subjects 2, 3, and 5) demonstrated good agreement or accuracy (70% above) with the observers in recording their on-task behavior. Subjects 4 and 6 appeared to become less accurate in their self-recordings as self-recording progressed. The mean percent accuracy of the first three sessions was 71.7 for Subject 4, and 76.7 for Subject 6 during self-recording,

Table 5

Mean Percent of Agreement Between the Self-Recordings and Self-Reinforcement Patterns of Each Subject and Observer Recordings During the Last Three Sessions of Self-Recording and Self-Reinforcement Phases

Initial Treatment Phase	Subject	Self-Recording	Self-Reinforcement
Self-Recording	1	48.3	88.3
	3	73.3	70.0
	5	86.7	88.3
Self-Reinforcement	2	83.3	86.7
	4	35.0	38.3
	6	58.3	60.0

which is substantially different from the percent agreement during the last three sessions of the phase for these subjects. Subject 1 demonstrated consistently low agreement with the observers throughout self-recording.

Table 6 presents the individual subjects' overall rates of underestimating and overestimating their behaviors. An underestimate occurred when the subject marked himself off-task, while the observer marked the subject on-task. An overestimate occurred when the subject marked

Table 6

Mean Percentage of Subject Underestimates and Overestimates of On-Task Behaviors Compared to Observer Recordings During the Last Three Sessions of Self-Recording and and Self-Reinforcement Phases

Initial Treatment Phase	Subject	Self-Recording		Self-Reinforcement	
		Under-estimate	Over estimate	Under-estimate	Over-estimate
Self-Recording	1	43.3	8.3	0.0	11.7
	3	11.7	15.0	0.0	30.0
	5	5.0	8.3	0.0	11.7
Self-Reinforcement	2	1.7	15.0	6.7	8.3
	4	0.0	65.0	1.7	60.0
	6	26.7	15.0	3.3	36.7

Note: The percentiles were computed from the total percent of disagreement during each session.

on-task and was rated off-task by the observer. Subjects 1 and 6 frequently underestimated their behaviors, while Subject 4 overestimated his behavior a great percentage of time. Subjects 2, 3, and 5 demonstrated what appeared to be reasonable percentages of underestimating and overestimating, and also demonstrated fairly similar errors in both directions.

Table 7

Mean Percent of Agreement Between the Self-Recordings and Self-Reinforcement Patterns of Each Subject and Observer Recordings During the Last Three Sessions of Self-Recording and Self-Reinforcement Phases

Inital Treatment Phase	Subject	Self-Recording	Self-Reinforcement
Self-Recording	1	48.3	88.3
	3	73.3	70.0
	5	86.7	88.3
Self-Reinforcement	2	83.3	86.7
	4	35.0	38.3
	6	58.3	60.0

Self-Reinforcement

Purpose 2 was to determine if these subjects could be successfully taught a self-reinforcement procedure, as reflected by increases in on-task behavior. The mean percentage of on-task behaviors for each subject during self-reinforcement (Table 2) indicates that for all subjects, except for Subject 4, the percent occurrence of on-task behavior increased 20% or more, the criteria for significance for this study, comparing the last three session means of baseline and self

reinforcement. For Subjects 1, 2, 3, 5, and 6, these gains were significant, and indicated that they successfully learned the self-reinforcement procedure. Specifically (see Table 2) these increases ranged from 26.6% to 53.3%. The increases occurred regardless of whether the subject had been exposed to self-recording or baseline immediately before self-reinforcement. For the subjects who were exposed to self-recording before self-reinforcement (Subjects 1, 3, and 5), the percent gains from self-recording to self-reinforcement were not as great as the gains from baseline to self-reinforcement, and were confounded by the previous history. Subject 4's on-task behaviors decreased by 30%, reflecting a significant negative change. Figure 4 indicates that Subject 4's on-task behavior consistently decreased throughout self-reinforcement. Subject 4's mean occurrence of on-task behavior for the first three and last three session days was 58.3 and 28.3, respectively.

The range of scores for each subject during the self-reinforcement sessions is presented in Table 3. Compared to the range of scores during baseline, Subjects 3 and 5 demonstrated less variability in their performance during self-reinforcement. Subject 6 demonstrated increased variability from baseline to self-reinforcement. Subjects 1, 2, and 3 demonstrated similar variability during baseline and self-reinforcement phases.

In-Seat and Looking at Paper Behaviors During Self-Reinforcement

Regarding in-seat behavior, as can be seen in Table 4, which presents both mean percentages and average percentages of change during the last three sessions, five subjects (Subjects 1, 3, 4, 5, and 6) showed a significant increase from baseline to self-reinforcement in in-seat behavior. Subject 2 also increased in-seat behavior, however, this was not a significant gain.

Subjects 1, 2, 3, and 5 significantly increased looking at paper behavior during self-reinforcement. Subject 6 showed a nonsignificant trend to increase this behavior, while Subject 4's looking at paper behavior significantly decreased during self-reinforcement.

Accuracy of Self-Reinforcement

A component of Purpose 2 was to determine the accuracy of the subjects in self-reinforcement patterns, as reflected in the percentage of agreement between the occurrence of on-task behavior as recorded by the observers and the subject's self-reinforcement behavior.

Table 5 presents the mean percentage of agreement between the self-reinforcement patterns of the subjects and the observer recordings of on-task behavior. Subjects 1, 2, 3, and 5 all demonstrated good agreement (70% or above) with the trained observers during the last three sessions of self-reinforcement. Agreement occurred when the subject's reinforcement response (taking or not taking a token during

each recording interval of a session) corresponded with the observer recording either on-task or off-task behavior. Subjects 4 and 6 appeared to become less accurate in their self-reinforcement practices as the phase advanced. The mean percent accuracy of the first three self-reinforcement sessions was 78.3 for both subjects, compared to the mean accuracy rates obtained during the last three sessions of 38.3 and 60, respectively.

Subjects overestimated their performances when they gave tokens during the intervals recorded as off-task by the observer. An underestimate occurred when the subject did not dispense a token during an interval recorded as on-task. Table 6 presents the mean percentage of subject underestimation and overestimation of on-task behavior during self-reinforcement. All six subjects overestimated their behaviors and awarded themselves tokens for observer-recorded off-task behaviors. Subjects 3, 4, and 6 especially appeared to over-reinforce themselves for their performances. Generally, overestimation occurred more than underestimation during self-reinforcement with these subjects.

At times during self-reinforcement sessions, the observers noted that subjects would either take more than one chip after an interval, or would "sneak" a token between intervals. To avoid directly looking at the subject, it was difficult to determine exactly when this occurred. Therefore, at the end of each self-reinforcement session the experimenter noted the total number of tokens taken by each subject during the

session and the number of tokens correctly and overtly taken at the end of each interval. The following mean ratio of total tokens dispensed/tokens correctly taken, was computed for each subject during all 12 self-reinforcement sessions: Subject 1, 18.6/19.3; Subject 2, 15.9/13.3; Subject 3, 19.3/17.5; Subject 4, 13/14.6 (this subject was often seen placing tokens back into token dispenser cup after being observered as taking too many tokens); Subject 5, 20/19.7; and Subject 6, 19.1/19. Observer agreement regarding whether or not a subject took a token at the end of each recording interval was 98.7 throughout self-reinforcement for all subjects. Therefore, taking into consideration minor inaccuracies in observer recordings of self-reinforcement practices, it can be said that Subjects 2, 3, and 4, on occasion, reinforced themselves inappropriately.

Self-Recording and Self-Reinforcement

Purpose 3 was to determine whether self-recording or self-reinforcement procedures had different effects on the occurrence of on-task behavior, as reflected by the rate of occurrence of on-task behavior during each treatment phase. From Figures 1 through 6, which present the daily percentage of on-task behaviors for each subject during self-recording and self-reinforcement, and Table 2, which presents the mean percentage of on-task behaviors for each subject for the last three sessions of both phases, it is apparent that self-recording and self-reinforcement both produced increases in on-task behaviors when these

conditions immediately followed baseline, for all but one subject (Subject 4). Subjects 1, 3, and 5 received self-recording first, and Subjects 2, 4, and 6 all went through self-reinforcement first, and it appeared that exposure to one condition initially produced the behavior change, and presenting the second condition, after the history of the first condition, did not appear to make a significant difference in the rate of on-task behaviors for any of the subjects.

Table 2 presents the percentage and direction of change of on-task behaviors for each subject during the last three sessions of both self-recording and self-reinforcement. Subjects 1 and 2 had six and five days of baseline, respectively, Subjects 3 and 4 both had nine days, and Subjects 5 and 6 both had 12 days of baseline condition. It appears that the longer the baseline, the greater was the percentage of behavior change for all subjects except Subject 4.

Comparing the accuracy of self-recordings with the accuracy of self-reinforcement patterns, as presented in Table 5, only Subject 1 demonstrated any major difference between the two treatment phases. Subject 1's accuracy increased 40% during self-reinforcement conditions. According to Table 6, patterns of underestimating and overestimating behaviors were different for some subjects during self-recording and self-reinforcement. For example, Subject 1 underestimated more during self-recording, and Subjects 3 and 6 appeared to underestimate more during self-recording, and overestimated more during self-reinforcement.

Durability

Purpose 4 was to determine whether teaching self-control procedures resulted in the durability of the increases in on-task behavior established during the procedures, as measured by the occurrence of on-task behavior during observations conducted after the procedures have been withdrawn.

Table 2, previously cited, presents the mean percentage of occurrence of on-task behaviors for each subject during durability observations. Only Subject 6 demonstrated maintenance or durability effects in the demonstration of on-task behavior after the procedures were terminated, according to the 20% change criteria. For the remaining five subjects (Subjects 1, 2, 3, 4, and 5) the percentages of occurrence of on-task behavior during the last three days of durability were not significantly different from baseline levels. More specifically, two subjects (Subjects 1 and 4) demonstrated a tendency to decrease on-task behaviors during the durability phase, one subject's (Subject 5) behavior stayed the same, and two subjects (Subjects 2 and 3) showed a trend to increase on-task behavior.

Looking at Figures 7 and 8, it appears that after a subject was removed from the treatment condition and was in the durability phase, rate of occurrence of on-task behavior for the subjects still undergoing treatment (either self-recording or self-reinforcement) was uneffected. Therefore, treatment withdrawal with some subjects did not

have an effect upon the behavior of subjects still under treatment conditions.

As can be seen in Table 3, which presents the variability between extreme scores, Subjects 1, 3, 5 and 6 demonstrated variability during durability closely approximating baseline durability. Subjects 2 and 4 demonstrated less variability between daily scores during durability in comparison to all other phases of the experiment.

In-Seat and Looking at Paper Behavior During Durability

Examining the mean percentage of occurrence of the two components of on-task behavior (in-seat and looking at paper), in Table 4 it can be seen that Subjects 5 and 6 demonstrated a significant increase in in-seat behavior during the durability phase, compared to baseline levels. These were the only significantly maintained changes in in-seat and/or looking at paper behaviors for all subjects in this study.

Generalization

Purpose 5 was to determine whether teaching self-control procedures resulted in the generalization of behavior changes established during treatment implementation, as reflected in the occurrence of on-task behavior during observations conducted during times other than experimental session times.

Figures 9 through 14 present the daily percent of on-task behaviors for each subject during the generalization sessions conducted throughout

Figure 9. Percent of on-task behaviors for Subject 1 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.

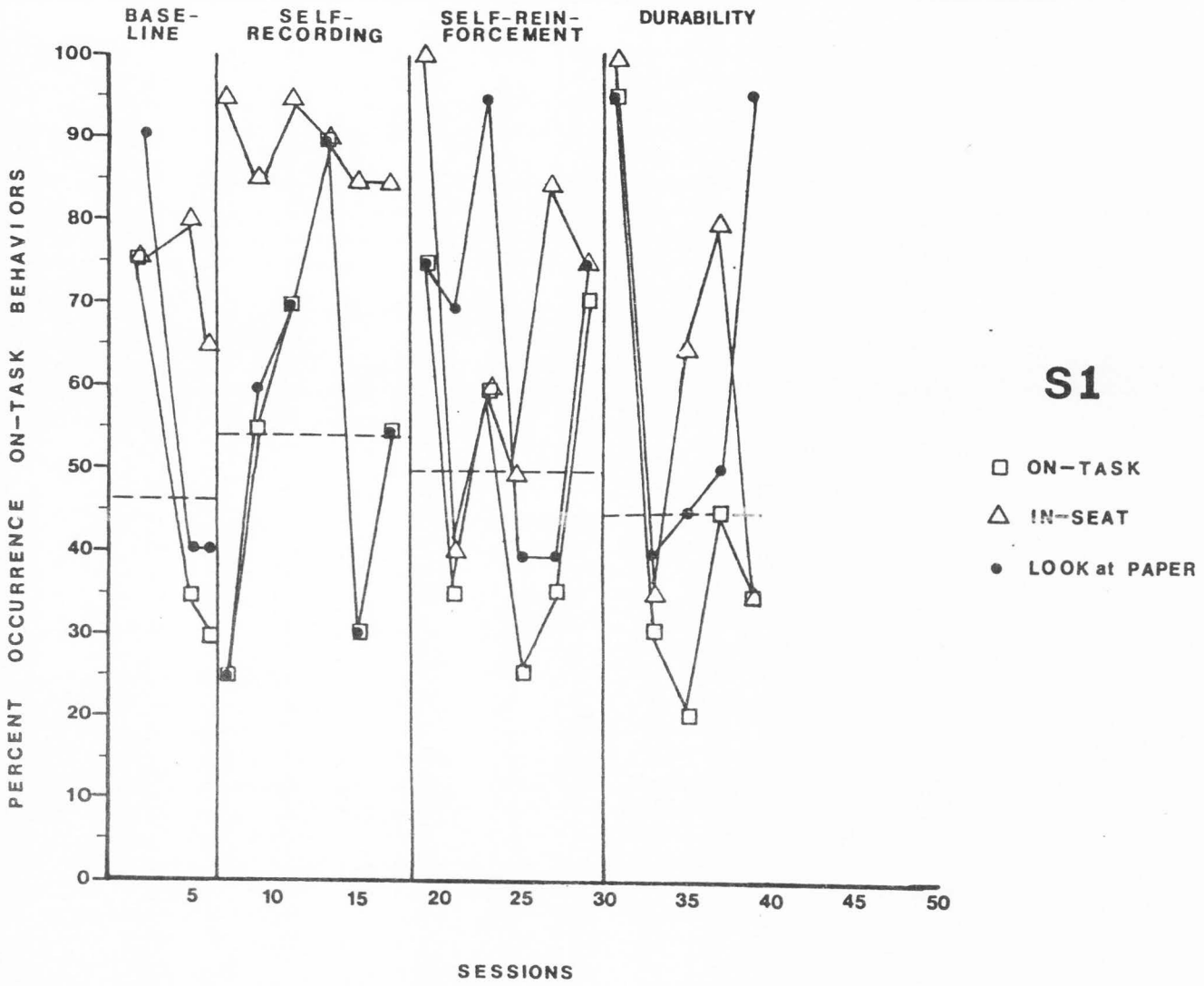

BASE-LINE
SELF-RECORDING
SELF-REIN-FORCEMENT
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
SESSIONS
S1
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 10. Percent of on-task behaviors for Subject 2 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.

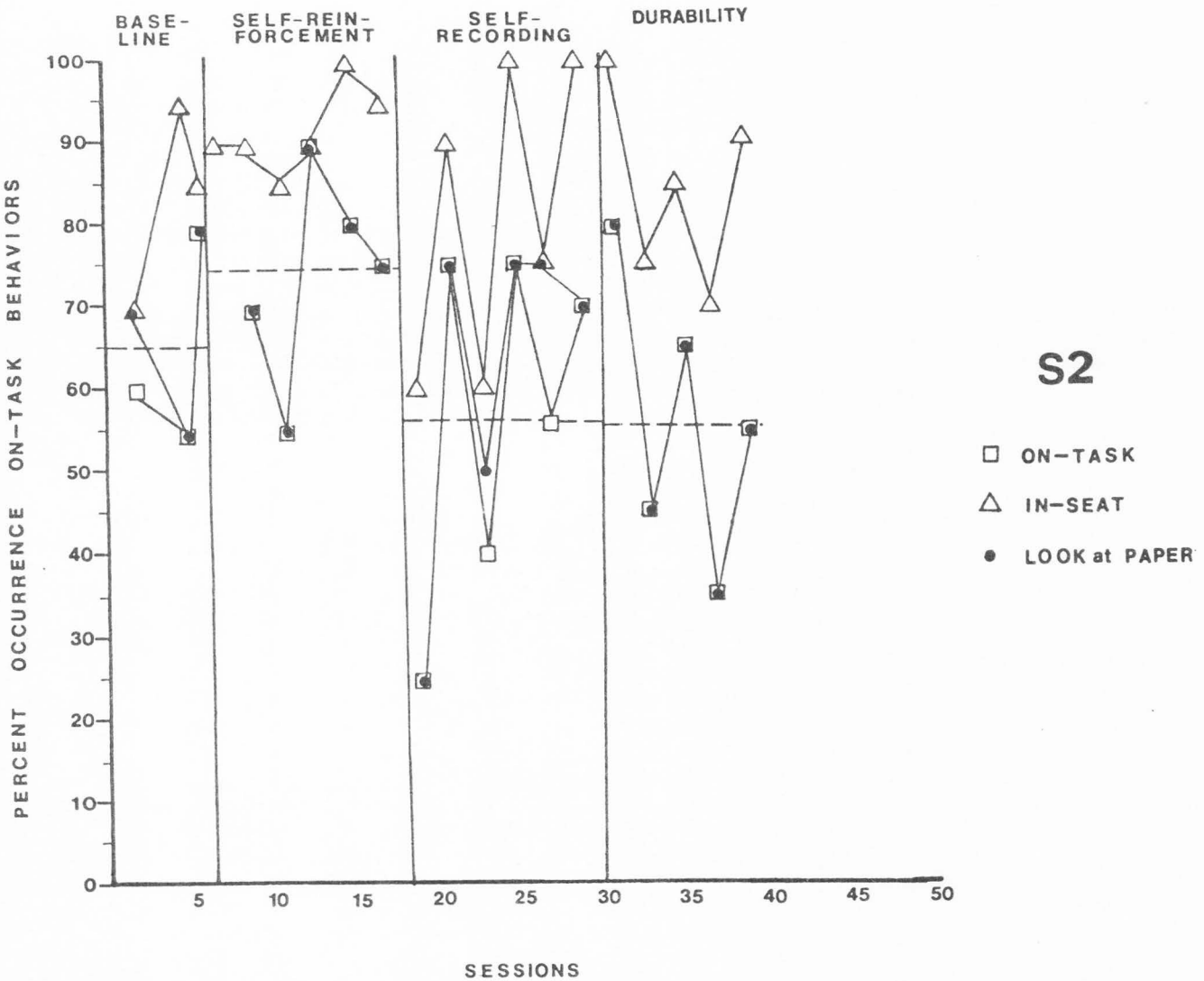
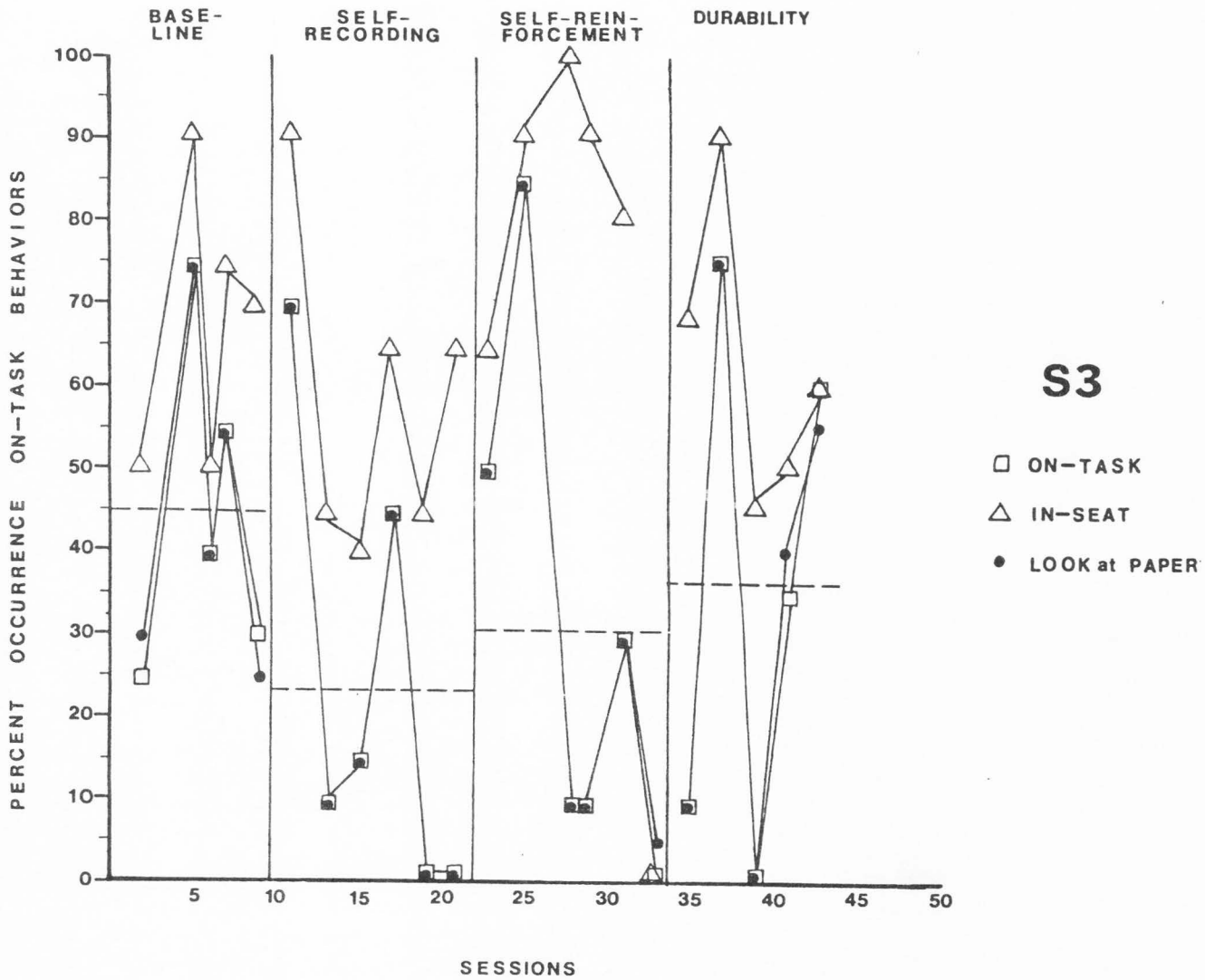

BASE-LINE
SELF-REIN-FORCEMENT
SELF-RECORDING
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
SESSIONS
S2
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 11. Percent of on-task behaviors for Subject 3 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.


BASE-
LINE
SELF-
RECORDING
SELF-REIN-
FORCEMENT
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
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70
60
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40
30
20
10
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10
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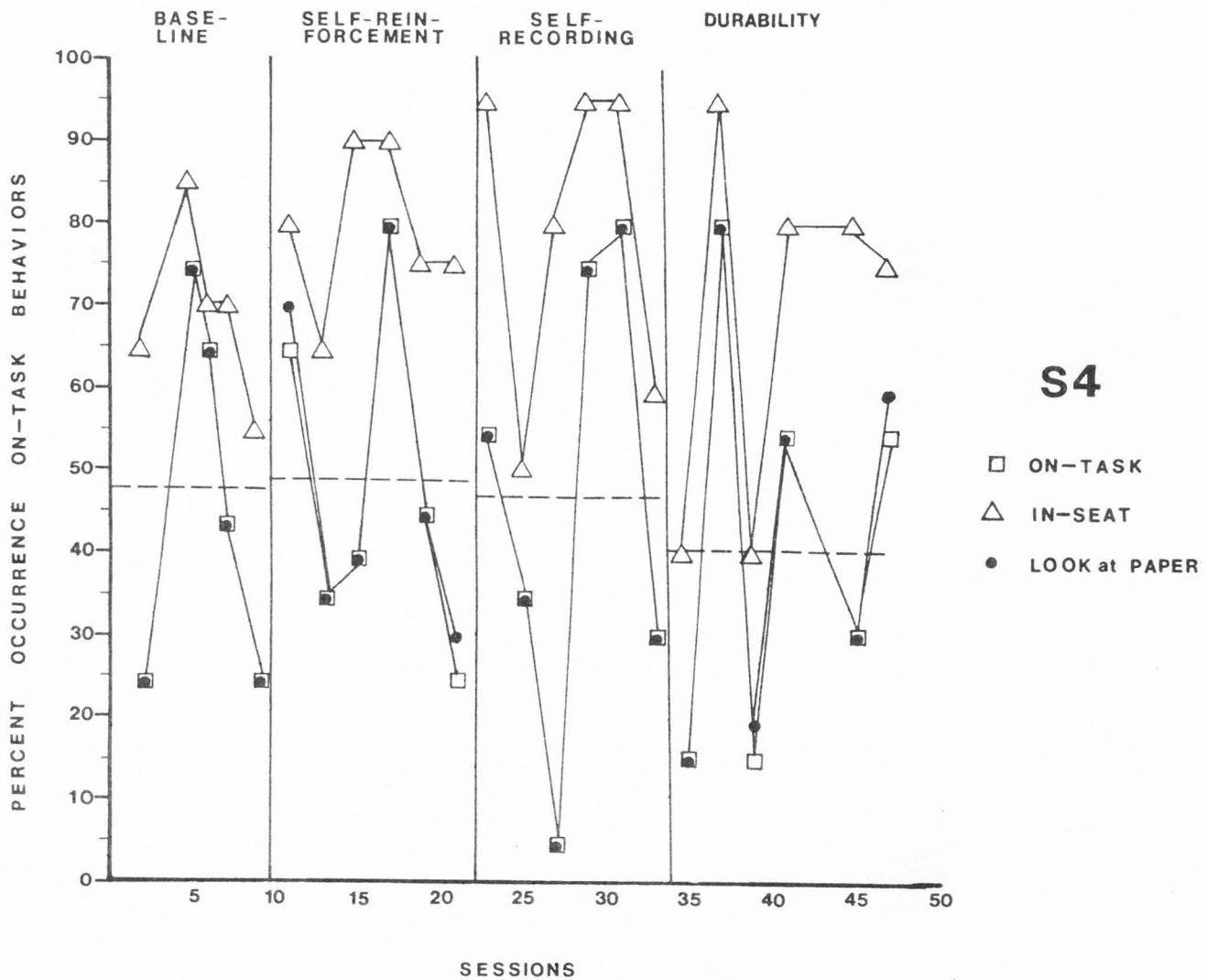
20
25
30
35
40
45
50
SESSIONS
S3
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 12. Percent of on-task behaviors for Subject 4 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.


BASE-
LINE
SELF-REIN-
FORCEMENT
SELF-
RECORDING
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
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40
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20
10
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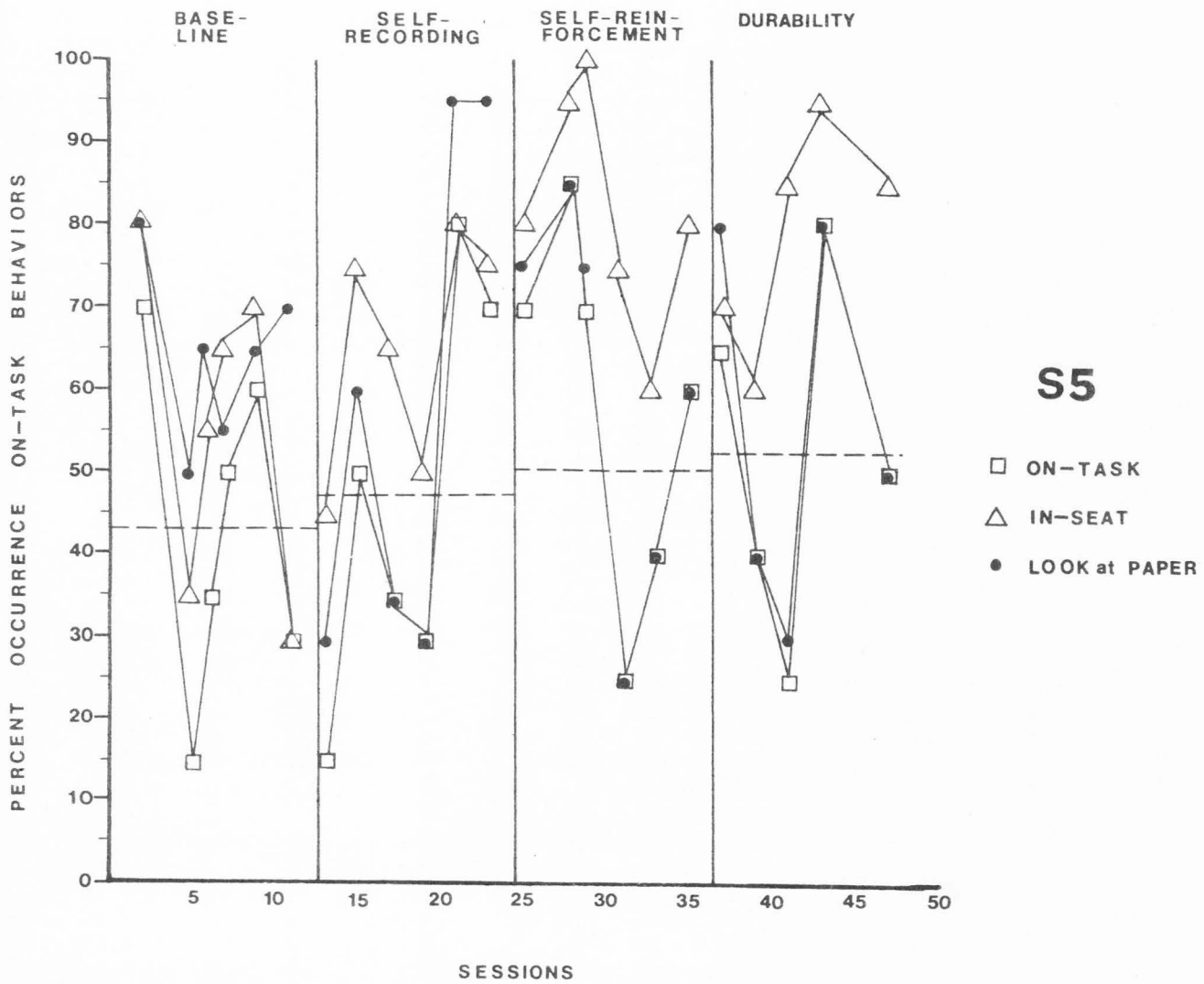
20
25
30
35
40
45
50
SESSIONS
S4
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 13. Percent of on-task behaviors for Subject 5 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.


BASE-
LINE
SELF-
RECORDING
SELF-REIN-
FORCEMENT
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
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30
20
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10
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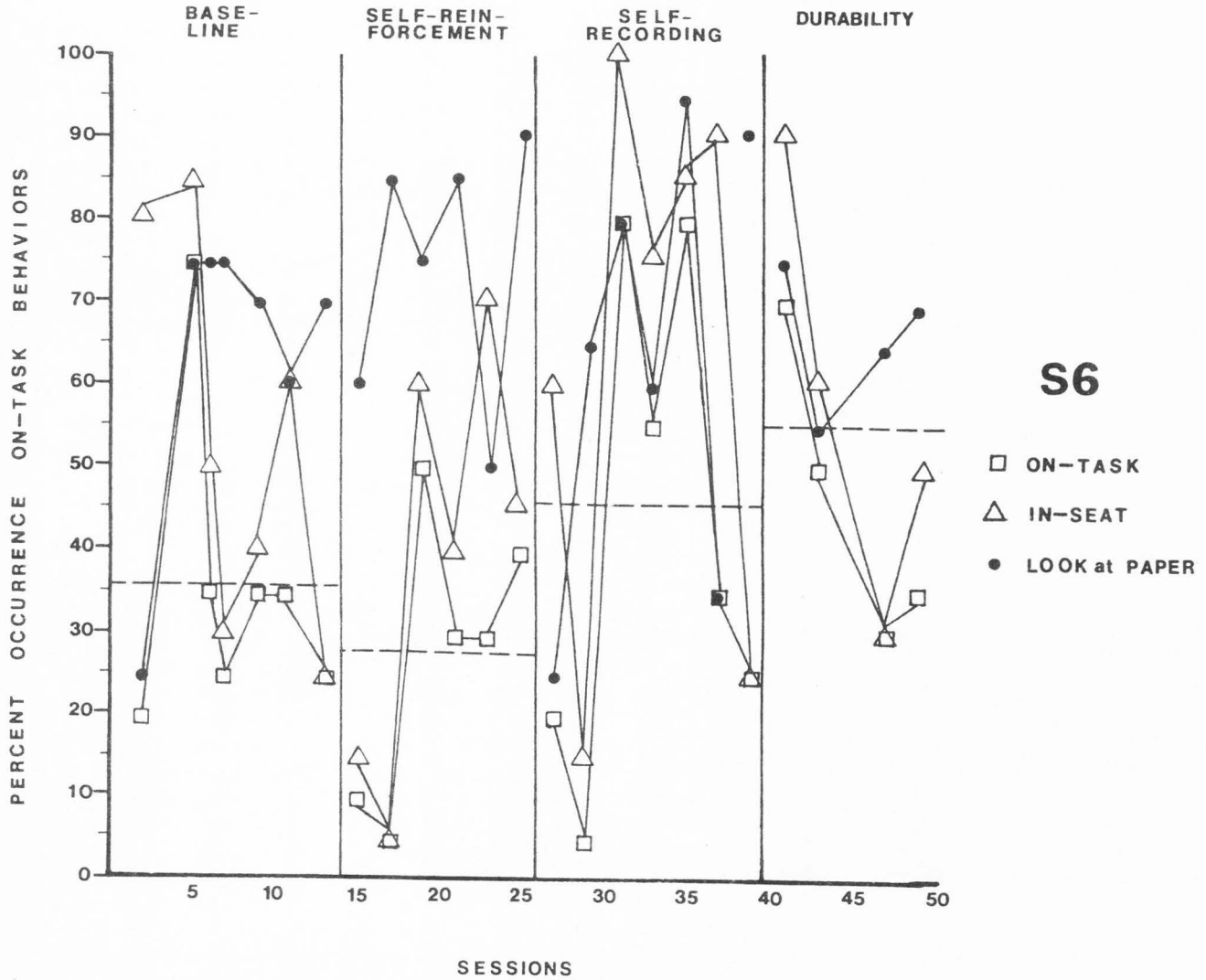
20
25
30
35
40
45
50
SESSIONS
S5
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 14. Percent of on-task behaviors for Subject 6 in Generalization phases occurring during each experimental phase. The dotted line represents the mean percent of on-task behavior during the last three sessions of each Generalization phase.


BASE-
LINE
SELF-REIN-
FORCEMENT
SELF-
RECORDING
DURABILITY
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
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80
70
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20
10
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45
50
SESSIONS
S6
ON-TASK
IN-SEAT
LOOK at PAPER

all phases of the experiment. Table 8 presents the mean occurrence of on-task behavior for generalization sessions corresponding to the experimental phases. Subjects 1, 2, 4, and 5 did not demonstrate significant changes in on-task behavior during generalization, compared to generalization baseline rates, regardless of which particular treatment phase was implemented on the day corresponding to the generalization session. Subject 3 demonstrated a significant decrease in on-task behavior during generalization sessions corresponding to self-recording treatment phases. Subject 6 demonstrated a significant decrease in on-task behavior during generalization sessions occurring during the durability phase.

Table 8

Mean Percent Occurrence of On-Task Behavior During All Generalization Sessions Occurring During Each Major Treatment Phase

Initial Treatment Phase	Subject	Baseline	Self-Recording	Self-Reinforcement	Durability
Self-Recording	1	46.7	54.2	50.0	45.0
	3	45.0	23.3	30.8	36.0
	5	43.3	46.7	50.0	52.0
Self-Reinforcement	2	65.0	56.7	74.2	56.0
	4	47.0	46.7	48.3	41.6
	6	35.7	45.8	27.5	56.0

Teacher Comments

Table 8 presents the mean frequency of teacher positive and negative statements to each subject during all experimental phases. The teacher demonstrated few interactions with the subjects, and it therefore does not appear that significant statements regarding changes in the teacher's behavior can be made. Subjects 5 and 6 tended to receive fewer teacher interactions, both positive and negative, during self-recording and self-reinforcement phases, as compared to baseline and durability phases. Patterns of teacher interactions were not discernable for the other subjects.

Table 9

Mean Frequency of Teacher Statements (Positive and Negative) to Each Subject During the Last Three Sessions of Each Experimental Phase

Initial Treatment Phase	Subject	Baseline		Self-Recording		Self-Rein.		Durability	
		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Self-	1	0.7	0.3	0.3	0.0	0.0	0.0	1.7	0.3
	3	0.0	0.0	0.0	0.0	0.3	0.0	0.7	1.0
	5	1.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3
Self-Reinforcement	2	1.7	0.0	1.0	0.3	2.0	2.0	1.7	1.3
	4	0.3	0.0	0.3	0.7	0.0	0.3	0.6	0.0
	6	1.3	3.0	0.3	0.0	0.0	0.0	0.6	0.6

DISCUSSION

Self-Recording and Self-Reinforcement Procedures

The results of this study indicated that, answering the questions raised by Purposes 1 and 2 of this study, self-recording and self-reinforcement self-control techniques were each effective in significantly increasing on-task behaviors with five subjects classified as Educable Mentally Retarded. Various experimenters have demonstrated the successful implementation of self-control procedures with "normal" young subjects. For example, Broden et al. (1971) and Kunzelmann (1970) demonstrated positive behavior change by implementing self-recording procedures, whereas Felixbrod and O'Leary (1973) and Glynn (1970) demonstrated the successful implementation of self-reinforcement procedures with "normal" subjects. Glynn and Thomas (1974) successfully implemented both self-recording and self-reinforcement procedures in a combined procedural approach with children in a regular classroom. Of the studies reviewed, only two (Nelson et al., 1976; Knapczyk & Livingston, 1973) were found to implement self-control procedures with individuals classified as mentally retarded. Both of these studies yielded successful results, however, the studies employed only the self-record component with older subjects

such as adolescents and adults. The present study appears to be one of the first to attempt the teaching of both self-recording and self-reinforcement procedures, each implemented alone, with young subjects classified as mentally retarded.

One subject demonstrated a significant decrease in on-task behavior during both self-recording and self-reinforcement treatment phases, compared to baseline levels. To assure that this subject understood the directions, after the last session of each treatment phase the subject was asked to describe the procedures to the experimenter. The subject did so without prompting, and therefore it was assumed that the procedures were understood. The observers noted that throughout both treatment phases, this subject frequently looked at the observers or looked at the picture of himself on his desk. Possibly the presence of the observers and the experimenter in the classroom, and the materials necessary for treatment implementation, were distracting for this subject, therefore fostering off-task behavior. It is also possible that free time was not reinforcing for this subject, and a functional reinforcer, therefore, may not have been identified. Broden et al., (1971) and Santogrossi et al. (1973) noted that the failure for their subjects to demonstrate positive behavior change was likely due to poor motivation. The motivational level of the subjects in the present study to increase on-task behaviors was not determined, and therefore, low motivation may have been a factor with the subject who demonstrated a significant decrease in on-task behavior during treatment implementation.

The behavioral changes that occurred with the subjects occurred without initially exposing them to an external contingency system, as was generally done in several past studies (Bolstad & Johnson, 1972); Glynn et al., 1973; Kaufman & O'Leary, 1972; Liebert & Ora, 1968; Santogrossi et al., 1973). Glynn and Thomas (1974) instituted self-control procedures without prior external contingency exposures, and found that cueing, in the form of posting a list and picture of expected behaviors, added greatly to the efficacy of self-control procedures. The present study incorporated individual pictures of each subject performing the desired behavior, and a data sheet for self-recording. Either these or both could have served as a cueing device for the subjects in this study, except perhaps for Subject 4, who demonstrated a significant decrease in on-task behavior during both self-recording and self-reinforcement phases.

As Goldiamond (1976) discussed, external factors may play a role, to some degree, in self-control procedures. In the present study, the presence of the trained observers and the experimenter could have functioned as a type of external control, thereby influencing the results obtained. However, if the presence of these individuals, rather than treatment implementation, was a critical factor, the significant differences achieved between baseline, treatment, and durability phases with these subjects would not have been expected, and more similarity would have been expected across all phases. The presence of these outside individuals would seem to approximate the presence of the regular teacher in the classroom after he/she has initiated self-control procedures, therefore making the results realistic to the classroom setting.

Each subject heard the taped instructions for self-recording and self-reinforcement treatment phases during the first three sessions of each treatment phrase, as prescribed in the procedures. All six subjects correctly verbalized the instructions after the first presentation. By the third instruction session, signs of boredom were noted in all six subjects when they were told to listen to the instructions. Some of the subjects vocalized annoyance at having to review the instructions again. Therefore, the instructions presented appeared to be both simplistic and clear in that apparently only one or two sessions were needed for subject comprehension.

Only one of the six subjects (Subject 4) met the 20% stability criteria of baseline data points before treatment was initiated. For the other five subjects, a downward trend in the rates of on-task behavior was evident. The significant increases in on-task behavior by these five subjects during treatment implementation, despite the downward trend in their performance during baseline, attests to the effectiveness of the procedures implemented.

It appeared that only with one subject (Subject 3) did the implementation of treatment with another subject effect the baseline levels of performance. With Subject 3, the rate of on-task behavior did significantly drop when Subject 1 began the self-recording treatment phase. It is unknown whether the decrease in the rate of Subject 3's on-task behavior was due to chance, other uncontrolled variables, or to confounding, as this subject observed what occurred to Subject 1

during treatment implementation. This decrease in baseline rates of on-task behavior was not evident with any of the other subjects. Therefore, with the exception of the one subject, it appears that the multiple baseline design used did control for the effects of introducing the independent variables along a time dimension.

Due to a general lack of information on what would be an appropriate criteria for clinical significance in the tasks involved in this study, a mean change of 20% was selected. The use of this criteria appeared to be appropriate for subjects who demonstrated high (near 60% pre-treatment baseline means (including Subjects 1, 2, 4 and 5) because a 20% gain would increase their performance to about 80%. However, for the other subjects (Subjects 3, and 6) with low pretreatment means, this criteria does not seem to have been appropriate. More specifically, with the later group of subjects, significant changes were demonstrated according to the criteria, even though the mean percent occurrence of on-task behavior was near or below 50% during treatment implementation. It may, therefore, have been advantageous to utilize a criteria that specified a minimum of 20% gain, plus a minimum overall performance level of 75% or more at the completion of training.

In addition, it appears that median scores, rather than means for the last three sessions of a condition should have been used, since a few extreme scores occurred. An analysis of the number of significant changes occurring when the median of the total sessions during a particular treatment phase was undertaken. Compared to the number of

significant changes obtained by computing the mean of the last three sessions (13 out of 18), there were fewer changes (10 out of 18) when looking at the total medians using the 20% criteria for significance. The use of the median in the present study may have provided a more realistic indicator of the subject's behavior, and therefore, a more realistic indicator of change in the behavior.

The implementation of self-recording and self-reinforcement procedures decreased behavioral variability in several of the subjects. Glynn et al. (1973) also found that the implementation of self-control procedures reduced response variability. In the present study, self-recording tended to be more effective than self-reinforcement in increasing the stability of behavioral responses in five of the subjects. Only one subject (Subject 6) demonstrated increased variability during both treatment phases. Previous to treatment implementation, this particular subject consistently responded within a small range of low percentages of on-task behavior. Perhaps exposure to treatment expanded this subject's behavioral repertoire, resulting in more variable performance during treatment implementation.

During self-recording and self-reinforcement treatment implementation, all subjects either significantly increased or showed a tendency to increase in-seat behavior. Therefore, the implementation of self-control procedures with these subjects fostered less movement throughout the classroom, thereby helping to promote a better work environment both for the individual subject and for the other children.

There was also an increase (significant and nonsignificant) in looking at paper behavior in five of the six subjects. One subject (Subject 4) who did not improve in this area, demonstrated a significant decrease in on-task behavior during both treatment phases. As stated earlier, this may have been a function of increased distractability when treatment procedures were implemented.

Accuracy of Self-Recording and Self-Reinforcement

The question of whether or not young individuals classified as Educable Mentally Retarded can be reliable observers of their behavior has not been explored in the literature, and was addressed in Purposes 1 and 2 of this study. Fixsen et al. (1972) stated that contingent reinforcement may be necessary to achieve good rates of accuracy in self-recording, since some individuals are not "natural" observers. Bolstad and Johnson (1972) and Santogrossi et al. (1973) provided external reinforcement for accurate recordings. During self-recording in the present study, without the use of contingent reinforcement, one-half of the subjects achieved reliability percentages of 70 or greater when comparing their recordings to the recordings of the observers. Two subjects were progressively less accurate in their recordings throughout the self-recording phase. Another subject did not mark the data sheet for an entire session. These difficulties with these three subjects could have been due to a fatigue factor and/or to the absence of external reinforcement for accurate recordings.

The accuracy of self-reinforcement patterns was higher than the accuracy during self-recording. More specifically, four subjects demonstrated an accuracy of 70% or better during self-reinforcement, when comparing their self-reinforcement pattern to observer recordings of on-task behavior. During self-reinforcement, the tokens may have served as reinforcement for making the appropriate dispensing response. It also may have been more rewarding for these subjects to dispense a token rather than to mark a data sheet, as required during self-recording.

There were more incidences of subjects underestimating their behaviors during self-recording, whereas overestimation occurred more frequently during self-reinforcement, possibly due to the fact that overestimation resulted in extra tokens during self-reinforcement. Only Subject 1 demonstrated a difference in the accuracy rates achieved during self-recording and self-reinforcement conditions, with this subject being more accurate during self-reinforcement.

Nelson et al. (1976), after implementing self-recording procedures with adolescents and adults classified as Trainable or Educable Mentally Retarded, concluded that these individuals were as accurate as "normal" subjects in their self-recordings. Nelson made this comparison with previous studies which he had conducted, where he found reliability to range from .64 to .72 with "normal" subjects. In these studies, the subjects were reinforced for accuracy and were aware that reliability checks were conducted. Therefore, the accuracy (reliability) rates obtained in the present study appear to be impressive, and

indicate that young children classified as Educable Mentally Retarded can record their own behaviors and reinforce themselves appropriately.

There was some discrepancy for the subjects between the number of tokens overtly dispensed, and the number of actual tokens taken during a given session, as determined by the observers counting the tokens at the end of each session. This discrepancy may have been due to several factors, such as: (a) slight inaccuracies in observer recordings of subject token dispensing (interobserver reliability was almost 99%); (b) two subjects (Subjects 1 and 4) sometimes took tokens out of their cup and placed them back into the supply cup, resembling a response-cost procedure for apparent off-task behavior during a given interval; and (c) some of the subjects handled the tokens during the procedures, perhaps creating confusion for the subject regarding which tokens belonged in which cup. Also, from observer reports, two subjects (Subjects 2 and 3) were observed to overtly take more than one token at the end of some intervals, or were seen to take a token between intervals. There was no penalty for taking more than one token at the end of any given interval, which may have encouraged this behavior. Of course, there was some control for taking more than one token, since only 20 tokens were available to each subject during a given session.

Additive treatment effects were not apparent with the self-control procedures implemented. The subjects did not show significant behavior changes from the first to the second treatment phase, regardless of the specific treatment order. The subjects who had longer baseline

periods did demonstrate larger percentage of change in on-task behavior. Perhaps the longer baseline subjects had ample opportunity to observe the other subjects on both treatment conditions, thereby enhancing their own performance. It is also possible that the subjects who had longer baselines tended to be bored during baseline, therefore increasing their responsiveness to the treatment procedures, which offered novelty of stimulation.

Generalization and Maintenance Effects

Glynn and Thomas (1974) discuss the need for systematic generalization and maintenance (durability) observervations in self-control studies. After reviewing the literature, it became evident as pointed out by Glynn and Thomas, that past studies that implemented self-control procedures with young children neglected to investigate generalization and maintenance effects. In an attempt to investigate these areas, Glynn and Thomas conducted informal observations two weeks following treatment cessation, and found drastic decreases in on-task behavior, therefore indicating a lack of durability or maintenance of the effects of the self-control procedures that were implemented during the experiment.

The present study systematically investigated generalization and durability effects, in accordance with Purposes 4 and 5. Regarding the durability of on-task behavior following the application of self-control techniques (Purpose 5), in only one subject (Subject 6) was the performance of the behavior maintained at a level significantly greater than baseline

levels and similar to treatment rates. Two subjects (Subjects 2 and 3) demonstrated a trend (nonsignificant) towards maintaining the on-task rates of behavior achieved during treatment phrases. Two subjects (Subjects 1 and 4) demonstrated a trend to decrease their on-task behavior from baseline to durability phases. One subject's behavior (Subject 5) was identical during both baseline and durability phases. Therefore, maintenance effects were only clearly evident with one subject.

Two subjects demonstrated significant maintenance (and one subject a nonsignificant trend) of the rates of in-seat behavior (Purpose 4). Three subjects demonstrated a trend towards maintaining the rate of looking at paper behavior. Therefore, there was evidence that in-seat and looking at paper behaviors were maintained after the self-control procedures had been terminated. It did not appear that either self-recording or self-reinforcement were differentually effective in fostering the maintenance of on-task behavior, since there was no pattern whereby either one of these treatment immediately preceded durability phases during which on-task behaviors were maintained.

Regarding generalization of on-task behavior to times outside of experimental session times, four of the six subjects did not generalize the rates of on-task behavior achieved during either self-recording or self-reinforcement treatment implementation to other times. Generalization effects may have been inhibited by the absence of materials, such as data sheets, the subject picture, and/or tokens, necessary

for either self-reinforcement or self-recording procedures. One subject (Subject 3) showed a significant decrease in on-task behavior during generalization sessions corresponding to the implementation of the self-recording phase. This decrease in on-task behavior might have been due to the subject's reaction to not being under procedural control during generalization sessions. That is, for this particular subject generalization sessions immediately preceded treatment sessions, and therefore, it is possible that the subject, knowing that during self-recording sessions he would probably remain on-task a great deal of the time, was more likely to display off-task behaviors during non-treatment times.

Another subject (Subject 6) demonstrated an increase in on-task behavior during generalization phases corresponding to the implementation of the durability phase. This may reflect a cumulative treatment effect, in that generalization occurred only after the subject was exposed to both treatment conditions. Therefore, it appears that maintenance and generalization effects were not evident consistently with all subjects in this study, and no specific patterns emerge relative to treatment presentation (Purpose 3).

Teacher Behavior

In studies by Bolstad and Johnson (1972), Glynn (1970) and Glynn and Thomas (1974), self-control procedures were implemented in the classroom, but attempts were not undertaken to investigate teacher behavior towards the subjects. Kaufman and O'Leary (1972) systematically

observed teacher behavior, and found no significant differences in the teacher's behavior throughout all phases of their experiment. In the present study, the classroom teacher did not interact frequently with any of the six subjects during the experiment, although she was instructed to go about her usual classroom business. Although two subjects (Subjects 5 and 6) appeared to receive fewer teacher comments during the treatment phases, in general, distinguishable interactive patterns were not evident. Therefore, in both this study and the study by Kaufman and O'Leary (1972) teacher behavior did not change as a result of positive changes in student behavior. These findings appear to contradict the postulation by Broden (et al. (1971) that positive behavior changes in students resulting from the implementation of self-control procedures can have a positive effect on teacher behavior. The teacher's verbal control and external contingency control system in effect before treatment was implemented (completed work was traded for free time and being able to go to lunch on time) did not appear to be effective in fostering on-task behavior, as reflected in low pre-treatment baseline rates of on-task behavior.

During self-recording and self-reinforcement phases, all subjects were occasionally observed to reprimand any other child in the classroom who was a distraction to their on-task behavior. For example, if while working, another child approached a subject's desk and began to verbalize, remarks were made by the subject such as, "No, leave me alone", or "Get out of here." Also, on occasion, if a particular subject did not

immediately respond by marking the data sheet or taking a token when a recording interval ended and the subject was in either the self-recording or the self-reinforcement treatment phase, other children in the room, both subjects and non-subjects, reminded the subject that the beep had sounded.

Combined Treatment Procedure

To determine the effects of a combination of self-recording and self-reinforcement procedures, three subjects (Subjects 1, 2, and 3) were exposed to both self-recording and self-reinforcement simultaneously after the durability phase of the experiment was completed. The other three subjects were not exposed to the combination treatment procedure because the school year came to an end. Combination treatment session data is represented on Figures 15 through 17 for these subjects, found in Appendix H. Also, Table 10 (Appendix H) shows the mean percentage of on-task behaviors during the last three sessions of the combined treatment approach. Comparing the mean rates of on-task behaviors achieved during self-recording and self-reinforcement conditions presented alone, with the rate during the combined treatment phase, two subjects (Subjects 1 and 3) demonstrated equivalent performance and the other subject demonstrated performance similar to baseline rates, perhaps due to boredom with the procedures by the time combined treatment was in effect. Therefore, the implementation of both major components of self-control, as previously done by Glynn et al. (1973) and McLaughlin and Malaby (1974), did not appear to be more effective than singular

treatment implementation in terms of behavior change. The percentages of in-seat and looking at paper behaviors were (Table 8, in Appendix H) also similar to singular treatment presentation rates with these three subjects.

Examining the accuracy of self-recordings and self-reinforcement patterns compared to observer recordings during the combined treatment phase, Subject 1's accuracy rate mirrored the rate achieved during self-reinforcement. However, the accuracy of this subject's self-recordings was significantly increased during the combined treatment phase, as compared to the self-recording phase. Subject 2's accuracy of self-recordings and self-reinforcement patterns significantly decreased during combined treatment (perhaps due to confusion), whereas Subject 4's rates of accuracy remained approximately the same for singular and combined treatment presentation. Therefore, no differential pattern of reliability/accuracy emerged during combined treatment implementation compared to single treatment presentation.

Table 11 presented in Appendix H shows the underestimating and overestimating rates for each component of combined treatments for these subjects. These results indicate that Subject 1, in self-recordings, underestimated performance less under the combined treatment compared to underestimation during self-recording. Subject 2 overestimated his performance in his self-recordings and self-reinforcement patterns more under combined treatment. Subject 3's patterns in these areas were similar when compared to singular treatment presentation.

Although during the combined treatment phase both self-recording and self-reinforcement responses were required, only Subject 1 showed identical patterns of recording and reinforcing during the same sessions. Regarding the variability of scores, it must be remembered that since fewer sessions were conducted during the combined treatment, there were less opportunities to produce divergent scores. Variability between extreme scores appeared to be high during the combined treatment phase for Subject 1 and Subject 2. Comparing the combined treatment generalization rates (Table 8) with generalization baseline rates (Table 6), generalization effects were not evident with these subjects during the combined treatment approach.

In general, the preliminary results obtained indicate that a combined treatment approach, presenting both major components of self-control simultaneously, was not more powerful in fostering behavior change. The combined treatment approach did not increase the accuracy of these subjects in terms of their self-recording and self-reinforcement patterns. Interestingly, two of the subjects exposed to the combined treatment approach demonstrated different self-recording and self-reinforcement patterns within the same session. Finally, variability between extreme percentage scores appeared not to decrease as a result of implementing both treatments simultaneously.

Therefore, it appears that implementation of one major component of self-control can be as effective as a combined treatment approach in bringing about behavior change in pre-adolescent children classified

as Educable Mentally Retarded. The results obtained in this study indicate that self-control techniques present a viable alternative to external control techniques with a young special population, as supported by Kurtz and Neisworth (1976), Lawrence and Winschel (1975) and Mahoney and Mahoney (1976). These subjects were taught self-control procedures through a very simplistic instruction presentation, placing few time demands on the classroom teacher who would implement such procedures in the non-experimental classroom.

General Discussion

This demonstration of the efficacy of implementing self-control procedures with a special population leads to suggestions regarding the direction of future research. To increase the applicability of self-control procedures with a more diverse population, such as individuals classified as emotionally disturbed and/or trainable mentally retarded, and to further simplify the procedures for ease of implementation in the classroom, variations of the procedures implemented in this study could be experimentally introduced. For example, a more compact and exportable unit chould be developed for self-recording, such as a small notebook or index card, which could be carried easily with the child throughout the school day (and at home, if self-control procedures were implemented there). Or, a wrist counter could be used as the self-recording technique. This would take less time than marking a data sheet, and would, therefore, detract less from the subject's attention to the task. Where videotaping equipment is available

in the classroom, the instructions could be taped and the child could view the instructions when necessary without using the teacher's time.

Probably the emphasis in future research should be on developing and simplifying self-recording procedures, since the use of these procedures would eliminate the use of school time as free time periods, often characteristic of self-reinforcement procedures. Furthermore, by teaching a child self-recording techniques, it would seem easier for the child to use the procedure later in other settings, rather than self-reinforcement, where reinforcers such as free time may not be readily available. It would be interesting, and perhaps advantageous, to develop a self-graphing procedure with pre-adolescents classified as intellectually/emotionally handicapped. Self-graphing may facilitate the effects of self-recording, since the graph would provide the subject with visual proof of change and would act as a progress report.

Another variation of the procedures implemented in this study might be to give the child free access to self-recording (or self-reinforcement) materials, thereby allowing the child the option of whether or not to self-record during the school day. It would be informative to find out if the subject would choose to engage in self-control techniques. This information could serve as an indicator of the role of motivation in behavior change. Also, free access may encourage generalization and maintenance of the behaviors.

As Cautela (1969) pointed out, self-control responses are likely to be maintained in the natural environment. In the present study this

was only found with one subject. It was noted that the teacher's behavior did not become more positive to any subject, even after positive behavior changes had occurred. This finding may explain, at least in part, why the behavioral changes were not maintained. Future research in what factors, such as teacher behavior, and possibly free access to the self-control materials, would encourage generalization and maintenance effects, since the utility of self-control procedures will be realized when self-control behaviors are not restricted to the experimental setting.

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APPENDICES

Appendix A

Utah State Board of Education
Guidelines for the Handicapped

A. CATEGORY: Educable Mentally Retarded

B. DEFINITION:

Mental retardation refers to significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior* and manifested during the developmental period (definition from American Association on Mental Deficiency). Persons whose intellectual disabilities prevent proper growth through regular program offerings, but who appear capable of acquiring primary academic skills, social adequacy and occupational competency are included in this category. Extreme care should be taken in the use of I.Q. scores. On an individual psychological test, mental retardation is generally indicated by a low score with a flat profile and fall within the I.Q. range of 55-75.

C. CLASSIFICATION GUIDELINES:

1. Eligibility is determined by a thorough case study provided by a multidisciplinary diagnostic team which must assess psycho-educational and adaptive functioning.

2. I.Q. generally 55-75, as determined by an individual psychological examination administered by a qualified psychological examiner using one or more standardized tests.

3. Adaptive behavior* assessment must show evidence that low I.Q. is not a function of:

   environmental disabilities
   experiential deprivation
   ethnic variables

4. Multidiagnostic instruments reveal a uniformly low profile.

* Adaptive behavior is defined as the effectiveness or degree with which the individual meets the standards of personal independence and social responsibility expected of pupils of comparable age and cultural group.

Appendix B

School Permission Letter

UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

ERSITY AFFILIATED
NAL CHILD CENTER

February 27, 1978

Dr. Bryce Draper
Superintendent, Cache County
School District
2063 North 12th. East
Logan, Utah 84321

Dear Dr. Draper:

I am currently a staff psychologist at the Exceptional Child Center and I am concurrently completing my doctoral degree in Clinical Child Psychology at Utah State University. For my dissertation study, my graduate committee has approved my proposal entitled: "The Use of Self-Control Procedures with Pre-Adolescent Individuals Classified as Educable Mentally Retarded". I would very much like to implement my procedures with six of the students enrolled in the Educable Mentally Retarded Classroom located at Summit School in Smithfield, taught by Mrs. Mary Gallery. I have discussed the procedures with Mrs. Gallery and she is extremely interested in initiating the procedures in her classroom. I also discussed my general procedures with Mr. Carl Johnson, Director of Special Services on February 24, 1978. He suggested that I write a synopsis of the procedures for your review and approval.

The study would involve six students in the classroom. The students will participate on a volunteer basis. Also, each student's parent will be provided with a brief description of the program and signed parental permission will be obtained. The confidentiality of each participating student would be respected and no identifying information will be given to any agency/person regarding any particular student.

For the actual procedure, each pupil will be involved for a total of twenty minutes daily for 24 school days. At the beginning of each daily session, the student will be asked to listen to a 30 second tape recording telling them how to record behaviors. Basically, the pupil will be told that periodically during the 20 minute period, while he/she is engaging in regular classroom activities, he/she is to mark on a data sheet (provided by myself) behavioral occurrences. Therefore, the procedure will not disrupt regular classroom work, will not involve any

teacher time or disruption to her regular activities, and will simply require that the student periodically mark his data sheet for the 20 minute period, therefore, requiring minimal time expenditure by the student.

Past research, with "normal" children has shown that this simplistic procedure may result in significant changes in behavior. Therefore, it may be that exposure to this simple procedure can have positive effects on the child's behavior in general. After the study is completed, I would be very happy to provide you with a copy of my results, and help Mrs. Gallery maintain the procedures in the classroom if she so chooses.

I am enthusiastic about the potential of implementing these simplistic procedures and would very much like to obtain your approval. If I can answer any questions that you may have, please feel free to contact me at the University at 752-4100, extension 8273.

I anticipate beginning the study by March, 1978, in order to have it completed during the school term, so I would appreciate hearing from you as soon as possible.

Thank you for your time.

Sincerely,

Lizabeth McGill

Lizabeth McGill

LM/ph

Appendix C

Child's Consent Form

March 10, 1978

I want to be in your study.

_____

NAME

Appendix D

Parental Letter and Parental Consent Form

UTAH STATE UNIVERSITY · LOGAN, UTAH 84322

VERSITY AFFILIATED
IONAL CHILD CENTER

Dear Parent:

We would like to obtain permission to include your child in an experiment project concerned with teaching children self-control techniques in order to help them modify their own behaviors. This letter is intended to explain what the project is about, how it is conducted, and what possible benefits may result for your child. We would be pleased to answer any particular questions you may have concerning the project. You may feel free to contact me at 752-4100, extension 8273.

Enclosed is a permission slip which, when signed, will allow your child to participate in the project.

The purpose of this project is to teach children in a classroom setting both to record their own behaviors and to apply reinforcement procedures to reward themselves for behaving appropriately. Self-control procedures have been used successfully with both adults and children for various types of problems, and we are interested in determining whether or not self-control procedures can be successfully taught to children who have encountered some difficulties with academic work and/or are having behavioral difficulties in school.

The children will be initially provided with instructions from the regular classroom teacher regarding the basic self-recording and self-reinforcement procedures. Each child will then participate in these two procedures. Throughout the entire experiment unobtrusive trained observers from Utah State University will be observing the child's behavior in the classroom during the experimental session.

There will be no financial cost for parents whose children are involved in the project. Each child would participate for approximately thirty minutes per day, Monday through Friday. The exact time for the session will be determined with the teacher. The session will occur during a study period and will, therefore, not interfere with regular academic work. To date there have been no reports of negative effects reported by others receiving or providing this type of training. In fact, positive results have been reported in terms of children learning to control their own behaviors and subsequently adapt more favorably to situations such as the classroom setting.

Should a child decide that he or she does not wish to participate in this project at any time, even though parental permission has been obtained, he or she will not be required to do so.

Although there are no guarantees, we anticipate that children will learn basic self-control techniques through the training offered, and that they will then be able to use this training to modify their own behaviors in other situations, especially in the classroom. If these goals can be achieved for your child, there could be a number of other beneficial side effects such as greater fellow-student harmony, a more acceptable attitude towards school and school work, and increasing academic accomplishments.

We are vitally concerned with maintaining the personal confidentiality of each child. To this end, no children will be identified by name on any results of the project. Rather, they will be identified by number, thus assuring confidentiality. In addition, the data on individual children will not be available to persons not directly concerned with the project. We welcome your interest in this project, and are available to discuss it with you at any time.

If you have questions, and you feel that you would like your child to receive the training we have outlined in this letter, please sign the enclosed permission slip. We would also appreciate your returning the permission slip if you decide not to allow your child to participate.

Sincerely,

Lizabeth A. McGill

LIZABETH A. McGILL, M.A.
Staff Psychologist

LAMcG:na

Enclosure

PARENTAL PERMISSION

I have read the letter outlining the purposes and procedures of the project concerned with teaching children self-control techniques, and hereby give my informed consent as parent or legal guardian of _____ to participate as a
(Child's Name)
subject in this project being conducted by the staff of the Exceptional Child Center.

_____ _____
(Date) (Parent's Signature)

I do not give my permission for _____
(Child's Name)
to participate in the project as outlined.

_____ _____
(Date) (Parent's Signature)

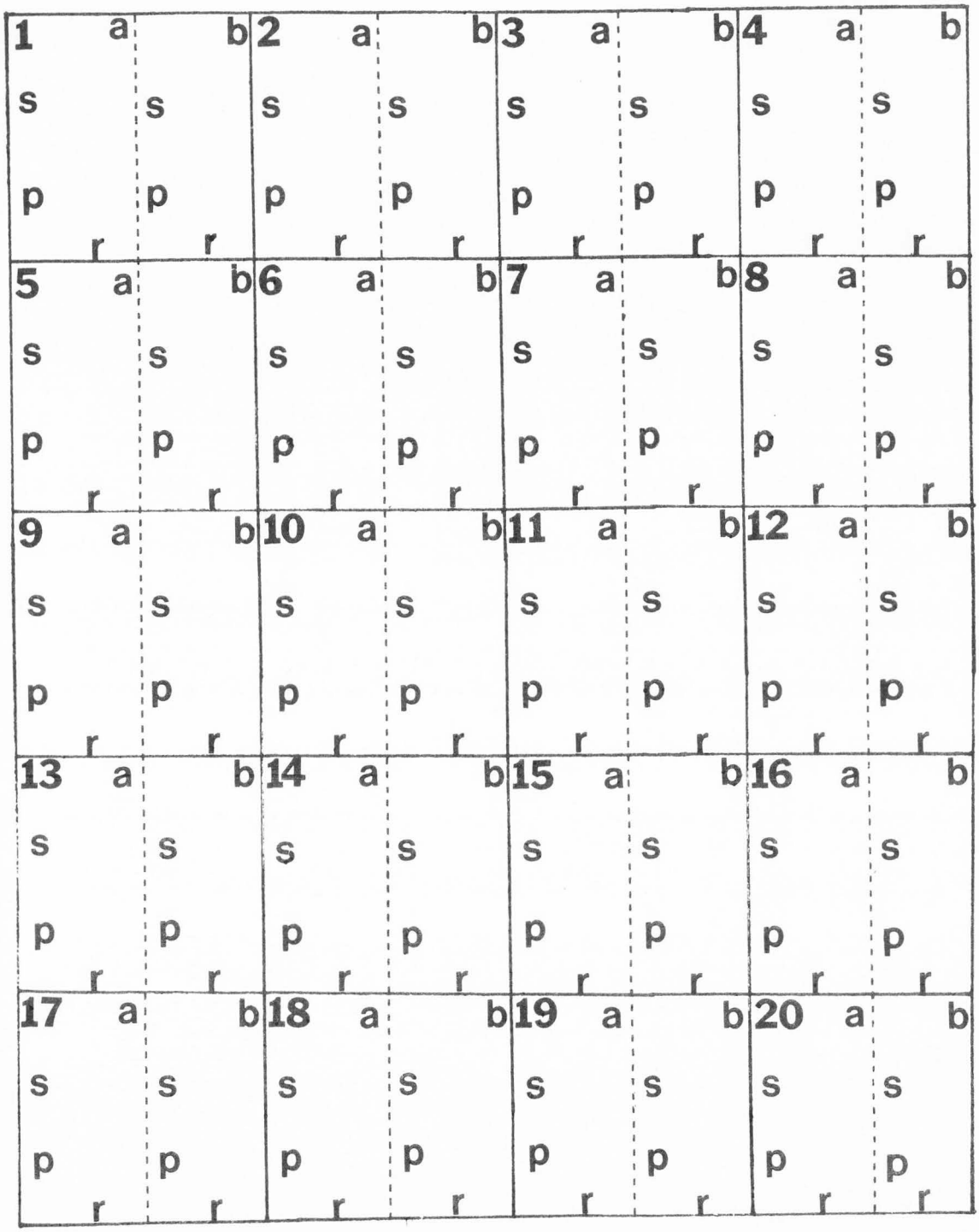
Appendix E

Classroom Seating Plan

S4
TEACHER'S DESK
S3
S1
S2
S6
S5

Appendix F

Sample Observer Data Sheet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s s
p p
r r
18 a b
s s
p p
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Appendix G

Sample Subject Data Sheet

1 yes no	2 yes no	3 yes no	4 yes no
5 yes no	6 yes no	7 yes no	8 yes no
9 yes no	10 yes no	11 yes no	12 yes no
13 yes no	14 yes no	15 yes no	16 yes no
17 yes no	18 yes no	19 yes no	20 yes no

Appendix H

Combined Treatment Data

Figure 15. Percent of on-task behaviors for Subject 1 during the combination treatment phase and all preceding experimental phases.

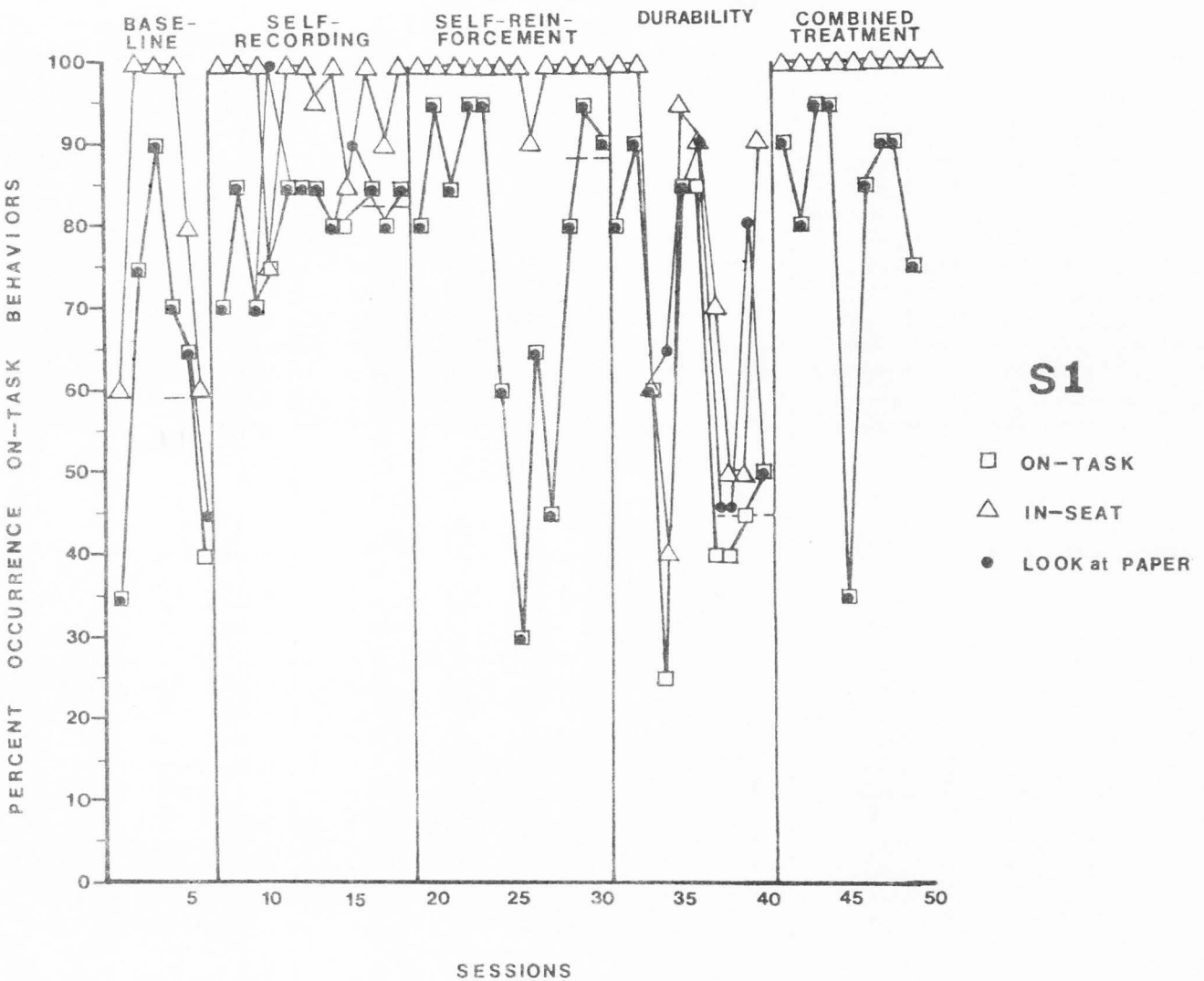

BASE-LINE
SELF-RECORDING
SELF-REIN-FORCEMENT
DURABILITY
COMBINED TREATMENT
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
SESSIONS
S1
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 16. Percent of on-task behaviors for Subject 2 during the combination treatment phase and all preceding experimental phases.

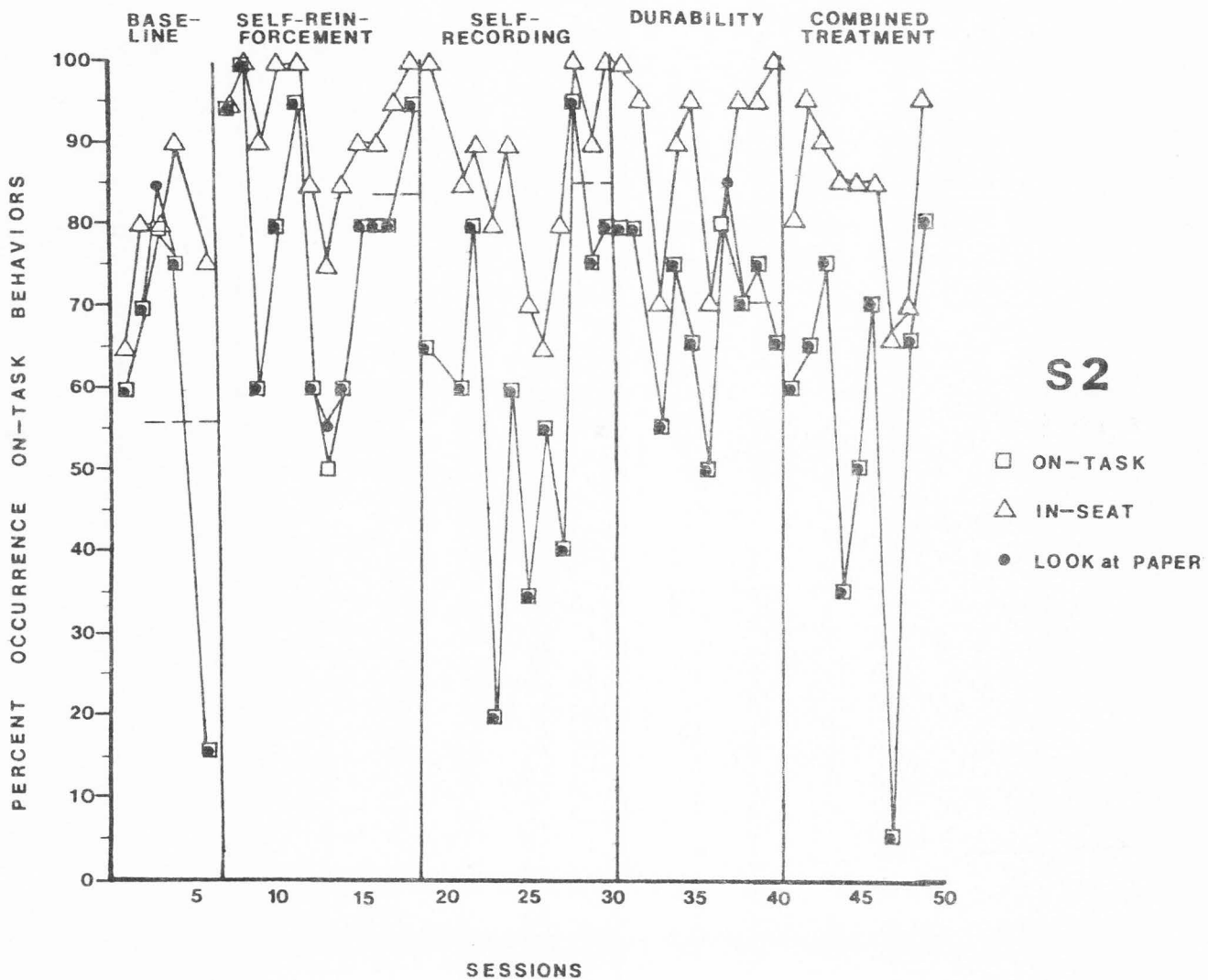
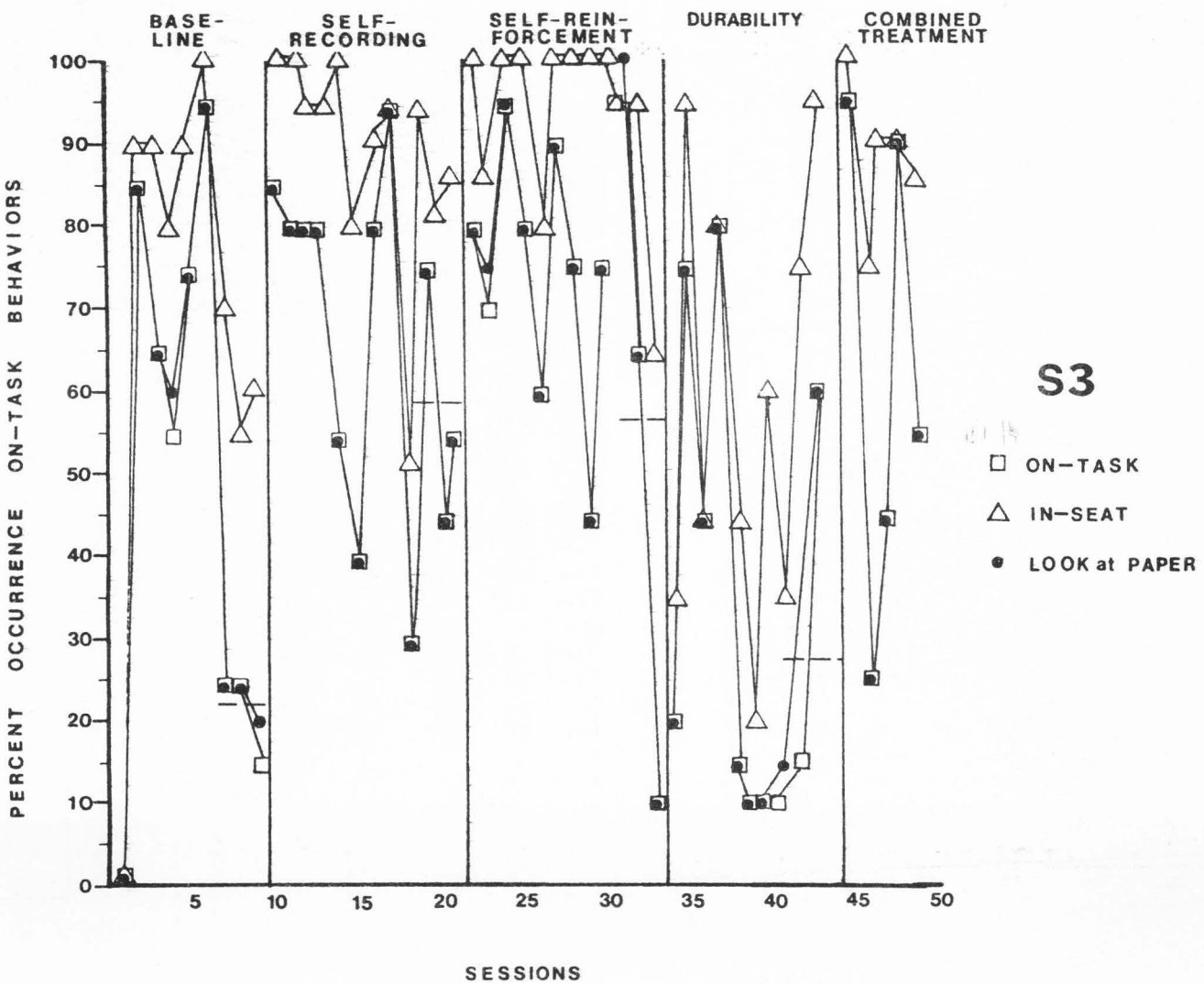

BASE-LINE
SELF-REIN-FORCEMENT
SELF-RECORDING
DURABILITY
COMBINED TREATMENT
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
60
50
40
30
20
10
0
5
10
15
20
25
30
35
40
45
50
SESSIONS
S2
ON-TASK
IN-SEAT
LOOK at PAPER

Figure 17. Percent of on-task behaviors for Subject 3 during the combination treatment phase and all preceding experimental phases.


BASE-LINE
SELF-RECORDING
SELF-REIN-FORCEMENT
DURABILITY
COMBINED TREATMENT
PERCENT OCCURRENCE ON-TASK BEHAVIORS
100
90
80
70
60
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30
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5
10
15
20
25
30
35
40
45
50
SESSIONS
S3
ON-TASK
IN-SEAT
LOOK at PAPER

Table 9

Mean Percent Occurrence of On-Task Behaviors During the Last Three Sessions of Combined Treatment and During Generalization Sessions Occurring During the Combined Treatment Phase

Subject	Combined Treatment	Generalization
1	85.0	45.0
2	50.0	42.0
3	63.3	41.7

Table 10

Mean Percent of Subject Underestimates and Overestimates of On-Task Behaviors During the Last Three Sessions for Each Component (Self-Recording and Self-Reinforcement) of Combined Treatment Phase

Subject	Self-Recording		Self-Reinforcement	
	Underestimate	Overestimate	Underestimate	Overestimate
1	0.0	15.0	0.0	15.0
2	5.0	46.7	11.7	36.7
3	0.0	25.0	6.7	26.7

VITA

LIZABETH A McGILL

Personal Data

Date of Birth: July 9, 1947
Place of Birth: Bridgeport, Connecticut
Current Address: Exceptional Child Center
Utah State University, UMC 68
Logan, Utah 84322
Telephone: (801) 752-4100, ext. 8273

Educational History

Ph.D. Utah State University, Clinical Child Psychology.
Planned completion date: August, 1978
Dissertation: The Use of Self-Control Procedures with Pre-Adolescent Individuals Classified as Educable Mentally Retarded.

M.A. Southern Connecticut State College, Psychology, 1972.
Thesis: Sex Role Preference in Four and Five Year Old Children.

B.A. Southern Connecticut State College, Psychology, 1969.

A.A. Westbrook Junior College, Social Sciences, 1967.

Related Professional Experiences & Training

1969-1972 Assistant Instructor of Psychology, Southern Connecticut State College.

Responsibilities: Assistance with course teaching; development and scoring of tests for an undergraduate course in introductory developmental psychology.

1969-1971 Psychological Examiner, Speech and Hearing Clinic, Southern Connecticut State College.

Responsibilities: Individual intelligence testing of preschool age children attending the clinic.

1972-1973 Instructor in Psychology, Southern Connecticut State College.

Responsibilities: Teaching developmental psychology to both undergraduate and graduate students, including activities such as preparing lectures, developing tests, grading, and student counseling.

1972-1973 Psychological Consultant, Board of Education, Milford, Connecticut.

Responsibilities: Academic tutoring and counseling with children classified as emotionally handicapped.

1973-1974 Staff Associate, Exceptional Child Center, Utah State University.

Responsibilities: Collection of various types of behavioral data; development and implementation of direct behavior modification programs with children having developmental disabilities.

1974-1975 Psychologist, MAPPS Project (Multi-Agency Project for Preschoolers), Exceptional Child Center, Utah State University.

Responsibilities: Developmental/behavioral assessment of children from infancy to age 5, having developmental disabilities; formulation of developmental and behavioral prescriptions (home programs); implementation of individual parent counseling; assistance with the development of parent training workshops; and development of an attitude scale for parents of exceptional children.

1974-1975 Evaluation Specialist, Utah State Board of Education.

Responsibilities: Team member on evaluation of experimental design, project implementation, data collection procedures and data analysis of Title III research projects; and, preparation of summary reports submitted to the Utah State Board of Education.

1977 Evaluator for Division of Family Services Parent Guidance and Training Project, Exceptional Child Center, Utah State University.

Responsibilities: Development and administration of criterion-referenced assessment of children and adults classified as severely mentally retarded throughout Utah.

1973-present Staff Psychologist, Exceptional Child Center, Utah State University.

Responsibilities: Intake coordination and management of multidisciplinary assessment teams; individual case coordination; selection and administration of psychological/educational assessment batteries; educational programming consultation; development and management of behavioral treatment programs for home/school; implementation of both individual and family therapy, including relaxation training; comprehensive writing evaluations for multidisciplinary and disciplinary case intake and follow-up; and staffing presentations.

1975-present Supervisor, Psychology Clinical Practicum, Exceptional Child Center, Utah State University.

Responsibilities: Provision of training and supervision of psychology graduate students in case coordination of multidisciplinary assessment teams; interview techniques; selection and administration of educational/psychological assessment batteries; report writing; development and implementation of treatment programs; and family and individual therapy programs.

Special Fields of Interest

Child Development
Developmental Disabilities
Family Therapy-Adult Behavior/Cognitive Therapy
Multi-Modal Therapy
Self-Control Techniques

Publications

McGill, et al. Encyclopedia of Sociology. Guilford, Connecticut: 1972.

Working Papers

Sex-role preference in four and five year old children. (Will be submitted to: Journal of Consulting and Clinical Psychology, 6/1/78).

Television viewing behavior: a review of the literature.

Grant Writing

Team member on the following grant:

TV and family interaction: a field-experimental study. Dr. J. Grayson Osborne, Principal Investigator, Department of Psychology, Utah State University, 1973 (submitted to Department of Health, Education and Welfare, 1973).

Presentations:

The Development of an Attitude Scale for Parents of Exceptional Children. Rocky Mountain Psychological Association, May, 1975.

Infant Assessment Techniques. Psychodiagnostics Seminar, Utah State University, March, 1975.

Mini-Workshop: Bayley Scales of Infant Development. Infant Education Project, Weber State College, Summer, 1975.

Demonstration of a Clinical Intake and Discussion of the Assessment Techniques. Nevada Rural Mental Health Clinics Workshop, Exceptional Child Center, Utah State University, August, 1977.

Parent Counseling Techniques. MAPPS Workshop for Utah-Nevada Rural Mental Health Clinics, Exceptional Child Center, Utah State University, September, 1977.

Parent-Sibling Training Workshop, Families of Exceptional Children, Idaho Falls, Idaho, May, 1978.

References

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