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THE EFFECT OF A COVERT BEHAVIORAL SELF-CONTROL PROCEDURE ON THE ON-TASK BEHAVIOR OF ELEMENTARY SCHOOL CHILDREN: A TIME SERIES ANALYSIS

A Dissertation

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ABSTRACT

In this investigation, five students in each of three groups were used to investigate the effect of instructions to engage in Covert Positive Reinforcement (CPR) on the on-task behavior (OTB) of elementary school children. The effect of a covert modeling control procedure was also investigated. Group I was exposed to an ABAB sequence of conditions, in which the A conditions were baseline conditions, and the B conditions were CPR conditions. Group II was exposed to an ABACA sequence, in which the A conditions were baseline conditions, the B condition was a CPR condition in which CPR was implemented in a classroom situation with all students in the classroom, and the C condition was a CPR condition in which the CPR procedure was implemented in a small group situation (three students received CPR, while two received an Attention-Control procedure). Group III was exposed to an ABACDE sequence of conditions. The A conditions were baseline conditions, and the B condition was a covert modeling control condition, in which the covert modeling procedure was implemented in a classroom situation, with all students participating. The C condition was a covert modeling condition in which the covert modeling procedure was implemented in a small group setting. The D condition was a CPR condition in which CPR was implemented in a small group setting,

while the E condition involved CPR procedures which were administered on an individual basis. During the CPR and covert modeling control conditions, the students were asked to rate how clearly they could imagine the covert images.

Data analysis procedures included the use of an Auto-regressive Integrated Moving Average time series analysis procedure, and a Shewart Chart analysis procedure. A secondary purpose of this investigation was to demonstrate the use of these complimentary procedures in the evaluation of behavior therapy programs. Additionally, a Kendall's Tau coefficient was computed between each student's ratings of image clarity and changes in OTB from baseline to CPR or the covert modeling control condition.

The results of this investigation for Groups I, II, and III indicated no clear effect for any of the CPR or covert modeling control conditions. There were, however, some indications of the presence of possible trends toward an effect for CPR in Group I, but any interpretation of these possible trends was obscured by an insufficient number of days in each CPR condition. None of the Tau coefficients were significant, indicating the absence of a relationship between subjective ratings of image clarity and changes in OTB for this group of students. The results were discussed in terms of several factors which might have resulted in the lack of significant changes in OTB due to CPR. Suggestions were made as to how these factors might be controlled in subsequent CPR studies.

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CHAPTER I

REVIEW OF THE LITERATURE

The purpose of this chapter is to (1) establish the rationale for evaluating the effectiveness of a covert behavioral self-control procedure with elementary school children and (2) establish the rationale for using two time series analysis procedures in the evaluation.

The Nature of Behavioral Self-Control

In recent years, researchers in applied behavior analysis have demonstrated the effectiveness of various Behavioral Self-Control (BSC) procedures in modifying a wide array of target behaviors (Thoresen and Mahoney, 1974; Mahoney and Thoresen, 1974; Williams and Long, 1975). In order to clarify the specific processes involved in these procedures, Glynn, Thomas, and Shee (1973) have proposed a model of the components of BSC. These components include: (1) self-assessment, wherein individuals examine their own behavior and determine whether or not they have performed a given behavior or class of behaviors, (2) self-recording, wherein an individual objectively records the frequency or duration of his/her performance of a given behavior or class of behaviors, (3) self-determination of reinforcement, wherein the individual determines the nature and amount of reinforcing events he or she should receive

contingent upon the performance of a given behavior or class of behaviors, and (4) self-reinforcement, wherein an individual dispenses his/her own reinforcing events (which may or may not be self-determined), contingent upon the performance of a given behavior or class of behaviors. A given BSC program might involve the use of one or several of these components.

The above model could be extended to include several other components of BSC including (1) self-determination and administration of aversive contingencies and (2) the emission of specific responses designed to inhibit other responses (e.g., self-mediated relaxation) (Cautela, 1969). Although BSC procedures involve a wide array of specific operations, it appears that all have the common characteristic of training individuals to systematically engage in certain behaviors (or sequences of behavior) in order to modify other behaviors in their repertoire.

Overt Self-Reinforcement with Children

Several investigations have clearly demonstrated the effectiveness of "overt" self-reinforcement procedures in modifying various behaviors of children in classroom settings (Workman and Hector, 1977). These procedures involve training children to present themselves with observable reinforcers, e.g., points or tokens, following their performance of some target behavior.

In an investigation using 38 disruptive elementary

school children, Bolstad and Johnson (1972) compared the effectiveness of overt self-reinforcement, teacher-reinforcement, and a no treatment control condition in reducing disruptive behavior. In the overt self-reinforcement condition the children were trained to present themselves with points (exchangeable for various prizes) contingent upon low rates of disruptive behavior. Students in the teacher-reinforcement condition also received points for low rates of disruptive behavior, but their points were administered by the teacher. The results of this investigation indicated that both the self-reinforcement and the teacher-reinforcement conditions were significantly more effective than the control condition in decreasing disruptive behavior. There was no significant difference between the two reinforcement conditions.

Using 128 "normal" ninth grade students, Glynn (1970) investigated the effects of two overt self-reinforcement conditions (self and teacher determined), a control condition, and a chance (non-contingent) reinforcement condition, on academic performance. Students on the self-reinforcement conditions presented themselves with tokens contingent upon correct responses to test items. The results of this investigation indicated that both self-reinforcement conditions resulted in significantly better academic performance than did the control or chance reinforcement conditions.

In another investigation, Ballard and Glynn (1975) investigated the effects of self-recording and overt self-reinforcement on academic productivity and on-task behavior during story writing sessions with third grade children. During the self-recording conditions, the children simply recorded their rates of on-task behavior and the frequency of specific types of academic responses (e.g., number of words written in stories). Using the overt self-reinforcement conditions, the children awarded themselves points (exchangeable for free time) for academic responses. The results of this study indicated that although self-recording had no effect on either of the target behaviors, overt self-reinforcement resulted in a dramatic increase in both academic productivity and on-task behavior. Interestingly, stories written during the overt self-reinforcement conditions were rated as having "creative quality" significantly more often than those written during self-recording or baseline conditions.

In a study involving eight second grade students, Glynn, Thomas, and Shee (1973) compared the effects of teacher-reinforcement and overt self-reinforcement on on-task behavior. During the teacher-reinforcement condition, students received points (exchangeable for free time) for being on-task during specified time intervals. During the overt self-reinforcement condition, the students awarded themselves points for being on-task during

specified time intervals. Although both teacher and overt self-reinforcement conditions resulted in higher rates of on-task behavior than did baseline conditions, the highest rates of on-task behavior occurred during the self-reinforcement conditions.

Using nine third grade children with severe deficits in attending behavior, Glynn and Thomas (1974) investigated the effects of overt self-reinforcement on on-task behavior. Following a baseline condition, the students were trained to award themselves points for on-task behavior. This condition was followed by a reversal to baseline conditions, and a reimplementation of overt self-reinforcement. The results of this investigation indicated that overt self-reinforcement was highly effective in increasing on-task behavior relative to baseline conditions. Overt self-reinforcement conditions resulted in 20 to 40 percent increases in on-task behavior relative to baseline conditions.

The above studies clearly indicate the usefulness of overt self-reinforcement procedures with children. The following section will describe a somewhat different self-reinforcement procedure than has been discussed, while subsequent sections will describe its use with adults and children.

Covert Positive Reinforcement

Several learning theorists have hypothesized that covert events (e.g., thoughts, feelings, images) follow the same behavioral laws as overt, observable events (Homme, 1965; Hull, 1952; Pavlov, 1927; Skinner, 1953, 1969). Following this hypothesis, Cautela (1970, 1972, 1973) has developed several procedures which utilize imagery in the application of operant learning principles to behavior problems. Although Cautela's "covert conditioning" procedures have utilized a number of operant learning principles (covert positive and negative reinforcement, covert punishment, covert extinction, and covert modeling), the present paper is concerned with only one of the procedures, Covert Positive Reinforcement (CPR). Since, in CPR, an individual administers his/her own reinforcing events, this procedure can be classified as a BSC procedure.

Cautela (1970) contends that a reinforcing stimulus can be presented to a human subject in any one of three ways. These modes of stimulus presentation include (1) external presentation, with transmission of the stimulus to the Central Nervous System (CNS) via external receptors (e.g., food, praise), (2) direct stimulation of the CNS, bypassing external receptors, and (3) instructing the subject to initiate mediational processes (thinking or imagery) which involve symbolic representations of external

stimuli. The assumption underlying the latter presentational mode is that mediational covert stimuli can be functionally equivalent to the external stimuli which they represent. That is, covert stimuli effect behavior is a manner similar to that of overt stimuli.

In CPR, an individual is instructed to imagine both a target response (to be increased) and the reinforcing stimulus. Cautela (1970) argues that this procedure is a covert analogue of the positive reinforcement paradigm in operant conditioning (Reynolds, 1968). It is hypothesized that the contingent covert reinforcing stimulus increases the strength of the covert target behavior, and through generalization, the strength of the overt behavior which the covert behavior represents. Although this hypothesis remains to be tested experimentally, Cautela (1970) cites extensive experimental evidence of stimulus and response generalization, and holds that such evidence lends some support to the hypothesis that changes in covert behavior can result in changes in overt behavior through generalization processes.

The basic procedures of CPR involve several steps. These include (1) the specification of the target behavior(s) (behaviors to be increased in strength), (2) the identification of pleasant (reinforcing) events through interviewing or the use of reinforcement surveys, (3) instructing the subject to imagine himself/herself engaging in the target

behavior, and then (4) immediately instructing the subject to shift to an image of the pleasant event (covert self-reinforcement). Cautela (1970) contends that most or all parameters of overt positive reinforcement (e.g., immediacy, satiation) also apply to CPR. This contention is based on the assumption that the CPR model is an analogue of the operant paradigm. Although some researchers (e.g., Ladouceur, 1974; Bajtelsmit and Gershman, 1976) question this assumption, it will stand as a working assumption in the present paper.

A relatively large number of investigations have demonstrated the effectiveness of CPR procedures in changing a wide array of overt behaviors in adults. The purpose of the following section is to review these investigations.

The Use of CPR Procedures with Adults

Seven investigations have focused on the effects of CPR on laboratory analogue tasks. Epstein and Peterson (1973) investigated the effect of CPR on the generation of two digit numbers ending with a specified group of one digit numbers. During a baseline condition, 22 college students were each asked to generate a number between zero and 100 each time one of 50 auditory signals was emitted. An experimenter recorded baseline rates of responding for specified numbers. During the covert conditioning phase, group A students were asked to visualize a pleasant (reinforcing) scene following their emission of numbers

ending in one through three, and a negative (aversive) scene following numbers ending in seven through nine. Group B students were instructed to visualize a pleasant scene following numbers ending in seven through nine, and a negative scene following numbers ending in one through three. The results indicated that whenever the emission of a given set of numbers was followed by instructions to visualize a pleasant scene, the frequency of emission of that number set was significantly increased over baseline levels. The opposite effect was found for number sets followed by instructions to visualize a negative scene.

Ascher (1973) investigated the effect of CPR on a pronoun selection task with 40 college students. The pronoun selection task consisted of the experimenter presenting the students with 50 cards on which several pronouns and an infinitive form of a verb were printed, and asking them to select one of the pronouns on each trial. Students were randomly assigned to four groups, each of which consisted of combinations of baseline, visualization control and CPR conditions. All CPR conditions consisted of instructing the students to imagine certain target pronouns, and then to imagine a pleasant scene. Results indicated that (1) target pronouns were selected significantly more often during CPR and subsequent reversal conditions than in the first baseline condition, (2) there was no significant difference between baseline and control

conditions in which the students visualized the target pronouns and pleasant scenes non-contingently, and (3) a CPR condition involving 30 CPR trials was significantly more effective in increasing target pronoun selection than was a condition involving 10 CPR trials.

Wish, Cautela, and Steffen (1970) investigated the effect of CPR on 50 college students' performance on a circle size estimation task. This task involved an experimenter presenting circles of various sizes to the students, and asking them to estimate their size. Students were randomly assigned to five groups involving combinations of baseline, CPR, and various control conditions. The CPR conditions consisted of instructing the students to imagine a pleasant scene following an under or over estimation of circle size (depending upon which group a given student was assigned). The results indicated that all CPR conditions resulted in significantly higher rates of the target estimation response than (1) baseline conditions, (2) conditions under which students were instructed to imagine a neutral scene following target responses, (3) conditions under which students were instructed to visualize pleasant scenes on a random (non-contingent) basis, and (4) conditions under which an experimenter said the word reinforcement following target responses.

Tondo and Cautela (1974), using a circle size estimation task similar to that of Wish, Cautela, and

Steffen (1970), investigated the relation between changes in performance during a CPR condition and image clarity and ease of initiation of imagery. Eighty-two college students were used as subjects. Students with "high" imagery (above average scores on an ease and clarity of imagery measure) and "low" (below average scores) imagery groups were randomly assigned to either an attention control or a CPR condition. Students in the CPR condition were instructed to visualize pleasant scenes following over estimations of circle size. The results of this study demonstrated that with "high" imagery students, CPR resulted in significantly higher rates of over estimation than did the control condition. No differences were found between the CPR and control conditions for the "low" imagery students.

Using 40 undergraduate students, Baron (1974) investigated the effects of a CPR procedure on a key press task. Lights of various colors were used to cue the students to engage in CPR upon their reaching certain response criteria. The results of this investigation indicated that (1) rate contingent CPR resulted in a significantly higher key press response rate than did a condition in which the lights indicated that a certain criterion had been met, and (2) a high quality CPR image (defined in terms of clarity, ease of induction, and degree of pleasantness) resulted in a significantly higher response

rate than did a low quality image.

In a study involving 22 students, Yager, Pace, and Tepper (1975) attempted to replicate Epstein and Peterson's (1973) investigation of the effects of CPR and covert sensitization on a number generation task. Although a significant covert conditioning effect failed to occur for the 22 students as a group, such an effect was obtained for the seven students who expressed an awareness of the purpose of the conditioning procedure.

Using 50 students, Elson, Yager, and Johnson (1976) attempted to replicate Wish, Cautela, and Steffen's (1970) investigation of the effects of CPR on a circle size estimation task. The researchers reported a failure to obtain significant differences between CPR and any of the other treatment or control conditions.

Eight "clinical" studies have investigated the effects of CPR on various avoidance behaviors. In these studies CPR was used to increase the strength of behaviors which are incompatible with maladaptive avoidance behavior. The target avoidance behaviors in these investigations have included (1) test anxiety, (2) rodent phobia, and (3) snake phobia.

In an early investigation, Wisocki (1973) compared the effect of CPR to a no treatment control condition in the treatment of test anxiety. Test anxiety was measured by a subjective self report rating scale. The subjects

included 18 pairs of test anxious female students matched on pre-test anxiety scale scores. Following the pre-test, students from each pair were randomly assigned to either the control or CPR group. CPR consisted of five one-hour sessions during which the students were instructed to imagine (1) an aversive test anxiety provoking scene, (2) themselves engaging in an adaptive (relaxation) response to the scene, and (3) a highly pleasant scene. The results of this investigation indicated that the CPR group's post-test test anxiety scores were significantly lower than their pre-test scores. No pre to post differences were found for the control group.

In an investigation involving 36 college students, Guidry and Randolph (1974) compared the effectiveness of CPR, placebo, and no treatment control procedures in the treatment of test anxiety. Test anxiety was measured by three subjective anxiety rating scales. The CPR procedure involved six 30-minute sessions in which students were instructed to imagine (1) a test anxiety provoking scene, (2) themselves describing the scene in a positive manner, and (3) a pleasant scene. The results of this study indicated that students assigned to the CPR procedure had significantly greater reductions in test anxiety on all three measures than did students assigned to the no treatment control procedure. CPR students exhibited significantly greater reductions in test anxiety than did those

assigned to the placebo procedure on one of the measures. A three week follow-up indicated that CPR students had significantly greater reductions in test anxiety than did the placebo condition on one measure.

In an investigation involving 27 test anxious college students, Kostka and Galassi (1974) compared the effectiveness of CPR, systematic desensitization, and a no treatment control condition. Dependent variables included debilitating test anxiety, facilitating test anxiety, and general (overall) anxiety, all of which were measured by subjective rating scales. The CPR condition involved eight one-hour sessions in which the students were instructed to imagine themselves engaging in an adaptive (non-anxious) response to test situations, followed by a pleasant scene. The CPR and systematic desensitization conditions were equated in terms of number and duration of sessions. On post-test measures, students in the CPR and systematic desensitization conditions exhibited significant decreases in debilitating anxiety relative to pre-test measures, and there was no difference between these two conditions. The students in the control condition exhibited no changes. Students in the CPR condition exhibited significant increases in facilitative anxiety, while students in the other conditions exhibited no changes on this measure. At a five month follow-up, students in CPR and desensitization had maintained

decreases in debilitating anxiety, and had also decreased in general anxiety relative to pre-test measures.

In a recent study, Bajtelsmit and Gershman (1976) investigated the effectiveness of CPR, in vivo desensitization and various control conditions in the treatment of test anxiety. Fifty-four college students were used as subjects. The dependent variable, test anxiety, was measured by several subjective rating scales. The CPR condition involved instructing the students to imagine themselves engaging in adaptive test behavior, and then to shift to an image of a pleasant scene. The results of this investigation indicated that (1) CPR was significantly more effective than a no treatment control procedure in reducing test anxiety, (2) there was no difference between the effects of CPR and the in vivo desensitization procedure in which students were actually exposed to progressively more anxiety provoking test situations, (3) there was no significant difference between CPR and a condition wherein students were instructed to imagine only anxiety provoking scenes (without accompanying adaptive responses) followed by pleasant scenes, and (4) there was no significant difference between CPR and a reversed CPR condition wherein students were instructed to imagine a pleasant scene and then an adaptive response to a test situation. The authors contend that the latter finding calls into question the operant conceptualization of CPR with avoidance behaviors.

Flannery (1972) compared the effectiveness of CPR, a modified in vivo desensitization procedure, and an attention control procedure in the treatment of rodent phobia. Forty-five rodent phobic female college students were used as subjects. The dependent variable, rodent phobia, was measured by (1) a behavioral approach test, which measured how close a student would stand to a live rat, and (2) subjective fear ratings of rats. The CPR procedure involved instructing students to imagine scenes of their making progressively closer approaches to a rat, and to follow each approach scene with an image of a pleasant event. The in vivo desensitization procedure involved instructing students to make progressively closer actual approaches to a rat, and instructing them to imagine a pleasant scene following each approach. The results of this investigation indicated that both CPR and the in vivo procedure produced significant increases in approach behavior and decreases in ratings of fear of rats. The control procedure produced no changes from pre to post testing.

An empirical case study (Blanchard and Draper, 1973) reports the successful use of CPR in the treatment of a severe rat phobia in a female college student. Rat phobia was measured by (1) a behavioral approach test, (2) arousal (heart rate) in the presence of a rat, and (3) subjective ratings of anxiety during the approach test. Following a

two-week baseline period, a CPR condition was implemented. This condition consisted of six 30-minute CPR sessions in which the student was instructed to imagine herself approaching a rat, and to follow this with an image of a pleasant scene. Subsequent conditions included (1) a CPR control condition in which the student was only instructed to imagine herself engaging in the approach behaviors (without the contingent pleasant scene), and (2) a re-implementation of the CPR condition. The results of these procedures indicated that both progressive increases in approach behavior and decreases in anxiety ratings followed the implementation of CPR, and continued throughout subsequent conditions. A progressive decrease in arousal also followed the implementation of CPR and continued throughout subsequent conditions except the CPR control conditions.

In a study involving 30 college students, Ladouceur (1974) compared the effectiveness of CPR, a reversed CPR procedure, and a no treatment control procedure in the treatment of rat phobia. Rat phobia was measured by a behavioral avoidance test. Students assigned to the CPR procedure were instructed to imagine themselves approaching a rat and then a pleasant scene, while students assigned to the reversed CPR procedure were instructed to imagine the same scenes in a reversed sequence. The results of this study indicated that CPR and the reversed CPR procedure were equally more effective than the control procedure in reducing rat phobia.

In an investigation by Marshall, Boutilier, and Minnes (1974), 48 snake phobic female students were used to compare the effectiveness of CPR, systematic desensitization, non-contingent CPR, placebo, and no treatment control procedures. Snake phobia was measured by (1) a behavioral approach test, and (2) subjective fear ratings. The CPR procedure involved instructing the students to imagine (1) an aversive snake scene, (2) themselves being calm and relaxed, and then, (3) a pleasant event. The non-contingent CPR procedure involved instructing the students to imagine the same scenes (as in CPR) in a randomized order. The results of this investigation indicated that both CPR and desensitization were significantly more effective in increasing approach behavior and decreasing subjective fear than were non-contingent CPR and control conditions. There was no significant difference between the CPR and desensitization procedures.

The above studies clearly indicate that CPR is effective in the treatment of behavior disorders involving maladaptive avoidance behaviors. There is strong evidence that CPR procedures are as effective as desensitization procedures which, as Marshall, Boutilier and Minnes (1974) point out, is by far the most well established behavioral treatment procedure.

Two studies have investigated the effectiveness of CPR in the treatment of eating disorders. In these studies

CPR was used in attempts to increase the strength of behaviors incompatible with over-eating.

Using 41 college students, Manno and Marston (1972) compared the effectiveness of CPR and a minimal treatment control procedure in the treatment of weight problems. The dependent measure in this study was amount of weight lost. The CPR procedure involved instructing students to imagine themselves turning away from food and to then imagine themselves having an ideal body and being praised by friends. The results of this study indicated that CPR was significantly more effective in producing weight losses than was the control procedure which involved the use of weight control discussion groups. Weight loss for students using CPR was maintained during a three month follow-up period.

In a study highly similar to that of Manno and Marston (1972), Brunn and Hedburg (1974) compared CPR procedures to minimal treatment control procedures. Their results also indicated that CPR was significantly more effective than the control procedure in terms of weight loss.

Four other studies have investigated the effectiveness of CPR in changing various behaviors in adults.

In one of the earliest investigations of CPR, Cautela, Walsh, and Wish (1971) compared the effectiveness of CPR and a visualization control procedure in changing

42 college students' "attitudes" toward the mentally retarded. "Attitudes" toward the mentally retarded were measured in terms of agreement and disagreement with positive and negative statements about mentally retarded persons on a questionnaire. The CPR procedure involved instructing the students to imagine a retarded person, and to then imagine a pleasant scene at least twice a day for three weeks. In the control procedure, students were simply instructed to imagine a mentally retarded person twice a day for three weeks. The results indicated that students using CPR exhibited significant positive changes in "attitude" while students using the control procedure did not.

Kendrick and McCullough (1972) reported an empirical case study wherein the homosexual "urges" of a 21-year-old male were modified through the use of CPR. Following a baseline period wherein the client recorded the frequency of homosexual and heterosexual urges, a CPR condition was implemented wherein the client was instructed to imagine himself engaging in heterosexual activity and to then imagine himself engaging in homosexual activity. The CPR condition resulted in a 29% decrease in homosexual "urges" and a 48% increase in heterosexual urges.

Krop, Perez, and Beaudoin (1973) investigated the effects of CPR, non-contingent CPR, and a no treatment control procedure on the "self-concept" of 69 psychiatric

patients. "Self-concept" was measured by selected items from the Tennessee Self-concept Scale (TSCS). CPR involved instructing the patients to imagine a pleasant scene following responses to TSCS items (read by an experimenter) which indicated positive "self-concept." The non-contingent CPR procedure involved instructing the patients to imagine a pleasant scene following responses to randomly selected TSCS items. The results indicated that only the CPR group exhibited significant improvement in "self-concept."

Krop, Messinger, and Reiner (1974) used 114 college students to investigate the effects of CPR, non-contingent CPR, and an attention control procedure on eye contact in interview settings. The CPR procedure involved instructing students to imagine a pleasant scene following each five second period of eye contact with an interviewer during an interview. In the non-contingent CPR procedure, students were instructed to imagine pleasant scenes at random points in the interview. The results of this investigation indicated that only the students using the CPR procedure exhibited significantly higher rates of eye contact during a post treatment interview.

The investigations reviewed in this section have generally supported the viability of CPR in the treatment of a wide range of behavior disorders in adults. The following section will review the literature involving CPR procedures with children.

CPR with Children

Using 36 emotionally disturbed children (mean age was 10 years), Krop, Calhoun, and Verrier (1971) investigated the effects of CPR, overt tangible reinforcement, and a no treatment control procedure on "self-concept." "Self-concept" was measured by the children's responses to TSCS items. Following a pre-test on the TSCS, the children were randomly assigned to one of three procedures including (1) CPR, during which the children were instructed to imagine a pleasant scene following responses to TSCS items (read by the experimenter) indicating positive "self-concept," (2) overt reinforcement, during which the children were given a token and a gumdrop following responses to the TSCS indicating positive "self-concept," (3) a no treatment control procedure in which the children were simply pre and post tested on the TSCS. The results indicated that only the students in CPR had significant increases in "self-concept" when the students were post-tested. Although these results are promising, several criticisms of this study are warranted. The first criticism is that this study did not use an actual CPR procedure. The target behavior ("self-concept") did not receive instructions to be imagined along with the pleasant scene as in the CPR model (Cautela, 1970; Scott and Rosenstiel, 1975). This alone prohibits the drawing of clear conclusions from this study concerning the effectiveness of CPR

procedures with children. Another criticism involves the lack of appropriate control procedures. The authors of this study offer no data to mitigate against the hypothesis that changes in "self-concept" resulted from the practice of visualizing the relevant scenes non-contingently.

Using 40 junior high school students, Schmickley (1974) investigated the effects of CPR and visualization control procedures on several indices of reading achievement. Dependent measures included reading speed and comprehension, performance on daily review tests, and attitudes toward reading. The students were randomly assigned to two groups, including (1) CPR, in which students, after reading one story from their reading books, were cued to imagine a scene which the experimenter thought to be pleasant, and (2) a visualization control procedure which was identical to CPR except that the students were cued to imagine a scene which the experimenter thought to be neutral. After three weeks the results of this investigation indicated no significant changes for either group, relative to pre-treatment measures. Several criticisms of this investigation are warranted, including (1) the lack of procedures to determine what events were pleasant to the students, (2) the lack of a specific contingent relation between the cues for CPR, and any behavior directly relevant to the dependent measures (e.g., the students could have been reading slowly or quickly, with or without acceptable

comprehension prior to cuing for CPR), and (3) this study, like that of Krop, Calhoun, and Verrier (1971) did not follow the CPR model (i.e., the target behaviors did not receive instructions to be imagined along with the pleasant scenes).

In an empirical case study, Workman and Dickinson (1977) used CPR procedures in the treatment of a nine-year-old male child described as "hyperactive" by his teachers and parents. Dependent measures included (1) number of times the child left his seat, (2) number of times the child rocked in his chair, and (3) number of times the child made noise by hitting his fingers or objects on classroom furniture. These behavioral indices were observed during reading class for 30 minutes on every other school day by an independent observer. Following an eight day baseline, a CPR procedure was implemented wherein the child was instructed to imagine (1) himself sitting upright in his chair with all four legs of the chair on the floor while listening to and looking at his teacher and then (2) one of 18 pleasant events identified through interviewing. Two 30-minute CPR sessions took place each week on days during which observations were not taking place. Ten CPR trials took place during each session. During nine observation days in which CPR sessions were taking place, the child's out of seat, rocking in chair, and noise making behaviors were reduced (relative to baseline) by 46.3%, 32.12%, and 48.93%, respectively.

During a reversal condition, in which the therapist continued to have 30-minute sessions with the child but without CPR trials, the child's out-of-seat and rocking-in-chair behaviors remained at approximately the same level as during CPR. Noise making behaviors were further reduced to 79% of the baseline level during this condition. Although this study suggests that CPR procedures may be useful in treating children's behavior problems, it does not utilize appropriate control procedures (i.e., multiple baseline procedures) which would allow the conclusion of a functional relation between CPR and changes in the target behavior.

Although two of the above investigations yield promising results (Krop, Calhoun, and Verrier, 1971; Workman and Dickinson, 1977), neither provides sufficient evidence to warrant general conclusions regarding the effectiveness of CPR procedures in the treatment of behavior problems in children. The demonstrated utility of overt self-reinforcement procedures with children, along with the relatively massive evidence of the effectiveness of CPR procedures in the treatment of behavior problems in adults, would seem to warrant controlled investigation of the effects of CPR procedures with children. Such investigations should focus on (1) clearly determining whether or not there is a functional relationship between CPR treatment conditions and changes in the strength of target behaviors,

and (2) determining which, if any, components of CPR procedures are responsible for changes in children's behavior.

Time Series Analysis

In recent years, the area of applied behavior analysis has witnessed a controversy which centers around the use of statistical analysis (Jones, Vaught, and Weinrott, 1977). One group of researchers (e.g., Michael, 1974) claims that the traditional "eye-balling" methods of analysis, wherein the researcher simply visually inspects the graphically presented means and individual data points of each condition, are the most appropriate and useful methods by which applied behavior analysis researchers can analyze their data. Another group (e.g., Thoresen and Elashoff, 1974; Glass, Wilson, and Gottman, 1975), however, claims that the "eye-balling" method is insufficient on the grounds that the visual inspection of graphical data is subjective and misleading. To the present writer's knowledge, two investigations clearly support the position of the latter group.

White (1971) found that individuals vary widely in terms of how they interpret data which they visually inspect. Some individuals, in fact, interpreted a trend as accelerating while others interpreted the same trend as decelerating.

Gottman and Glass (1976) reported an investigation wherein 13 graduate students with substantial experience in

interpreting operant data were asked to interpret several graphs in terms of possible intervention effects. The data which were graphically presented to the 13 students were also analyzed via a time series analysis procedure (Glass, Willson, and Gottman, 1975). Not only did the students vary widely in their interpretation of the data, but their interpretations were in sharp conflict with the results of the time series analysis. For example, in one comparison of conditions, a highly significant change in the dependent variable was indicated by the time series analysis. Only seven of the 13 students, however, interpreted such a change. In another comparison, no significant change was indicated by time series analysis, although 11 of the 13 students believed that a significant change had taken place. The results of this investigation and those of White (1971) clearly underscore the need for behavioral researchers to add statistical analysis procedures to their present armamentarium of data analysis techniques.

As several researchers (e.g., Hartmann, 1974; Thoresen and Elashoff, 1974; Gottman, 1973; Gottman, McFall, and Barnett, 1969; Jones, Vaught, and Weinrott, 1977) have indicated, various time series analysis procedures are more appropriate for the statistical analysis of dependent serial data than are more traditional parametric statistical procedures (e.g., ANOVA), since the latter procedures usually require the assumption of independence of errors. According

to Hartmann (1974), the presence of serial dependence (correlated errors) in data analyzed by parametric procedures can result in serious errors of inference. First, serial dependence results in a reduction of the amount of independent information included in the data. This suggests that the recommended values of degrees of freedom for an F or t-test are inflated and would result in a positively biased test. Second, Hartmann points out that serial dependence usually produces artificially reduced variability, which also results in a positively biased test. It seems clear that if serial dependence characterizes a set of data, then the data must be appropriately transformed to a serially independent form before an F or t-test can be applied.

As Jones, Vaught, and Weinrott (1977) pointed out, a substantial percentage of applied behavior analysis studies yield data which is characterized by serial dependence. This is due, most often, to the frequent use of observations taken on consecutive days. Since many applied behavior analysis investigations yield serially dependent data, it seems imperative that researchers in this area become familiar with time series analysis procedures which transform dependent data to an independent form prior to applying the usual test statistics.

The statistical analysis of the data in the present investigation involved the use of an autoregressive

integrated moving average (ARIMA) time series analysis procedure (Glass, Willson, and Gottman, 1975), and a Shewart Chart analysis procedure (Gottman and Leiblum, 1974). The ARIMA analysis required the use of two Fortran IV computer programs which were developed by Bower, Padia, and Glass (1974). (These can be obtained from Gene Glass at the Laboratory of Educational Research, University of Colorado-Boulder, at a cost of $25.00.) According to The University of Tennessee Computer Center staff, the programs are designed for use with a CDC machine and must be converted for use with a non-CDC machine. As the mathematical processes involved in these programs are beyond the scope of the present investigation, the reader is referred to Glass, Willson, and Gottman (1975) for an extremely thorough description.

The first step in the use of the ARIMA time series analysis involves the use of the initial program, CORREL. When the data from each set of conditions to be compared is submitted to this program, the experimenter is provided with a correllogram of the two series. From this correllogram, one determines (1) whether the data are characterized by serial dependence, and if so, then (2) the mathematical model of the series. The mathematical model is determined by the specific rules provided by Glass, Willson, and Gottman (1975).

If the series is not characterized by serial

dependence, then the second step entails the use of Shewart Chart analysis (Gottman and Clasen, 1972; Gottman and Lieblum, 1974). In this procedure, lines are drawn two standard deviations above and below the mean of the pre-intervention series (i.e., the first of the two conditions being compared). If any two consecutive post-intervention observations exceed the limits of this "band" of lines, a statistically significant shift has occurred at an alpha of .05.

If, in Step 1, the series is found to be characterized by serial dependence, the second step involves the use of the second program, TSX. The TSX program initially transforms the serially dependent data in each series to an independent form. The program then forecasts hypothetical post-intervention data points that would be expected if there were no intervention effect on the data. In other words, a hypothetical post-intervention series is generated which reflects the expected progression of the data in the previous condition, given that no intervention had taken place. After this forecasted series is generated, a least squares line is "drawn" (conceptually) through the actual post-intervention series and also through the forecasted post-intervention series. TSX then performs a simple t-test for: (1) the change in the initial level of the series at the point of intervention, and (2) change in trend. The change in initial level is tested by

comparing the initial level of the least squares line for the forecasted data to the least squares line for the actual data. A similar comparison is made for the slope of the actual and forecasted least squares line when the program tests for change in trend. All t-statistics are distributed on N-4 degrees of freedom, where N is equal to the number of data points in the pre- and post-intervention series.

Statement of Purpose

The primary purpose of the present investigation was to evaluate the effect of a CPR procedure on the on-task behavior (OTB) of elementary school children in naturalistic classroom situations. The importance of OTB in classroom settings appears to be reflected in the large number of behavior management studies which have attempted to modify this behavior through external (overt) contingencies (Williams and Anandam, 1973). Procedures which could modify OTB in children using CPR would have several advantages over the use of traditional external contingency programs. These include (1) the lack of reliance on expensive equipment (e.g., reinforcers), (2) the greater flexibility provided by covert procedures, since the therapist is not limited to practical realities in the choice of reinforcers, and (3) covert procedures do not require the extensive cooperation of mediators in the child's environment, as do traditional behavior management

procedures (Tharp and Wetzel, 1969).

A secondary purpose of this investigation was to demonstrate the use of two complementary time series analysis procedures in the evaluation of behavior therapy programs with children. The ARIMA time series analysis will be used on those data sets exhibiting serial dependence, while the Shewart Chart analysis will be used for those data sets exhibiting serial independence.

There are several questions which this investigation attempted to answer. Do systematic instructions to engage in CPR (with OTB as the target behavior) result in significantly higher rates of OTB in elementary school children than do baseline procedures? Are systematic instructions to engage in CPR more effective in modifying the OTB of elementary school children when presented in a large classroom setting or a small group setting? Do systematic instructions to engage in CPR result in significantly higher rates of OTB in elementary school children than do self-modeling control procedures in which the children are instructed to imagine themselves engaging in the target behaviors, and then to imagine various "neutral" events? Are systematic instructions to engage in CPR more effective in modifying OTB in elementary school children when presented in a small group or individual setting? Is there a relationship between children's subjective self ratings of CPR image clarity and changes in levels of OTB during CPR conditions?

CHAPTER II

METHOD

Subjects and Setting

The subjects in this investigation included 15 students enrolled in three upper elementary (grades four, five, and six) public school classrooms in the Knoxville City and Maryville City school systems in eastern Tennessee. Five students were selected from each classroom to serve as subjects. These subjects will hereafter be referred to as target students. The following steps were included in the selection of target students: (1) each classroom teacher was asked to select 10 students who exhibited the most severe difficulties in maintaining OTB (as defined in the next section), (2) the OTB of these 10 students in each classroom was observed by behavioral observers for one hour at the same approximate time period on two days (the observers were in the classroom for one week prior to this time for acclimation purposes), and (3) the five students in each classroom who exhibited the lowest percentages of OTB (averaged over the two day observation period) were designated as target students. It should be pointed out that although treatment and control procedures were applied to all students in each of the three classrooms, the behavior of only the target students in each classroom was observed and analyzed.

All treatment conditions and observations were carried out in the classroom situation. All observations, following target student selection, were taken for one-half hour (30 minutes) each day in each classroom. In classroom I (Group I), observations were taken from 10:30 to 11:00 during Math class. In classroom II (Group II), observations were taken from 11:15 to 11:45 during Language Arts class. In classroom III (Group III) observations were taken from 9:15 to 9:45 during Language Arts class.

Dependent Variable: On-Task Behavior

On-task behavior (OTB) is defined as the percentage of observation intervals during which a target student's behavior is classified as on-task by a behavioral observer. Behaviors which are classified as on-task include (1) looking at the teacher or blackboard during lecture or demonstration periods (the student's face must be turned within an angle of approximately 45° toward the teacher or blackboard), (2) taking part in oral discussions with the teacher, (3) reading to the teacher, (4) looking at the pages of a text, notebook, etc. (with face turned within approximately 45° toward the pages), (5) drawing a picture as instructed by the teacher, (6) writing an assignment specified by the teacher, (7) using an eraser during a written assignment, (8) looking at a map, wall chart, etc. (with face turned within approximately 45° toward the relevant materials) as instructed by the teacher, (9) using

a dictionary or resource materials, (10) seeking teacher assistance by raising hand, (11) asking a peer or teacher a question about an assignment, and (12) looking at another student who is directing answers or questions toward the teacher.

Behavioral Observations

All observations of OTB were taken by a pool of observers composed of University of Tennessee students. These students received course credit for their participation in this study. All observers remained naive as to the purpose of their observations.

Prior to placement in the experimental setting, each observer was trained until he or she reached 85% agreement with the experimenter in rating the OTB of elementary school children on a 30-minute video tape. The method of calculating inter-observer agreement (reliability) is described below. The specific observer training procedures which were followed are described in detail elsewhere (Morales and Workman, 1976).

Observations of OTB consisted of a 30-minute observation of each group of five target students on consecutive days during this investigation, with each target student in each group (classroom) being observed consecutively. Each group was observed during the same time period each day. The order in which the target students

in a given group were observed was randomly determined on a daily basis. Randomization was carried out by (1) assigning each of the five target students in each group a number ranging from one to five, (2) drawing one digit numbers from a table of random numbers, and (3) ordering observations of the target students in a given group according to the order in which their numbers were drawn. This procedure was carried out for each group of five target students for each day of this investigation.

The specific observation procedure used was "on-the-count" time interval analysis (Williams and Anadam, 1973), with observations taking place at 15-second intervals. At the beginning of each observation period, the observer was presented with an auditory signal (via a cassette recorder) instructing him or her to observe the first target student on the randomized list for that day. The observer observed that target student for one second, recorded the observation ("+" for on-task, "-" for not on-task) on the recording sheet, and at the end of another 15-second interval, an auditory signal instructed the observer to observe the next student on the list, etc. This procedure was followed throughout each of the 30-minute observation sessions, with each target student being observed approximately 24 times per session. A sample observation recording form is shown in Appendix A.

Inter-observer reliability was determined by having

a calibrating observer observe along with the primary observer once per week for the duration of the investigation. The specific days on which reliability was checked were randomly determined for all groups. This was accomplished by (1) assigning a number (from one to five) to each day of a given week, (2) drawing a one digit number from a table of random numbers, and (3) designating the day of the week represented by this number as the day on which a reliability check was to take place. This procedure was carried out for each week of the investigation. Reliability was determined by dividing the number of intervals during the 30-minute observation period on which the observers agreed (i.e., both rate an interval as either on-task or not on-task), by the total number of intervals, and multiplying this value by 100 (Kazdin, 1975).

Research Design and Procedures

A diagram of the experimental design used in this investigation is shown in Appendix B. That part of the design involving Groups I and II combines a multiple baseline across subjects and situations design with a reversal design as suggested by Kazdin and Kopel (1975). This part of the design allows the experimenter to investigate the effects of the treatment condition (CPR) on two different groups of target students at two different times and situations, yet allows for the investigation of the effects of the successive presence and absence of the treatment

condition on the same target students. The implementation of the treatment condition at two different points in time with two different groups of target students allows the experimenter to determine the presence or absence of a functional relation between the treatment condition and levels of OTB, regardless of the presence or absence of a reversal effect when the treatment condition is removed (Kazdin, 1975). That part of the design involving Group III is an ABACDE reversal design, and allows the experimenter to compare the effects of successive applications of baseline, control and treatment conditions on the same group of target students.

Group I

Group I was composed of five target students from classroom I, who were exposed to an ABAB sequence of conditions. The conditions included Baseline I, CPRI-I, Baseline II and CPRI-II.

Baseline I. This condition involved the OTB of the target students simply being observed during the same time period each day. This condition lasted for 19 days, during which 16 observations were taken. This condition served as a reference point by which to compare the effectiveness of subsequent conditions. The classroom teacher was asked to behave in her usual manner during this and all other conditions. No experimental interventions were in effect during this period. On the fifth day of

this condition (three hours after the observation period), all students in the classroom were administered a modified form of the Children's Reinforcement Survey (CRS) (Cautela, 1976) in order to determine appropriate potential reinforcers for use in the next condition. The administration of the CRS entailed the experimenter reading both the instructions and the CRS items to the students in the class, and asking them to respond to each item as specified in the instructions. The CRS form was derived by combining portions of forms A, B, and C of Cautela's (1976) CRS, and adding items which seem likely to have "neutral" value to elementary school students. The modified CRS, hereafter referred to simply as the CRS, is shown in Appendix C.

Several investigations have indicated that self report reinforcement surveys are relatively reliable with adults and children (Kleinknecht, McCormick, and Thorndike, 1973; Atkins and Williams, 1972). However, since there is conflicting evidence concerning the validity of self report reinforcement surveys (e.g., Atkins and Williams, 1972; Mermis, 1971), the classroom teacher was asked to complete the CRS for each of the five target students in her classroom. The teacher was asked to evaluate each stimulus item in terms of how she believed the target student in question would evaluate it. Potential reinforcers were determined by selecting 12 events on the CRS which were most often rated by both the teacher and target students in the category of "like" or "like very much."

This survey was given to all members of the classroom, but only the target students' and the teacher's responses were used in determining potential reinforcers. Only during this condition was the CRS administered to students in the Group I classroom.

CPRI-I. In addition to observations of target students' OTB (which characterizes all conditions in this investigation), this condition involved the implementation of a Covert Positive Reinforcement Instructions (CPRI) procedure in a small group setting and lasted for five days. CPRI is defined as systematically instructing a student to imagine himself/herself performing a target behavior, and to then imagine an event which is potentially reinforcing (pleasant). Approximately 15 minutes prior to the observation period on each day of this condition, the experimenter took the five target students to a room adjacent to the classroom and gave the following instructions:

> "Today and every day for the next few days, we're going to try to find out how well we all can imagine certain things through our imagination. Everyone close your eyes and try to imagine yourself eating an ice cream cone. Raise your hand when you can see yourself doing this." (Different warm-up exercises were used on each day.) "Now, everyone open your eyes and take a deep breath. Close your eyes again and when I say "NOW," I want everyone of you to imagine yourself _____." (The students were instructed to imagine themselves engaging in a target behavior listed in Appendix D on each trial until all of the behaviors have been included in the instructions. The order of the items in Appendix D was followed in the instructions.) "Alright, NOW, continue to imagine yourself _____ until I say STOP. Raise your hand

> whenever you can see yourself doing this, but keep your eyes closed. STOP. Now keep your eyes closed and imagine yourself _____." (The students at this point were instructed to imagine a potentially reinforcing event.) "Raise your hand when you can imagine this, but keep your eyes closed and continue to imagine yourself _____ until I say STOP. Alright, STOP, and open your eyes and rest."

Potential covert reinforcers consisted of those 12 items from the CRS which were selected in the manner described in the previous section, and were included in the instructions in a randomized order on each day. Randomization was accomplished by (1) assigning a number to each of the 12 items, (2) drawing numbers from a table of random numbers, and (3) ordering the sequence of potential covert reinforcers according to the order in which their numbers were drawn. This procedure was carried out for each day of the CPRI-I condition.

Each CPRI trial involved instructions to imagine a target behavior for 15 seconds, and a potentially reinforcing event for 30 seconds, followed by a 10-second rest period. Following the rest period, the next trial (using the next target behavior and potential reinforcer) began, with the instructions to imagine the target behaviors and potential reinforcers being repeated for each trial. The experimenter began timing the 15- and 30-second imagination periods with a stopwatch whenever all students in the classroom had raised their hands in order to indicate that they were imagining the relevant image. The duration for the images of the potential reinforcers was selected

in light of previous research with adults (Haney and Euse, 1976), which indicates that a visualization period of at least 20 seconds is necessary in order for a pleasant image to result in maximal physiological arousal.

After all target behaviors and potential reinforcers had been included in the instructions for one trial, all five target students were asked to subjectively rate the clarity of their images on a scale of one to five. The following rating instructions were given to the target students on each day of the CPRI condition:

> Take out a sheet of paper. On the sheet of paper, I want you to rate how well you could see most of the things I asked you to imagine. Write a 1 if you couldn't see what I asked you to imagine at all, a 2 if you could barely see them for only a second or two, a 3 if you could see them fairly well but not in detail, a 4 if you could see them in detail, for example, you could see what kind of clothing you were wearing, and a 5 if you could see the things I asked you to imagine as well as you could see something if you were really looking at it. Write only one number down on the sheet of paper in front of you.

Baseline II. This condition involved a re-instatement of the Baseline I condition, but the administration of the CRS was omitted. This condition enabled the experimenter to determine the effects of the abrupt withdrawal of the CPRI condition. This condition lasted for five days, during which four observations were taken.

CPRI-II. This condition involved a re-instatement of the CPRI-I condition, and enabled the experimenter to determine

the effects of a second implementation of CPRI. Two sets of instructions, identical to those given during the CPRI-I condition, were given during this condition. The first set of instructions were the instructions to imagine the target behaviors and potentially reinforcing events in a contingent manner, while the second set of instructions was composed of instructions to rate the clarity of the images from the CPRI trials. The same 12 CRS items that were identified during Baseline I were used as potential reinforcers during this condition. The order of the potential reinforcers was randomized for each day as during CPRI-I. This condition lasted for five days.

Group II

Group II was composed of five target students from a second classroom, who were exposed to an ABACA sequence of conditions. These conditions included Baseline I, CPRI-I, Baseline II, CPRI-II, and Baseline III. The Baseline II and CPRI-II conditions served as a time-lagged control (Glass, Willson, and Gottman, 1975) for the effects of CPRI-I with Group I.

Baseline I. This condition was identical to the Baseline I condition for Group I, except that it lasted for 11 days during which 10 observations took place. The CRS was administered to all students in the classroom on the third day of this condition. This condition served as

a reference point by which to compare the effectiveness of subsequent conditions.

CPRI-I. This condition was identical to CPRI-I for Group I, except that (1) potential reinforcers which were identified for Group II target students were used, and (2) CPRI were presented to the entire classroom. This condition lasted for eight days.

Baseline II. This condition involved a re-instatement of the Baseline I conditions, except that the administration of the CRS was omitted. This condition lasted for five days, and allowed the experimenter to determine the effects of the abrupt withdrawal of the CPRI condition on OTB.

CPRI-II. During this condition, three of the five target students were randomly selected for inclusion in a small group CPRI program. Random selection was accomplished by (1) placing all five student's names (written on slips of paper) in a container, and (2) assigning the first three names drawn to the CPRI program. The two remaining students were assigned to an Attention-Control procedure.

During the five days of this condition, the three students assigned to CPRI were taken to a room adjacent to the classroom, and exposed to procedures which were identical to the procedures of the CPRI-I condition for Group I. The two students assigned to the Attention-

Control procedure were simply taken to a room adjacent to the classroom each day (approximately 30 minutes prior to the observation period), and were instructed to incorporate each of 12 words into a story as they were presented by the experimenter. This procedure lasted for approximately 15 minutes each day.

Baseline III. This condition involved the re-implementation of the Baseline II condition for all five target students and lasted for five days. The purpose of this condition was to allow the experimenter to determine the effect of the withdrawal of CPRI on OTB.

Group III

Group III was composed of five target students from a third classroom, who were exposed to an ABACDE sequence of conditions. The conditions included Baseline I, Self-Modeling Control I (SMC-I), Baseline II, SMC-II, CPRI-I, and CPRI-II. This sequence of conditions was designed to allow the experimenter to determine whether there is a significant difference between the CPRI procedures, as used with Groups I and II, and control procedures in which students are instructed to imagine themselves engaging in OTB along with scenes of "neutral" events. This sequence also allowed for the comparison of small group and individual CPRI procedures.

Baseline I. This condition involved observations of the target students' OTB for 10 days. All observations were taken during the same 30-minute period each day. On the third day of this condition, all students in the classroom were administered the CRS. Twelve potential reinforcers were selected through procedures identical to those described for Groups I and II. Twelve "neutral" events were also selected by identifying those items most often rated in the category of "Don't care" by both the classroom teacher and the target students. The major purpose of this condition was to provide the experimenter with a reference point by which to evaluate the effects of subsequent conditions.

Self-Modeling Control I (SMC-I). Approximately 15 minutes prior to the observation period on each of the 10 days of this condition, all students in the classroom were given instructions identical to the first set of instructions given during CPRI-I for Group I, except that "neutral" events were substituted for potential reinforcers. This condition was equated with the CPRI conditions for Groups I and II in terms of (1) the specific target behaviors which students were instructed to imagine, (2) the number of target behaviors which the students were instructed to imagine, (3) duration of the instructions to imagine target behaviors (15 seconds each), (4) the number of stimulus events the students were instructed to imagine,

(5) duration of the instructions to imagine stimulus event images (30 seconds each), and (6) the sequence in which target behaviors and stimulus events were to be imagined. Also, the order of the "neutral" events was randomized on a daily basis, by using the same procedure as previously described for randomizing reinforcing events.

Following the instructions described above, all students in the classroom were given instructions for image clarity ratings which were identical to those given during the CPRI conditions for Groups I and II.

Baseline II. This condition lasted for 10 days and involved a re-instatement of the Baseline I condition, without the administration of the CRS. The OTB of the target students was simply observed. The purpose of this condition was to allow the experimenter to determine the effects of the abrupt withdrawal of the SMC-I condition.

SMC-II. This condition was identical to the SMC-I condition, except that the five target students were taken to a room adjacent to the classroom and were presented with instructions identical to those described for SMC-I. This condition lasted for five days.

CPRI-I. This condition was identical to the CPRI-I condition for Group I and lasted for five days.

CPRI-II. During this condition, three of the five target students were randomly selected for inclusion in an

individualized CPRI program. Random selection was accomplished through the use of procedures identical to those described for the CPRI-II condition for Group II.

On each of the five days of this condition, the three students assigned to CPRI were individually taken to a room adjacent to their classroom and given five CPRI trials. Each trial consisted of instructing the student to (1) imagine themselves engaging in an OTB for 15 seconds (OTB's consisted of items 1, 2, 5, 7, and 12 from Appendix D), and (2) imagine one of five events that they described as being highly pleasant for 30 seconds. Highly pleasant events were determined by asking each student what five objects or activities they would most like to have or take part in. Following each CPRI trial, the student was asked to describe, in detail, what they had imagined. This procedure was included in order to provide a check on the content of the students' imagery.

The two remaining target students were assigned to a No-treatment Control procedure. This procedure was identical to the previous baseline conditions, in which the target students' OTB was simply observed.

CHAPTER III

RESULTS

Introduction

In the present investigation, a time series analysis was performed on group and individual data by analyzing the conditions in sequential order. The mathematical models of the group and individual data in each contrast (the comparison of each condition and the subsequent condition) are shown in Tables 1, 2, and 3. Following model identification, each contrast was tested at an alpha of .05. All t-tests in the ARIMA time series analysis were two-tailed. The weekly reliability data ranged from 78% to 100%. The average reliability was 90.95%.

The results for Groups I and II are shown graphically in Figure 1. The daily group means were derived by summing the values of each target student's daily percentage of OTB, and dividing by the number of students observed on that day. The results of the statistical analysis for both individual and group data for Groups I and II are shown in Tables 4 and 5.

Group I

The purpose of the sequence of conditions for this group was to investigate the effects of small group CPRI

TABLE 1

MATHEMATICAL MODELS IDENTIFIED BY CORREL FOR GROUP I[a]

	BI/CPRI-I	CPRI-I/BII	BII/CPRI-II
Group Means	011	000	000
Student 1	000	002	000
Student 2	041	000	000
Student 3	000	000	000
Student 4	012	001	000
Student 5	012	001	000

[a]BI = Baseline I; CPRI-I = Covert Positive Reinforcement Instructions I; BII = Baseline II; CPRI-II = Covert Positive Reinforcement Instructions II.

TABLE 2

MATHEMATICAL MODELS IDENTIFIED BY CORREL FOR GROUP II[a]

	BI/CPRI-I	CPRI-I/BII	BII/CPRI-II	CPRI-II/BIII
Group Means	000	000	-	-
Student 1	000	000	000	000
Student 2	000	000	000	000
Student 3	002	001	000	000
Student 4	000	001	000	000
Student 5	000	000	000	000

[a]BI = Baseline I; CPRI-I = Covert Positive Reinforcement Instructions I; BII = Baseline II; CPRI-II = Covert Positive Reinforcement Instructions II; BIII = Baseline III.

TABLE 3

MATHEMATICAL MODELS IDENTIFIED BY CORREL FOR GROUP III[a]

	BI/ SMC-I	SMC-I/ BII	BII/ SMC-II	SMC-II/ CPRI-I	CPRI-I/ CPRI-II
Group Means	002	001	001	001	-
Student 1	001	000	000	001	000
Student 2	011	001	001	000	000
Student 3	000	000	000	000	000
Student 4	000	001	001	000	011
Student 5	000	001	001	000	000

[a]BI = Baseline I; SMC-I = Self Modeling Control I; BII = Baseline II; SMC-II = Self Modeling Control II; CPRI-I = Covert Positive Reinforcement Instructions I; CPRI-II = Covert Positive Reinforcement Instructions II.

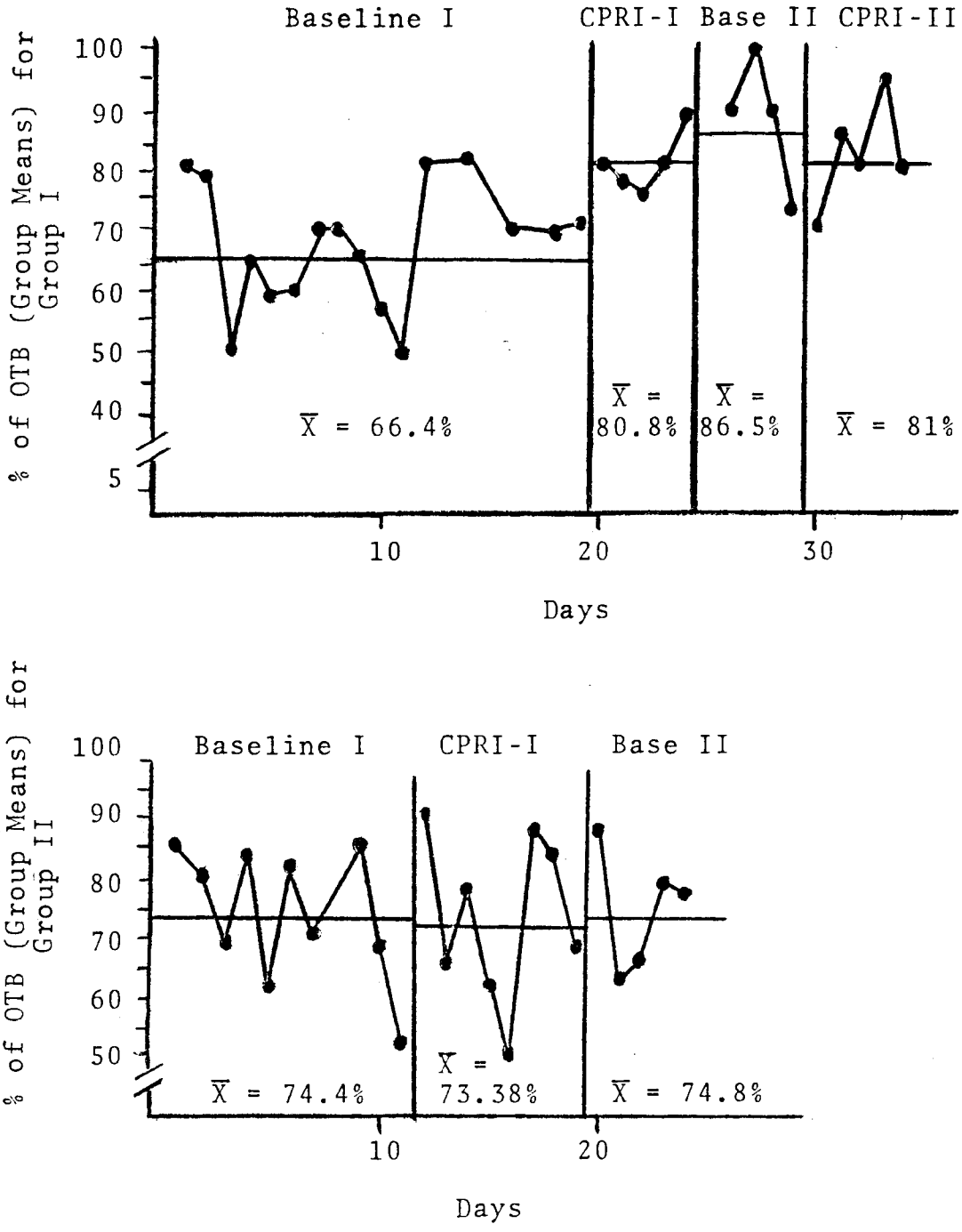


Figure 1. Daily group mean percentages of OTB for Groups I and II.

TABLE 4

RESULTS OF THE STATISTICAL ANALYSIS FOR ALL COMPARISONS OF CONDITIONS FOR GROUP I[a]

BI/CPRI-I	CPRI-I/BII	BII/CPRI-II
Group Means t1=.55 df=17 t2=.58	NSS	NSS
Student 1 NSS	t1=2.47 df=5 t2=1.68	NSS
Student 2 t1=.37 df=17 t2=-.17	Shewart*	NSS
Student 3 NSS	Shewart*	NSS
Student 4 t1=.04 df=16 t2=.60	t1=2.26 df=5 t2=-2.49	NSS
Student 5 t1=.51 df=17 t2=.05	t1=.19 df=5 t2=1.02	NSS

[a]t1 = t-statistic for change in level; t2 = t-statistic for change in trend; NSS = Non-significant Shewart Analysis; Shewart* = Significant ($p < .05$) Shewart Analysis, * = Statistically significant at $p < .05$.

TABLE 5

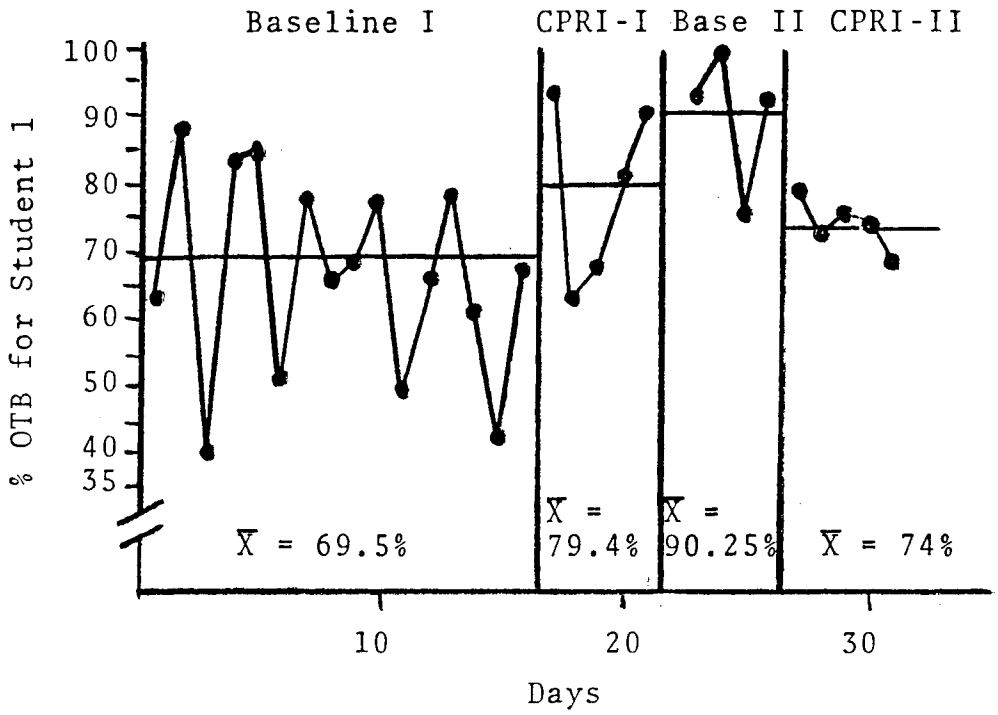
RESULTS OF THE STATISTICAL ANALYSIS FOR ALL COMPARISONS OF CONDITIONS FOR GROUP II[a]

BI/CPRI-I	CPRI-I/BII	BII/CPRI-II	CPRI-I/BIII
Group Means NSS	NSS	NSS	NSS
Student 1 NSS	NSS	NSS	NSS
Student 2 NSS	NSS	NSS	NSS
Student 3 t1=-.28 df=14 t2=-.84	t1=-1.39 df=9 t2=1.02	NSS	NSS
Student 4 NSS	t1=2.21 df=8 t2=-.42	Shewart*	NSS
Student 5 NSS	NSS	NSS	NSS

[a]t1 = t-statistic for change in level; t2 = t-statistic for change in trend; NSS = Non-significant Shewart Analysis; Shewart* = Significant ($p < .05$) Shewart Analysis; * = Statistically significant at $p < .05$).

procedures on the students' OTB. During the Baseline I condition, the mean rate of OTB for the group was 66.4%. During CPRI-I, the mean rate of OTB for the group was 80.8%. During Baseline II and CPRI-II, the rates of OTB for the group were 86.5% and 81%, respectively. There was no significant change in OTB from Baseline I to CPRI-I in terms of level ($t=.55$; $df=17$) or trend ($t=.58$; $df=17$). When CPRI-I was compared to Baseline II via Shewart Analysis, no significant change in OTB was found (Shewart lines ranged from 71.91-89.69). The Shewart Analysis of the Baseline II and CPRI-II comparison also indicated no significant change in OTB (Shewart lines ranged from 66.68-106.32).

The individual data for Group I are shown graphically in Figure 2. Only two students exhibited significant changes in OTB during any of the conditions. The Shewart Analysis of the CPRI-I and Baseline II conditions for student 2 indicated that a significant increase in OTB took place during Baseline II (Shewart lines ranged from 69.12-96.08). The Shewart Analysis of CPRI-I and Baseline II for student 3 also indicated a significant increase in OTB during Baseline II (Shewart lines ranged from 73-95.4). No other significant changes in OTB were found for this group of students.



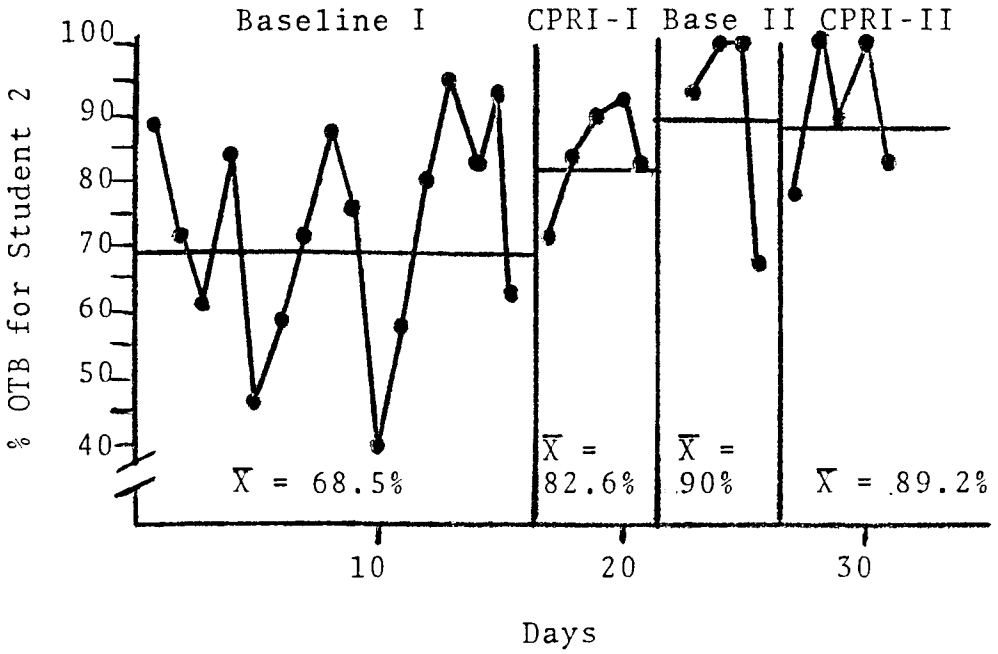


Figure 2. Daily percentages of OTB for individuals in Group I.

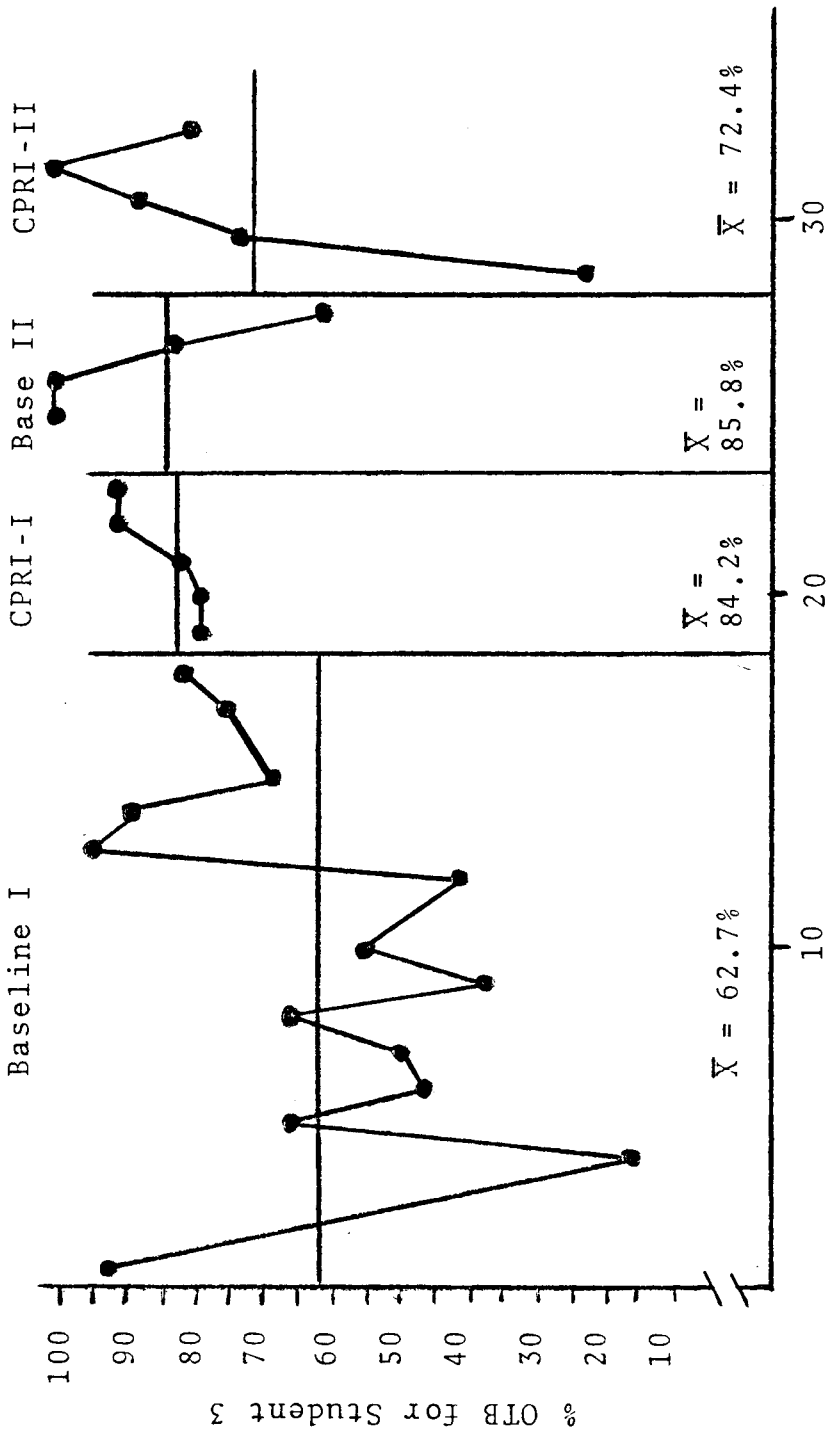


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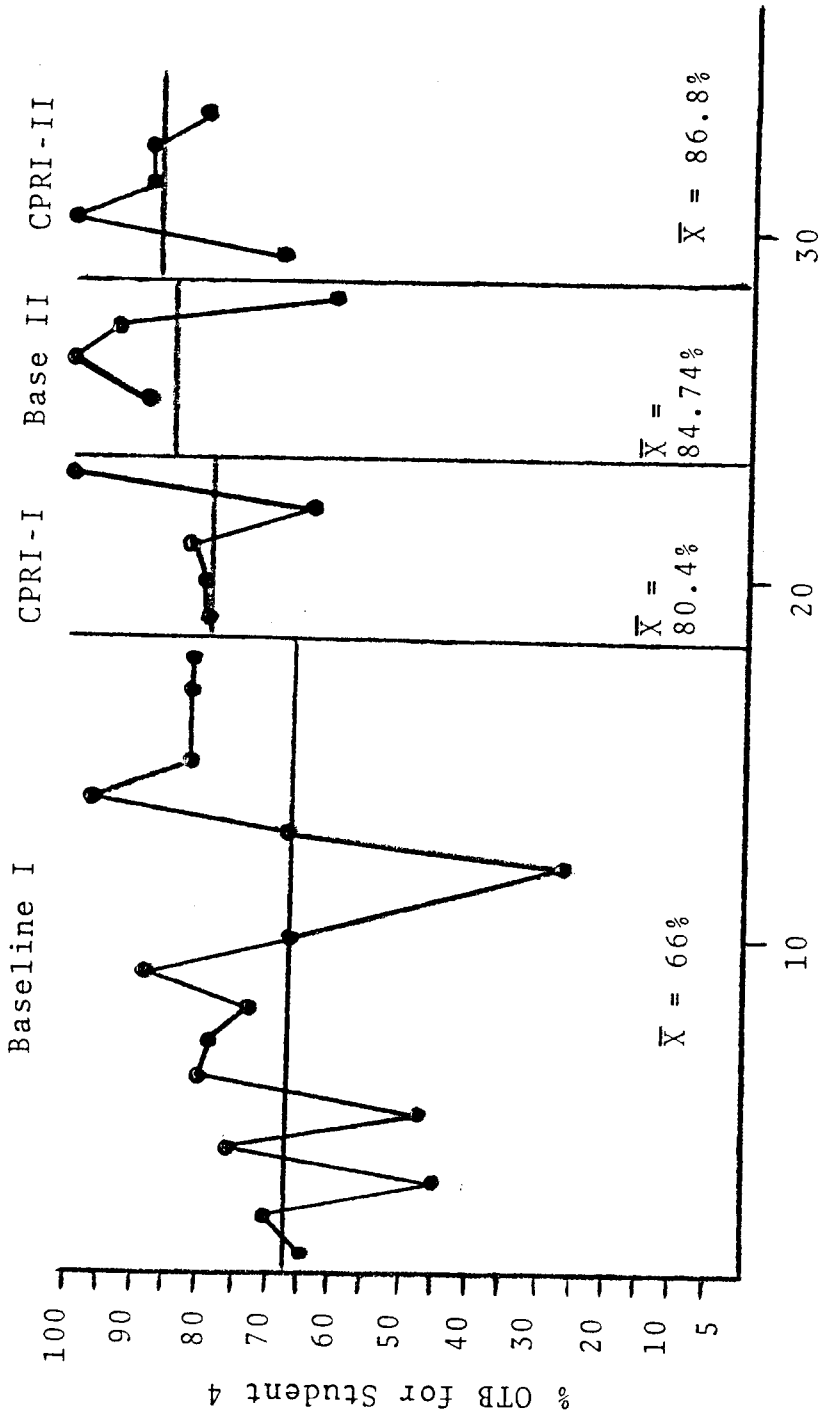


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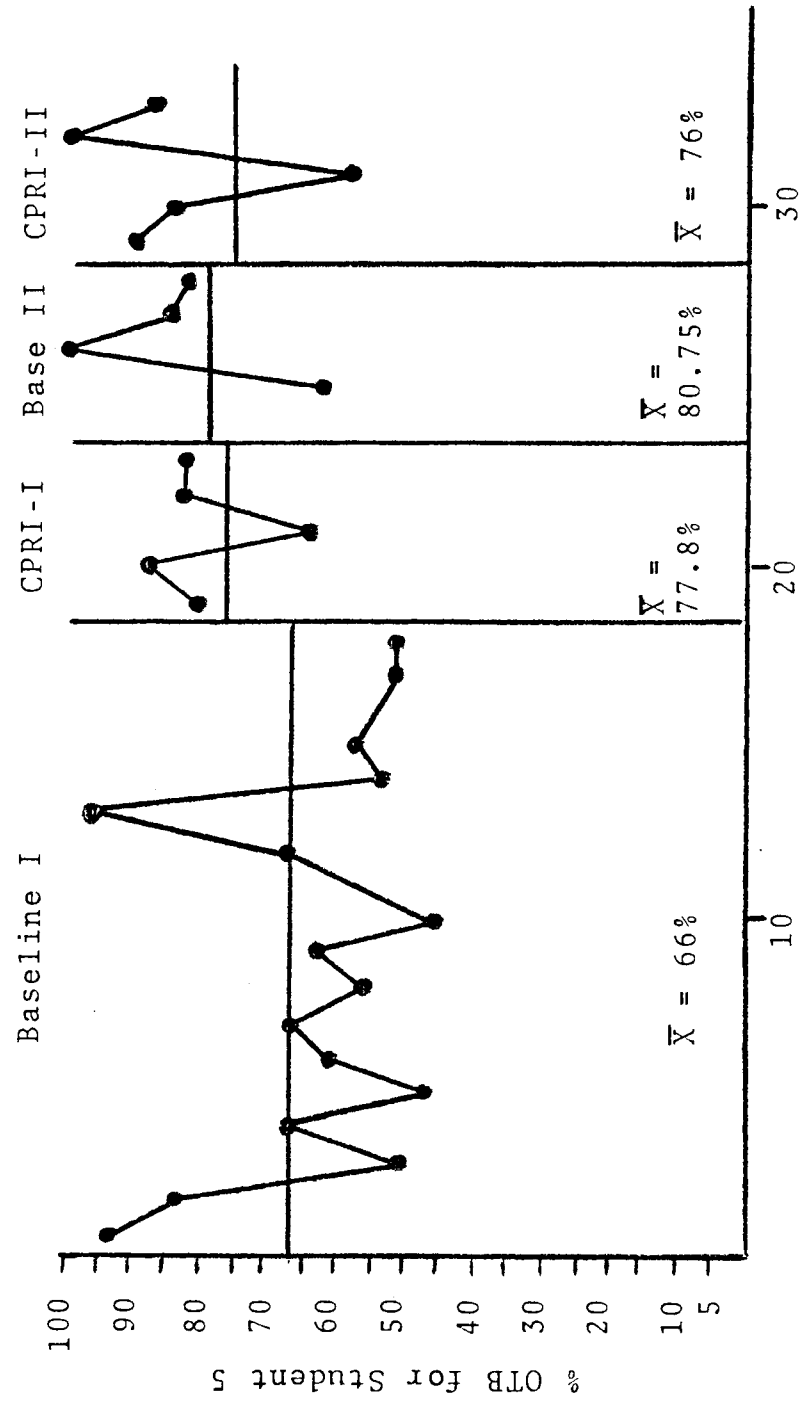


Figure 2 (continued)

Group II

The purpose of the sequence of conditions for this group as a total unit was to investigate the effect of large group CPRI procedures on OTB. Additionally, individual students were exposed to either a small-group CPRI procedure or an Attention-Control procedure during CPRI-II in order to: (1) investigate the effect of a small group CPRI procedure on OTB, and (2) to determine if this effect could be produced by simply exposing the students to an Attention-Control procedure. Also, the small group CPRI procedure during CPRI-II was to serve as a time-lagged (multiple baseline) control for the CPRI-I condition for Group I.

During Baseline I, this group's average rate of OTB was 74.4%. During CPRI-I, the rate of OTB was 73.38%. During Baseline II, the rate of OTB was, on the average, 74.8%. Group mean data were not computed for subsequent conditions, since all target students in the CPRI-II condition did not receive identical treatments (two were randomly assigned to an Attention-Control procedure). The Shewart Analysis of Baseline I and CPRI-I indicated no significant change in OTB (Shewart lines ranged from 50.6-97.48). The Shewart Analysis of CPRI-I and Baseline II also indicated no significant change in OTB (Shewart lines ranged from 46.92-99.82).

The individual data for Group II are shown graphically in Figure 3. Only one student in this group exhibited a significant change in OTB during any of the conditions. The Shewart Analysis of Baseline II and CPRI-II for student 4 indicated that a significant increase in OTB took place during CPRI-II (Shewart lines ranged from 65.3-94.3). No other significant changes were found for this group of students.

Group III

The purpose of the sequence of conditions for this group was to investigate the effects of a large group self-modeling control (SMC) procedure, a small group SMC procedure, and a small group CPRI procedure on OTB. Additionally, some students were exposed to individualized CPRI procedures during CPRI-II, in order to investigate the possible differences between these and small group CPRI procedures.

The results of the statistical analysis for group and individual data for Group III are shown in Table 6. The results for Group III (group mean data) are shown graphically in Figure 4. During Baseline I, the average rate of OTB for this group was 52.9%. During SMC-I, the average rate was 56.9%. During Baseline II, SMC-II, and CPRI-I, the average rates of OTB were 64%, 63.6%, and 61%, respectively. Group mean data were not computed and

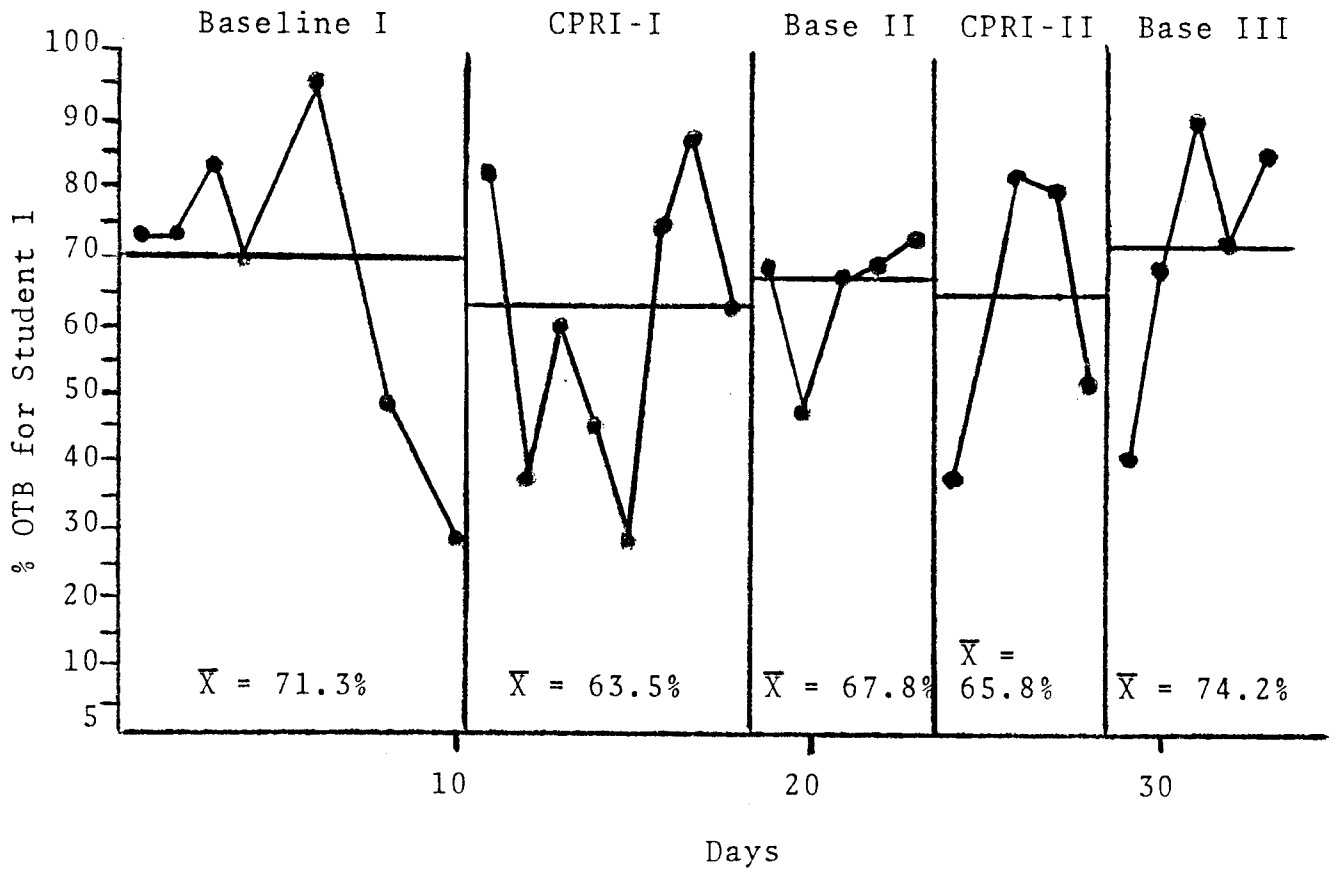


Figure 3. Daily percentages of OTB for individuals in Group II.

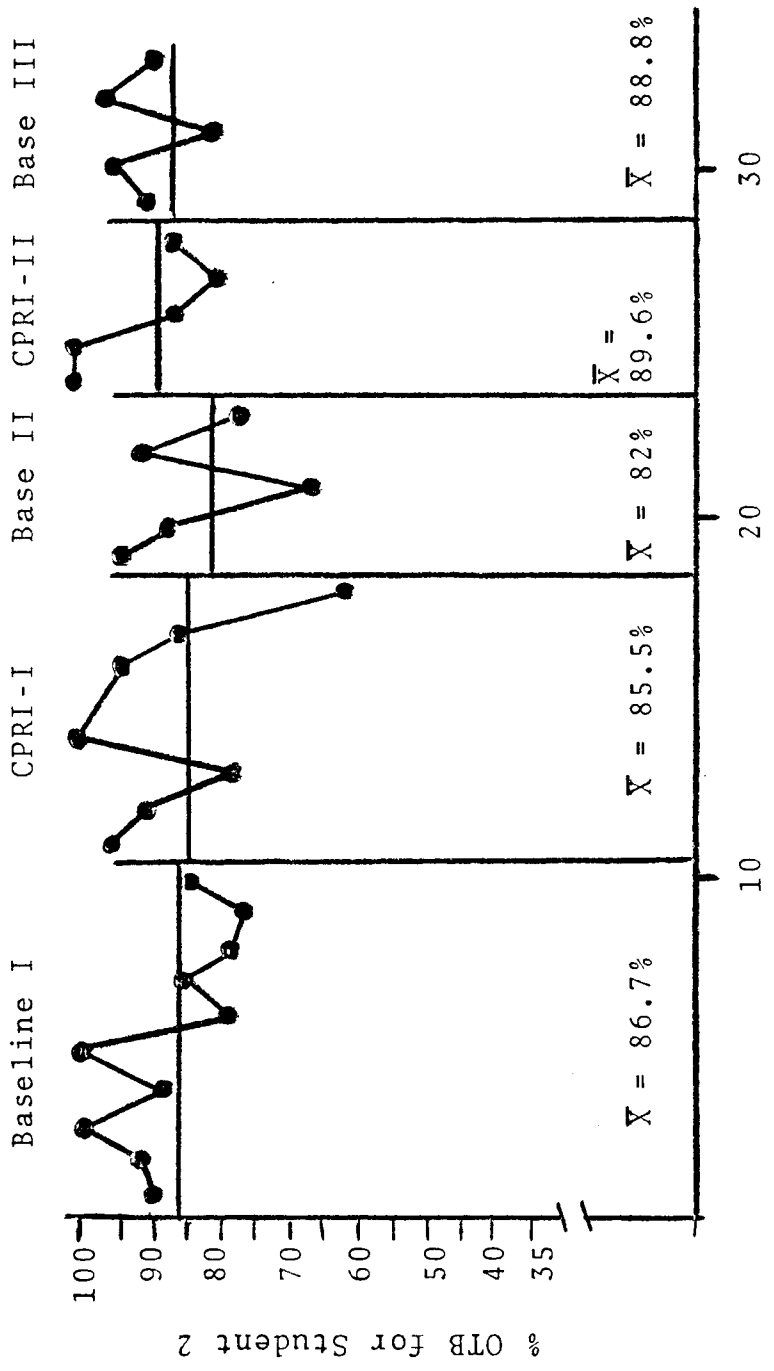


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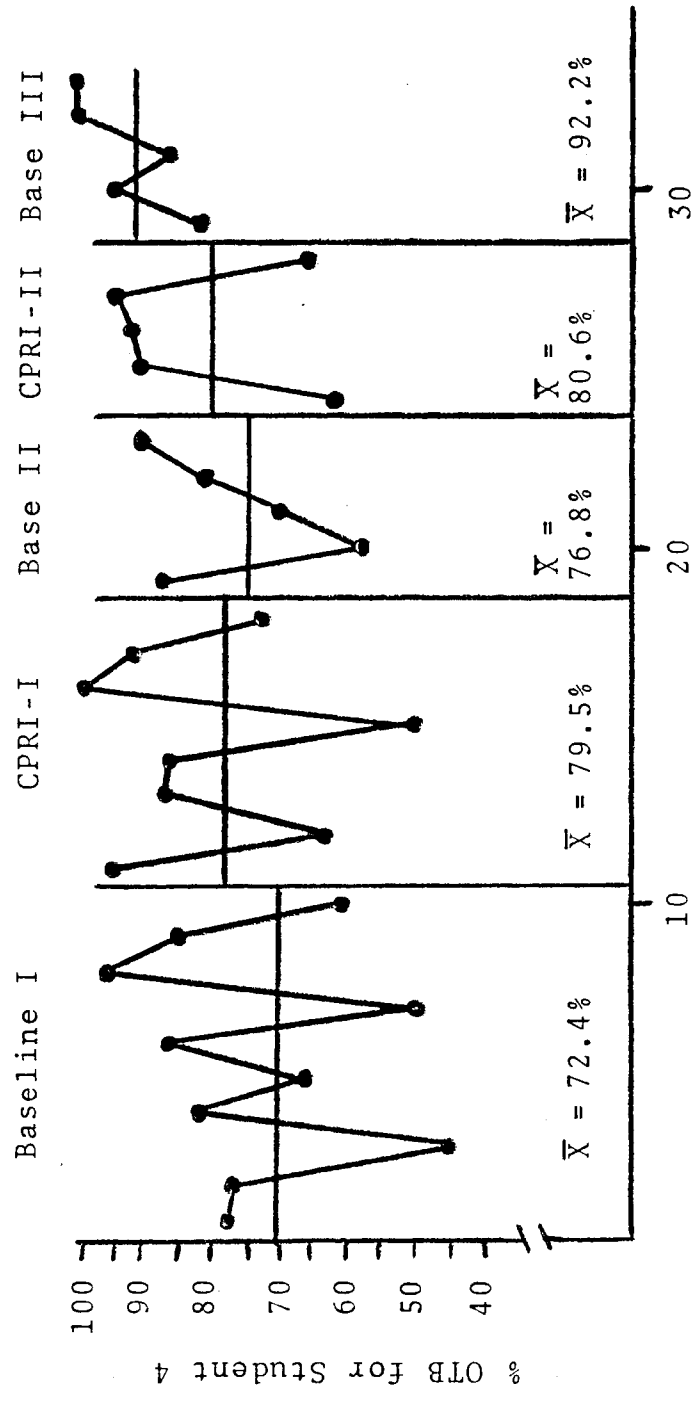


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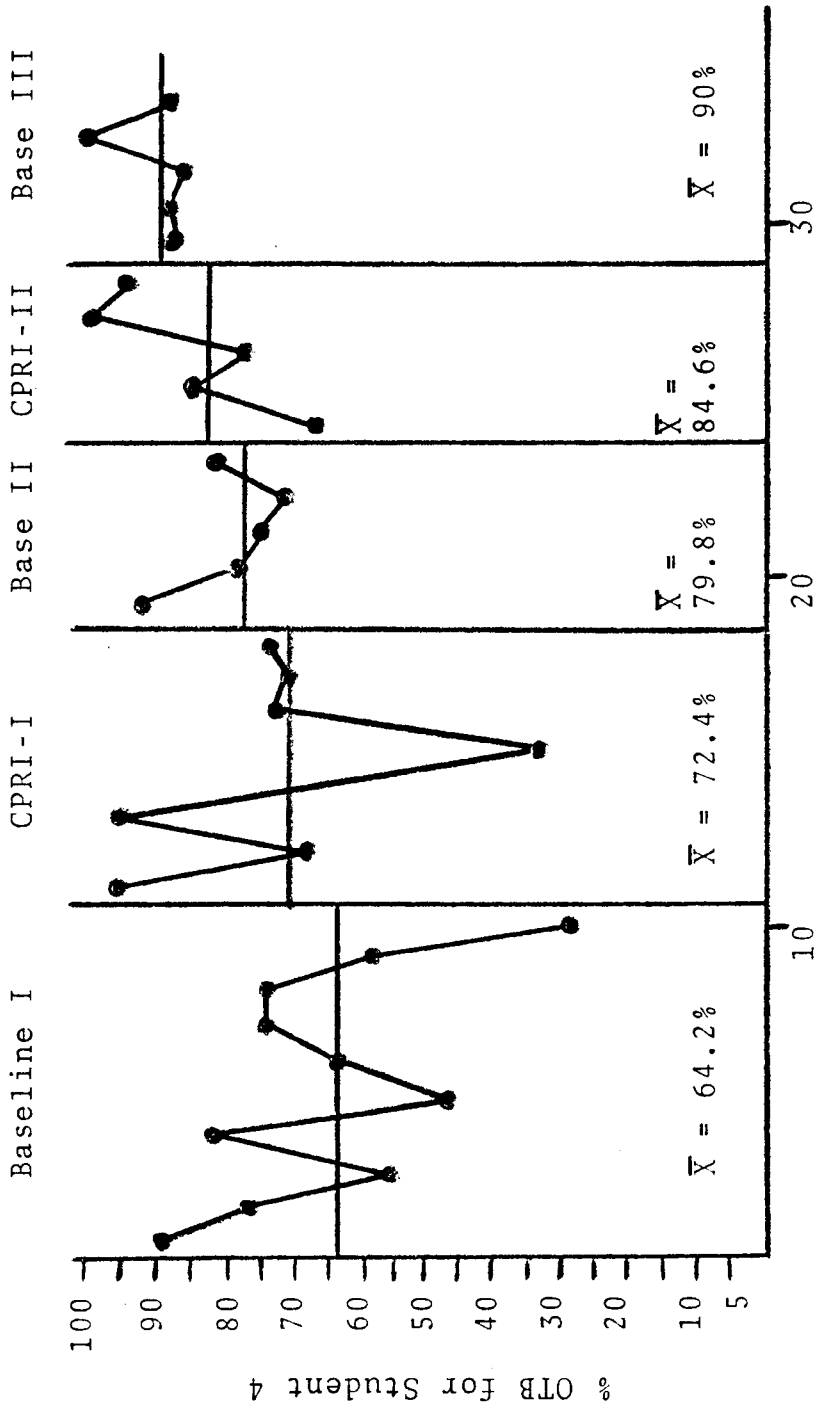


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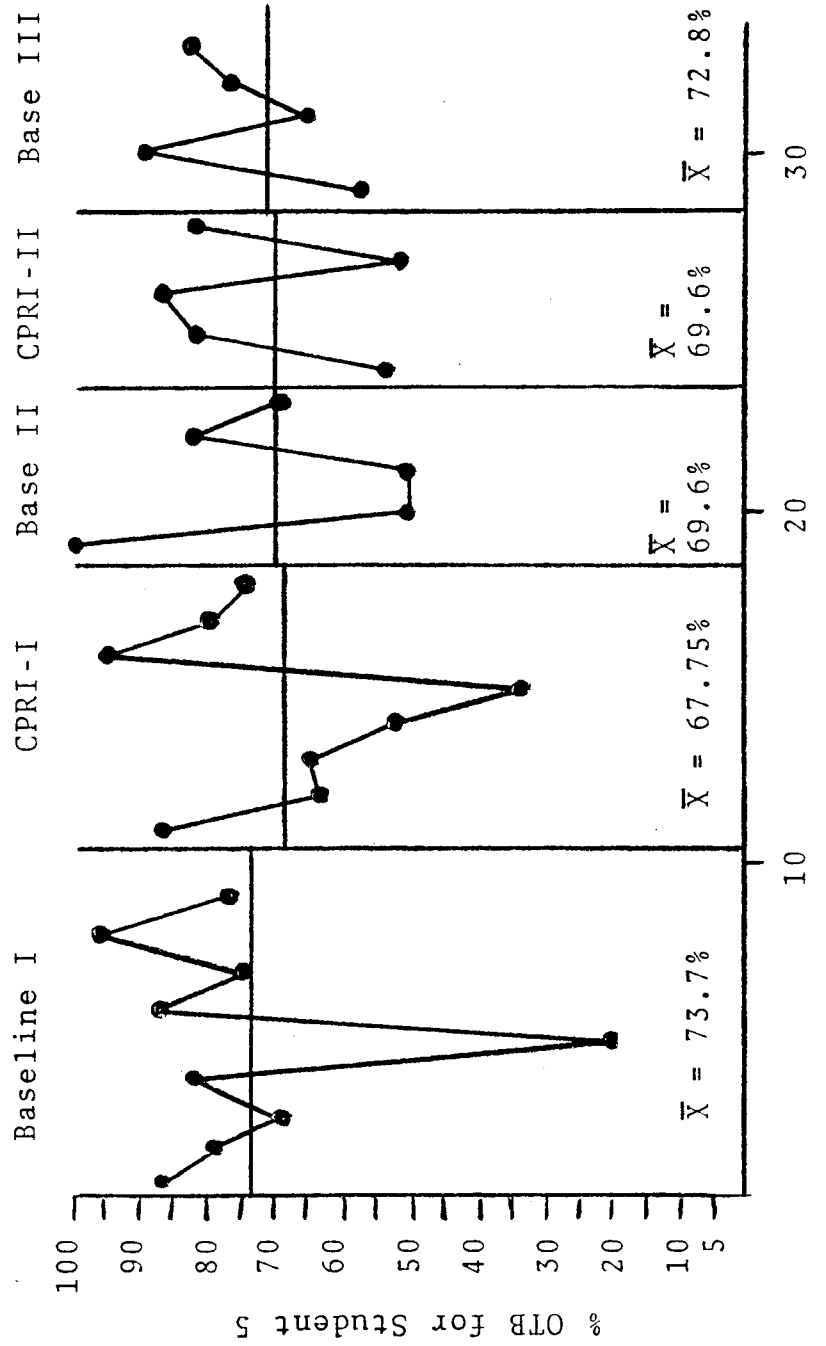


Figure 3 (continued)

TABLE 6

RESULTS OF THE STATISTICAL ANALYSIS FOR ALL COMPARISONS OF CONDITIONS FOR GROUP III[a]

BI/SMC-I	SMC-I/ BII	BII/ SMC-II	SMC-II/ CPRI-I	CPRI-I/ CPRI-II
Group Means t1=-.32 t2=8.20* df=16	t1=-.87 t2=-2.29* df=11	t1=-.15 t2=-.10 df=6	t1=.19 t2=-1.66 df=5	-
Student 1 t1=2.41* t2=5.46* df=15	NSS	NSS	t1=-.70 t2=-1.52 df=5	NSS
Student 2 t1=-1.82 t2=2.47* df=13	t1=-2.71* t2=-1.10 df=9	t1=.02 t2=.98 df=5	Shewart*	NSS
Student 3 NSS	NSS	NSS	NSS	NSS
Student 4 NSS	t1=-.41 t2=-.06 df=11	t1=1.85 t2=-1.74 df=5	NSS	t1=-.14 t2=.41 df=4
Student 5 NSS	t1=-.20 t2=.04 df=6	t1=-.08 t2=-1.21 df=5	NSS	NSS

[a]t1 = t-statistic for change in level; t2 = t-statistic for change in trend; NSS = Non-significant Shewart Analysis; Shewart* = Significant ($p < .05$) Shewart Analysis, * = Statistically significant at $p < .05$.

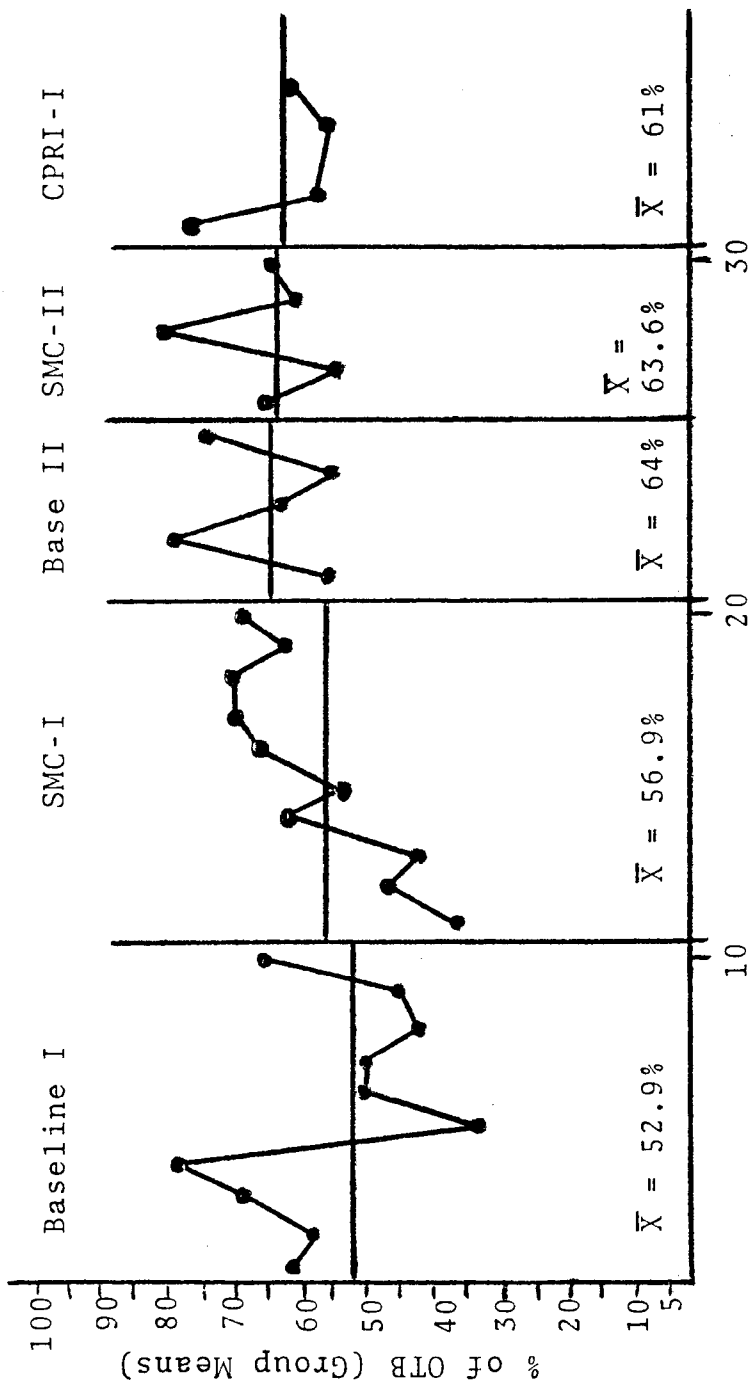


Figure 4. Daily group mean percentages of OTB for Group III.

analyzed for the CPRI-II condition, since all target students were not exposed to the same treatment procedures.

The ARIMA time series analysis of Baseline I and SMC-I indicated a significant positive change in OTB in terms of trend (t=8.20; df=16), but not level (t=-.32; df=16). There was also a significant negative change in OTB from SMC-I to Baseline II in terms of trend (t=-2.29; df=11), but not level (t=-.87; df=11). Although this reversal (Kazdin, 1975) indicates a possible functional relationship between SMC and increases in OTB, the analysis of Baseline II and SMC-II indicated no significant change in OTB in terms of level (t=-.15; df=6) or trend (t=-.10; df=6). The lack of a replication of the results of SMC-I, during the SMC-II conditions would seem to seriously contraindicate the inference of a functional relationship between SMC procedures and increases in OTB. The analysis of SMC-II and CPRI-I also indicated no significant change in OTB in terms of level (t=.19; df=5) or trend (t=-1.66; df=5).

The individual data for this group are shown graphically in Figure 5. Two students in this group exhibited significant changes in OTB. For student 1, there was a significant positive change in OTB from Baseline I to SMC-I in terms of both level (t=2.41; df=15) and trend (t=5.46; df=15). For student 2, there was a

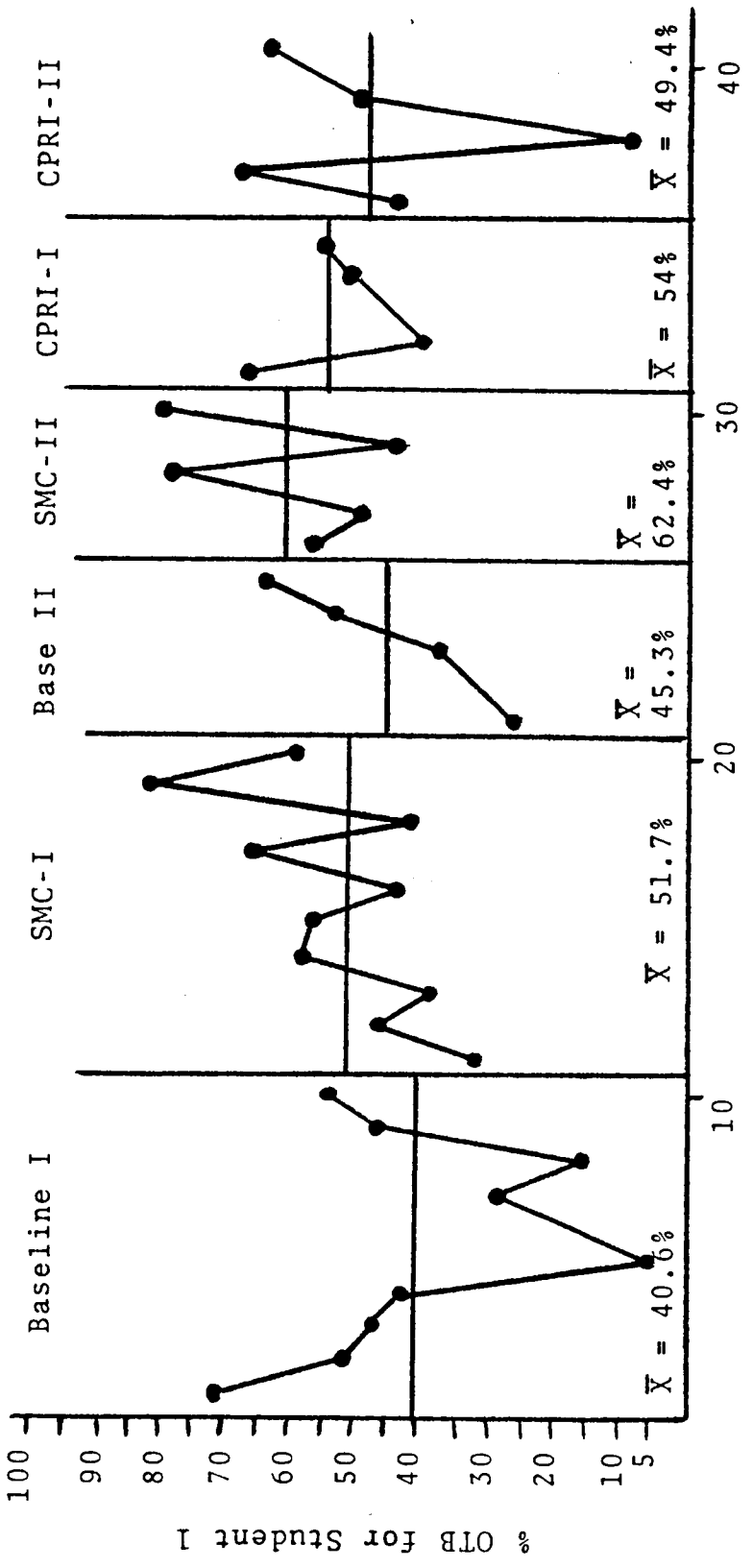


Figure 5. Daily percentages of OTB for individuals in Group III.

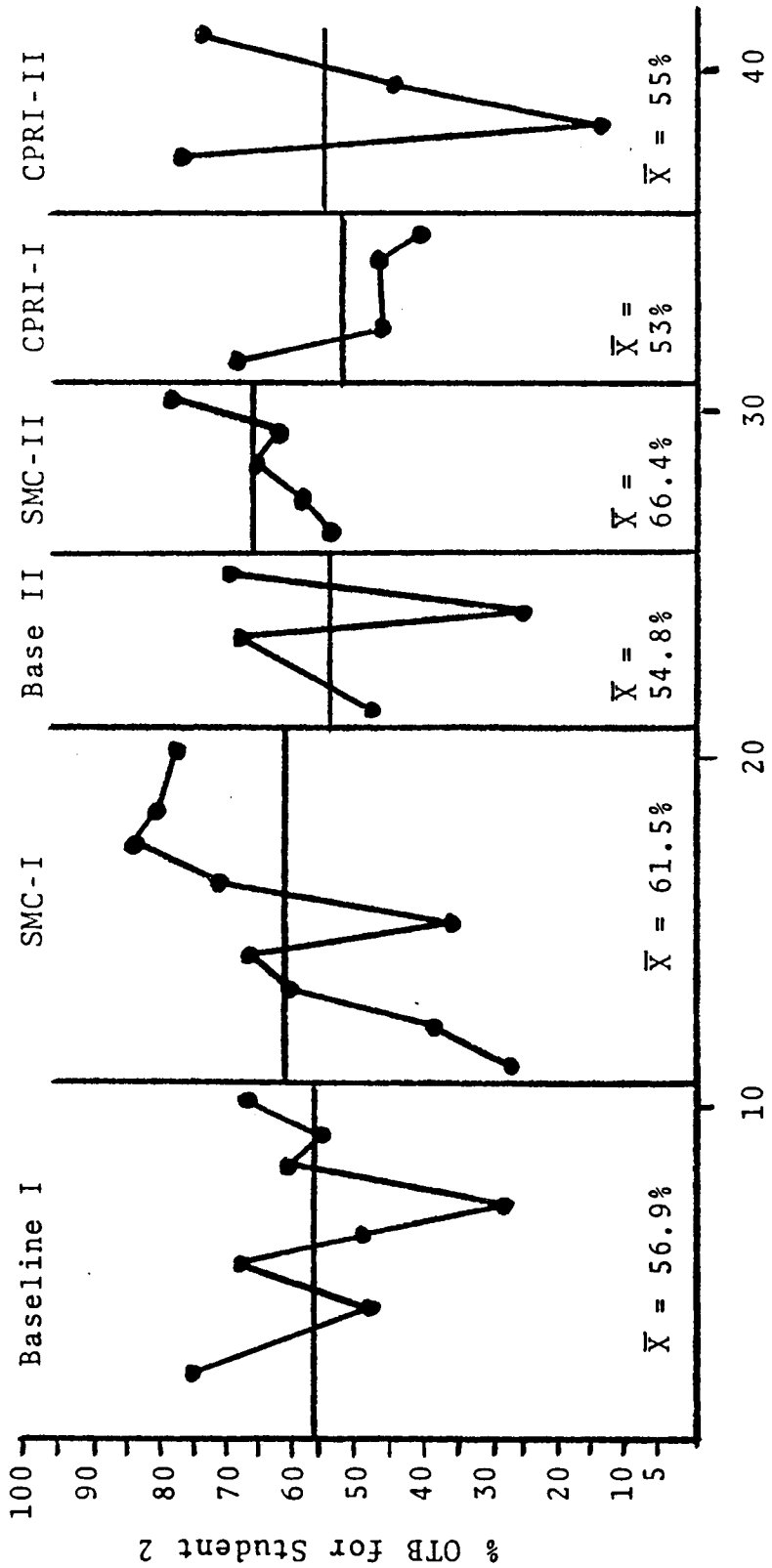


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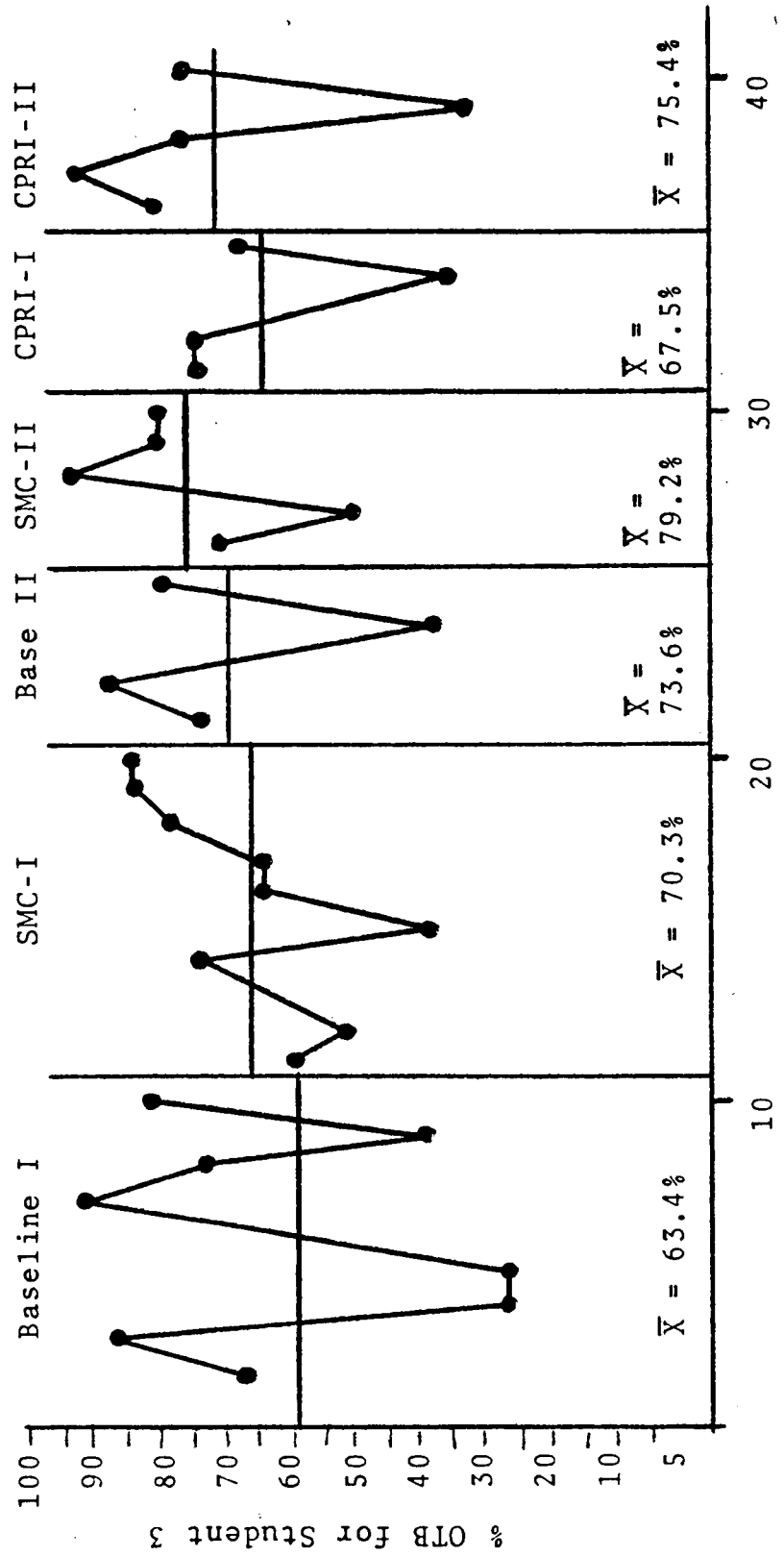


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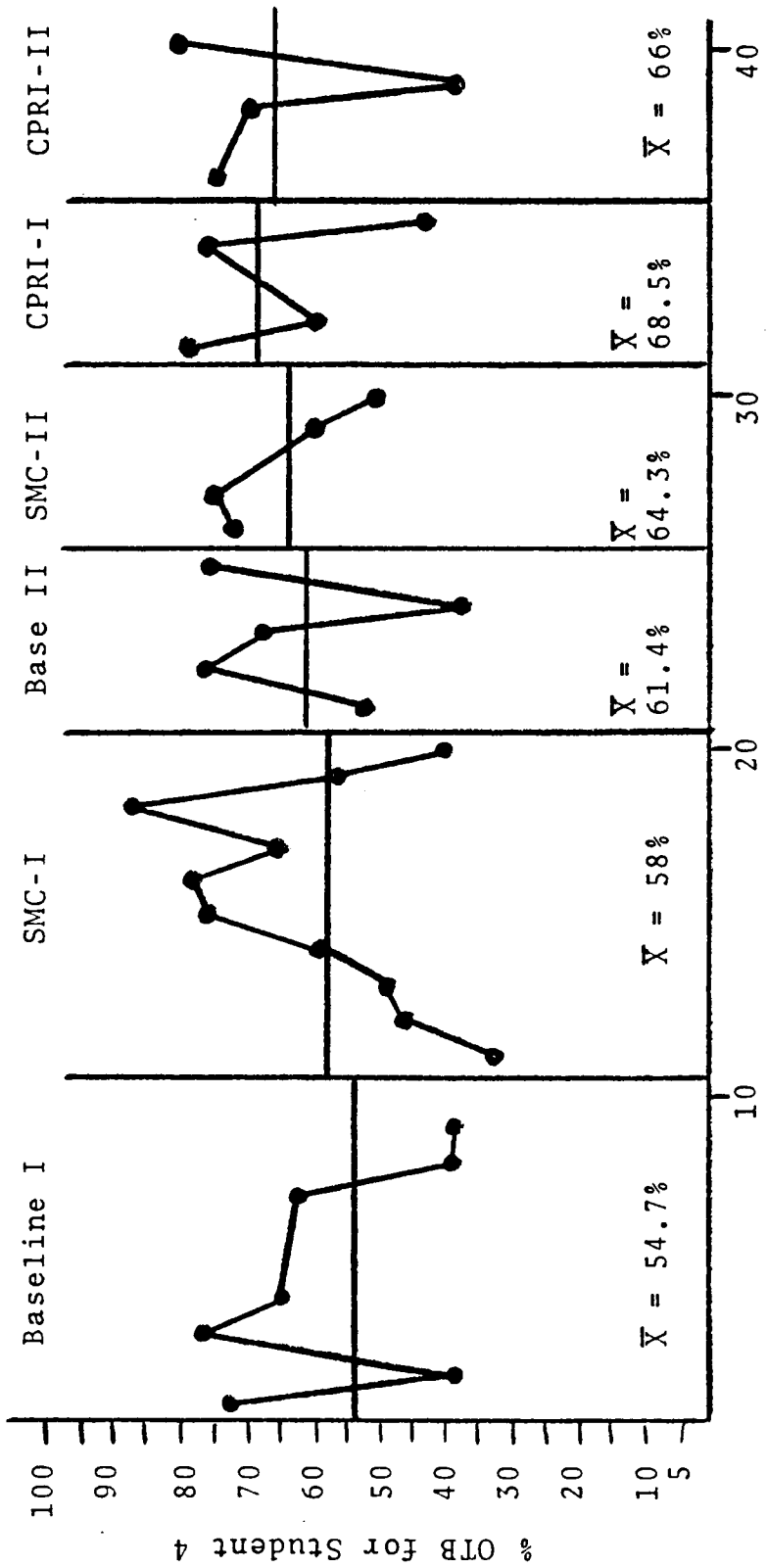


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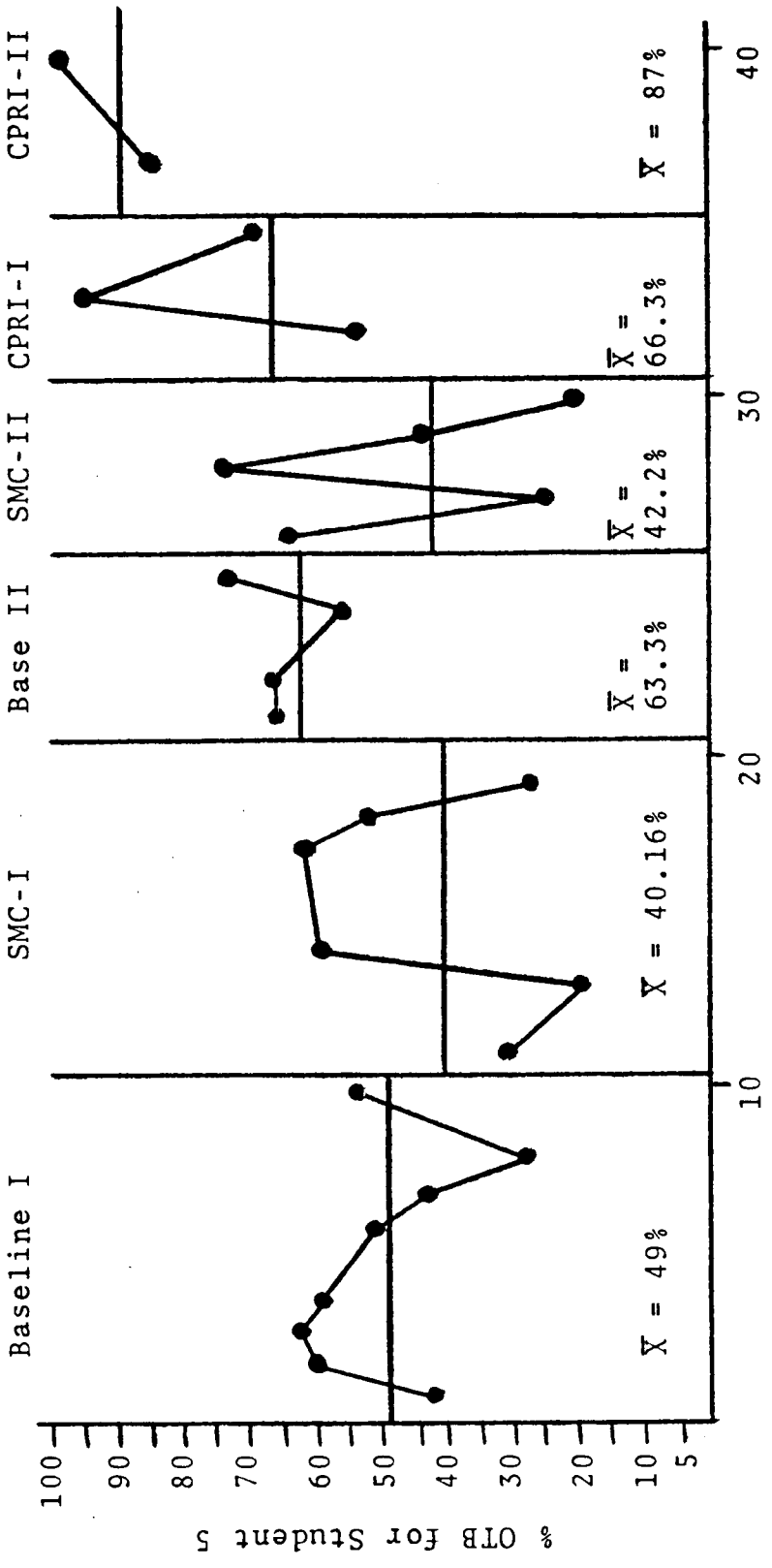


Figure 5 (continued)

significant positive change in OTB from Baseline I to SMC-I in terms of trend (t=2.47; df=13), but not level (t=-1.82; df=13). There was also a significant negative change in this student's OTB from SMC-I to Baseline II in terms of level (t=-2.71; df=9), but not trend (t=-1.10; df=9). The Shewart Analysis of SMC-II and CPRI-I, indicated a significant decrease in this student's OTB during CPRI-I (Shewart lines ranges from 50.03-82.7).

In order to investigate the relation between subjective ratings of image clarity and changes in OTB during the CPRI and SMC conditions, Kendall's Tau coefficients (corrected for ties) were computed for each target student's daily ratings of image clarity and their daily change scores for OTB during CPRI or SMC conditions. The daily change scores were computed by finding the difference between each target student's level of OTB for a given day during the CPRI condition (or, for Group III, the SMC-I condition), and their mean initial baseline level. The significance of each Tau coefficient was determined by computing a Z score for the obtained Tau (Champion, 1970) and comparing this to the critical Z at an alpha of .05. The Tau coefficients are shown in Table 7. None of the coefficients reached statistical significance at an alpha of .05.

TABLE 7

KENDALL'S TAU COEFFICIENTS FOR SUBJECTIVE IMAGE CLARITY RATINGS AND OTB CHANGE SCORES

Group	Tau Coefficient	Z Score
Group I		
Student 1	.362	.980
Student 2	.000	.000
Student 3	-.097	-.268
Student 4	-.248	.625
Student 5	-.554	-1.450
Group II		
Student 1	.120	.370
Student 2	-.370	-.900
Student 3	.154	.330
Student 4	-.100	-.300
Student 5	.000	.000
Group III		
Student 1	.070	.208
Student 2	-.107	-.370
Student 3	.000	.000
Student 4	.177	.520
Student 5	-.330	-.735

Summary of Results

For Groups I and II, the group mean data exhibited no statistically significant OTB changes across conditions. In Group I, two students exhibited significant OTB changes during Baseline II, which were maintained across subsequent conditions. For Group II, one student exhibited a significant change in OTB during CPRI-II, which, for this student, was an Attention-Control procedure.

For Group III, the group mean data exhibited a significant positive change in trend during SMC-I, and a significant negative change in trend during Baseline II. One individual student exhibited a significant positive change in trend during SMC-I, and a subsequent negative change in level during Baseline II, while another student exhibited a positive change in level and trend of OTB during SMC-I. The former student also exhibited a significant decrease in OTB during CPRI-I.

None of the Kendall's Tau coefficients for the strength of the relationship between students' subjective image clarity ratings and OTB change scores were significant.

CHAPTER IV

DISCUSSION

The results of this investigation for Groups I and II indicate a failure to demonstrate a functional relationship between the CPRI procedure and significant increases in OTB. Several factors might be responsible for this failure, and each of these will be discussed in this section.

The first factor to be discussed is the use of CPRI procedures which deviated from standard CPR techniques (Cautela, 1970; 1973). CPR, as originally formulated by Cautela (1970), involves several components which were absent in the CPRI procedures used with Groups I and II in this investigation. These include: (1) the use of CPR in an individual, one-to-one setting, (2) the use of highly individualized covert reinforcement scenes, (3) the client having specific knowledge of the purpose of the CPR procedures, and (4) the therapist's questioning the client after each CPR trial in order to determine exactly what the client was visualizing and how well. The failure to incorporate any one or several of these components could have resulted in the lack of significant results for Groups I and II in this investigation. Quite clearly, future research on the effect of CPRI on OTB in children should attempt to determine whether the inclusion

of the four CPR components specified above results in the effective use of CPRI.

Another set of factors which might be responsible for the lack of significant results with Groups I and II involves the questionable reliability and validity of the methods used to determine reinforcing events. Atkins and Williams (1972) found that a children's self-report reinforcement questionnaire was of only moderate test-retest reliability when a two-week retest interval was used. More importantly, these researchers failed to find evidence of the criterion validity of such an instrument. Although, in the present investigation, reinforcing events were determined through a combination of teacher-report and student self-report, there is no evidence that such a combination of methods results in increased reliability or validity for reinforcement surveys with children. If the potential reinforcers identified for use in this investigation were either unstable or invalid as indicators of whether the stimulus could be used contingently to change behavior, then a fair test of the efficacy of the small group or classroom CPRI procedures could not take place.

It seems imperative that future investigations of CPRI procedures with children either: (1) make use of reinforcer assessment instruments of demonstrated test-retest reliability (the retest interval should, at least, equal the number of days in the study), and criterion

validity, or (2) make use of individualized potential reinforcers derived from extensive interviewing. A first step toward developing an adequate reinforcer assessment instrument might be to explore the reliability and validity of the method used in this investigation. Following the suggestion of Atkins and Williams (1972), it might prove useful to expose both teacher and students to the potentially reinforcing stimuli prior to assessment.

As Cautela (1970) implies, it is often necessary to change covert reinforcers frequently in order to avoid satiation. Although, in the present investigation, 12 different potential reinforcers were used with each group, the same 12 were presented across a relatively large number of days (10 days for Group I and 13 for Group II), leaving open the possibility of satiation. Future research might benefit from using a much larger number of reinforcing events than in the present study, and varying their use over the duration of the CPRI conditions.

Another factor which may have contributed to the lack of significant results for Groups I and II involves the reinforcement value of participating in this study. On several occasions during the CPRI conditions, the students stated that they were bored, and proceeded to suggest other, apparently more reinforcing, activities. This suggests that the students' motivation to engage in CPRI was relatively poor, and this could have adversely affected

their performance during CPRI. Future research should investigate possible differences between the effectiveness of CPRI procedures when used with students who are highly motivated to participate in CPRI, and those who are not.

Related to the students' motivation for participating in CPRI is another factor that may have also contributed to the results of this study. When the students were verbalizing their desire to change activities, they frequently did so during the CPRI trials themselves. Baron (1975) found that even slight extraneous noises such as a faint electronic beep can disrupt CPR imagery and render the procedures ineffective. Future CPR research with children should attempt to keep extraneous verbalizations to a minimum during CPR trials. This might be accomplished by using only those students who express a definite desire to change the target behaviors, and to participate in CPRI. Another possible way of controlling extraneous verbalizations during CPRI is to implement a point contingency wherein the absence of verbalizations over a specified time period results in a rewarding consequence, and the occurrence of extraneous verbalizations results in a punishing consequence. Of course, if such a procedure were used, its effect, per se, should be partialed out from the effect of the CPRI procedure. Possibly, a third way of controlling extraneous verbalizations would be to administer CPRI only in individual, one-to-one

settings. The present writer's experience in using CPRI with children indicates that extraneous verbalizations seldom occur in individual settings.

Another variable which might account for the lack of significant changes in OTB for Groups I and II is the small number of days in the CPRI conditions. A visual inspection of the Group I data (particularly group means and the data for Students 2, 3, and 4) for CPRI-I, Baseline II, and CPRI-II, indicates the possible presence of some weak trends toward increases in OTB during CPRI-I (which continued into Baseline II), decreases (reversal effects) during the latter part of Baseline II, and increases in OTB during CPRI-II. However, with the use of such short conditions (five days), it is difficult to accurately determine whether such visual fluctuations in the data do, in fact, reflect weak trends. Before what appears to be a trend could stabilize, the condition had changed, making any attempt to clearly interpret the "trend" meaningless. Also, the significant increases in OTB for two Group I students during Baseline II could possibly be interpreted as delayed effects of CPRI. Future research in this area might benefit from using longer CPRI conditions. The use of longer CPRI conditions would provide time for possible trends to stabilize, and would also enable the researcher to investigate the possibility of delayed effects of CPRI. Longer conditions

would provide an extended time period during which an effect might be observed.

It was initially hypothesized (by the present researcher) that the relatively high Baseline I rates of OTB for Groups I and II might have contributed to the lack of significant changes in OTB during CPRI conditions. For Group I, the average Baseline I rate of OTB was 66.4%, while for Group II, the average Baseline I rate was 74.4%. A brief review of recent investigations, however, isolated two studies which successfully increased the OTB of students whose Baseline rates of OTB were in excess of 65-70% (Knapzyk and Livingston, 1974; Glynn, Thomas, and Shee, 1973). It seems unlikely, then, that the high Baseline rates of OTB are responsible for the lack of significant results in this study.

Another variable which may have contributed to the lack of significant results is the use of OTB as the target behavior. It seems possible that some behavior therapy procedures are more effective in changing certain behaviors than others. Future research should explore the comparative effectiveness of CPRI procedures with the widest possible array of target behaviors.

The above factors, which might have contributed to the lack of significant results with Groups I and II, might also account for the failure to obtain clear significant results with the SMC and CPRI conditions for Group III.

The only possible exception involves the factor of deviation from original CPR procedures, since the CPRI-II condition for three students in Group III closely followed original CPR procedures as developed by Cautela (1970). However, the results of this condition are confounded with the students' prior exposure to SMC-I, SMC-II, and CPRI-I, and therefore fail to provide a clear test of CPRI.

The results of this investigation suggest that future research on the use of CPRI with OTB might be improved by: (1) the incorporation of several factors into the CPRI program and (2) the investigation of the relative importance of these factors in terms of the effectiveness of CPRI. These factors include: (1) use of highly individualized potentially reinforcing events, (2) use of CPRI in an individual, one-to-one setting, (3) informing the students in the study of the purpose of the CPRI procedures, (4) use of a reinforcer assessment device which has been demonstrated to be reliable and valid, (5) use of frequent questioning to insure that the student is visualizing appropriate events, (6) use of a wide array of potentially reinforcing events and varying them across days in CPRI conditions in order to avoid satiation, (7) use of students who are highly motivated to participate in CPRI, and (8) use of a relatively large number of days in CPRI conditions. It is also recommended that the effects of CPRI procedures be investigated on a variety of behaviors in addition to OTB.

Although the preceding conceptual analysis of the possible factors influencing the results of this study is important in terms of future research, it does not represent the only contribution of the study. Possibly, the major contribution of this investigation is the demonstration of how and why two complementary time series analysis procedures, ARIMA time series analysis and Shewart Chart analysis, can and should be used to quantitatively evaluate the effectiveness of child behavior therapy programs.

The group mean data for Group I (Figure 1, page 52) provide an example of the necessity of statistical procedures in applied behavior analysis. Suppose, for a moment, that these data were analyzed in the same manner as applied behavior analysis data are most often analyzed (Kazdin, 1975). That is, suppose that the data were analyzed by simply inspecting the difference between the means of adjacent conditions. Using this procedure, one would probably conclude that during CPRI-I, OTB increased (relative to Baseline I) by approximately 21% of the Baseline I level. Furthermore, one might conclude that, during Baseline II, OTB increased by approximately 30% of the Baseline I level. Since investigations demonstrating increments in OTB of 20-30% have been published in the recent applied behavior analysis literature (e.g., Knapcyzk and Livingston, 1974), it seems that one might

also conclude that our OTB increments of 20-30% are considered "significant" by the applied behavior analysis community. However, the ARIMA and Shewart Chart analyses of the data clearly suggest that, had we concluded that "significant" changes in OTB took place during CPRI-I and Baseline II, we would have likely committed Type I errors. These analyses indicate that no significant changes in OTB took place during any conditions for the data in question.

Not only do the group mean data for Group I serve as an example of the necessity of statistical procedures per se, they also serve as an example of the necessity of statistical procedures which take the mathematical model of the data into account. If a researcher were to disregard the possibility of these data being characterized by serial dependence, a logical means of analyzing the data might involve a simple independent samples t-test. When this test is applied to the data in question, the results indicate that a statistically significant increase in OTB took place during CPRI-I ($t=4.175$; $p < .05$). However, as we know, the data were characterized by serial dependence, and serial dependence results in a positively biased test (Hartmann, 1974). The ARIMA analysis, which took the serial dependence into account and therefore performed an unbiased test on the data, indicated no significant OTB changes during CPRI-I. It seems clear that the use of

statistical procedures which ignore the mathematical model of the data in question are similar to data analysis techniques which ignore the need for statistical analysis. In both situations, the applied behavior analysis researcher might run a high risk of being led to believe that a given procedure is effective in changing some behavior, when, in reality, it is not.

Quite clearly, the use of ARIMA time series and Shewart Chart analysis procedures strengthened the present investigation from the point of view of program evaluation. It is hoped that this investigation will serve as a model for the use of these procedures in applied behavior analysis, and therefore indirectly foster the discovery and use of maximally powerful behavior change techniques.

perhaps it would then be wise to use the TS procedures correctly.

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APPENDICES

APPENDIX A

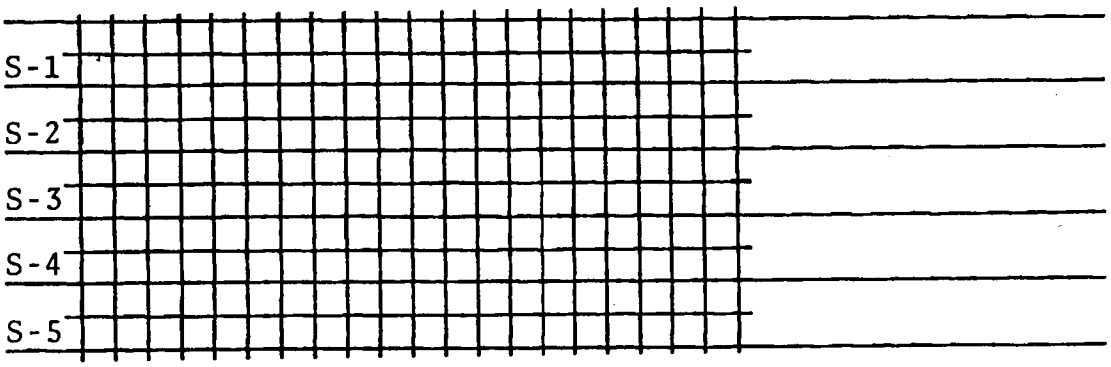
OBSERVATION FORM

Date_____ Classroom_____

Observer_____ Time_____to_____

S1_____ S2_____ S3_____

S4_____ S5_____



APPENDIX B

EXPERIMENTAL DESIGN

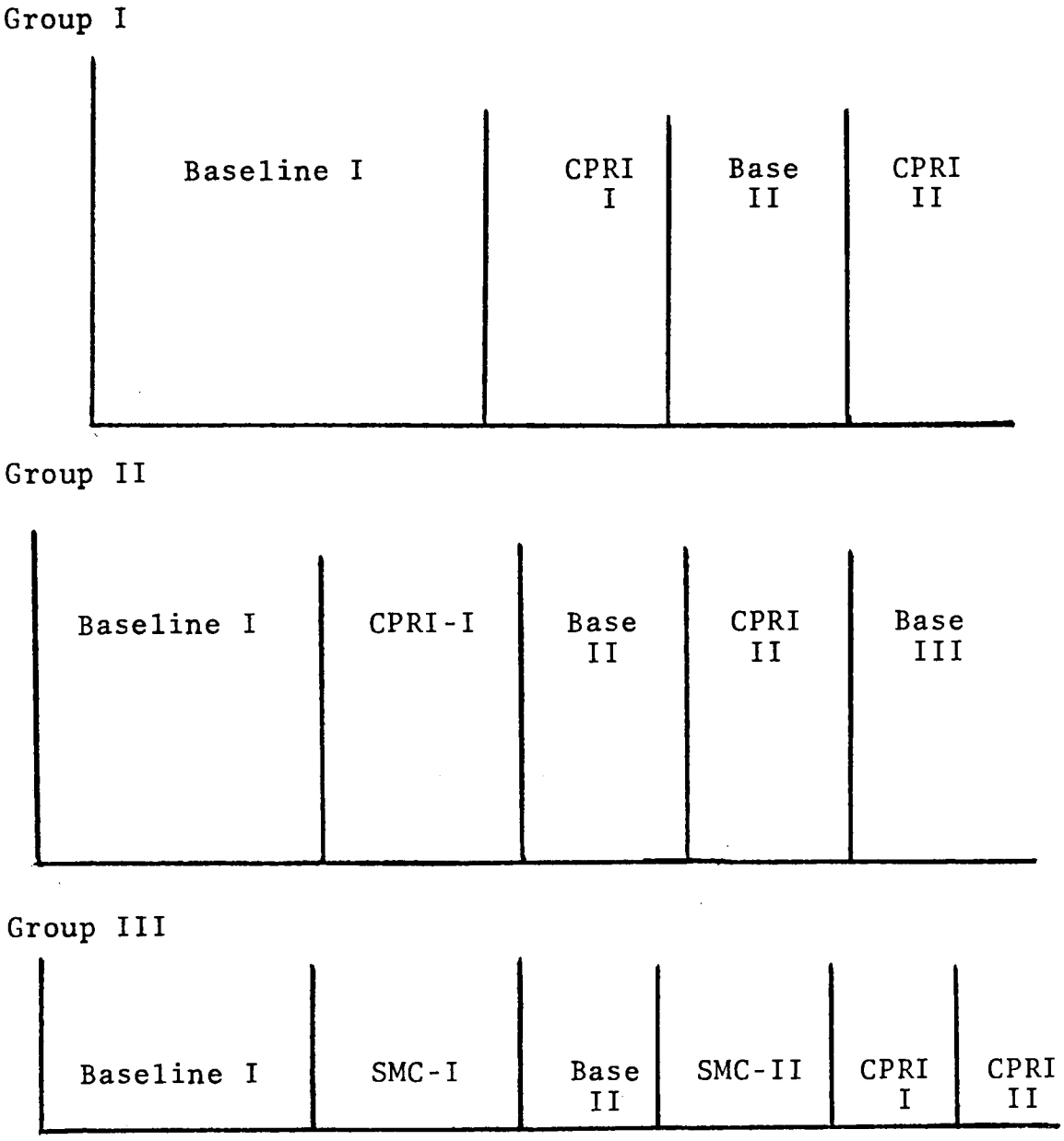


Figure 6. Experimental design.

APPENDIX C

CHILDREN'S REINFORCEMENT SURVEY

Boy Girl

Name_____
Age_____

	DISLIKE	DON'T REALLY CARE	LIKE	LIKE VERY MUCH
Do you like painting?				
Do you like making things out of wood?				
Do you like to sing?				
Do you like to read comic books?				
Do you like to watch cartoons?				
Do you like swimming?				
Do you like riding a bike?				
Do you like having an outdoor recess?				
Would you like to be the winner of a contest?				
Do you like to watch TV?				
Do you like traveling to far-away places for vacation?				
Do you like to go to the movies?				
Do you like to play with model cars and airplanes?				
Would you like to have sports equipment of your own?				
Do you like to play baseball?				
Do you like to play football?				
Do you like to play basketball?				
Do you like to play kickball?				

	DISLIKE	DON'T REALLY CARE	LIKE	LIKE VERY MUCH
Do you like to play with dolls?				
Do you like to play with your parents' clothes?				
Do you like to go camping?				
Do you like listening to music?				
Do you like go-carts?				
Do you like minibikes?				
Do you like going shopping?				
Do you like to eat out in restaurants?				
Would you like to talk to your favorite sports star?				
Would you like to talk to your favorite TV or movie star?				
Would you like to fly an airplane?				
Do you like having a birthday party and getting presents?				
Do you like repairing things that are broken?				
Do you like going on field trips in school?				
Do you like being the teacher's helper?				
Do you like looking at a rug?				
Do you like cleaning up your room?				
Do you like for people to tell you that you did a good job?				
Do you like watching other people play?				
Do you like watching other people eat?				
Would you like to go to a circus?				
Do you like watching the wind blow the trees?				
Do you like watching a bird fly?				
Do you like watching the moon?				
Would you like to go to the fair?				
Do you like answering the phone when it's not for you?				

	DISLIKE	DON'T REALLY CARE	LIKE	LIKE VERY MUCH
Do you like walking on the sidewalk?				
Do you like to hear dogs bark?				
Do you like to play with dogs?				
Do you like to play with cats?				
Do you like to hear cats meow?				
Do you like to ride in your parents' car?				
Do you like to hear a car motor running?				
Do you like looking at rocks in the street?				
Would you like for someone to give you lots of money?				

DIRECTIONS: Look at each item on this list. This is a list of things that some people like to do, and things that some people don't like to do. If you just don't like doing what an item describes, put an "X" beside the item in the dislike column. If you don't care whether you do what an item describes, put an "X" beside the item in the don't really care column. If you would like doing what an item describes, put an "X" beside the item in the like column. If you would really like to do what an item describes an awful lot, put an "X" beside the item in the like very much column.

APPENDIX D

TARGET BEHAVIORS TO BE IMAGINED DURING CPRI AND SMC CONDITIONS

1. Looking straight at your teacher while she is in front of the class teaching.
2. Looking straight at the blackboard while your teacher is writing something on it.
3. Asking your teacher questions about what she is saying.
4. Reading something from the textbook to your teacher.
5. Sitting in your chair and silently reading an assignment that your teacher has assigned.
6. Sitting in your chair and drawing a picture as part of an assignment.
7. Sitting in your chair and writing an assignment that your teacher has assigned.
8. Looking at a map that your teacher is pointing to.
9. Using the dictionary to look up a word that you need for an assignment.
10. Raising your hand to ask your teacher a question about an assignment.
11. Answering a question that your teacher has asked the whole class.
12. Looking straight at and listening carefully to another student who is answering a question that your teacher asked.

VITA

Edward A. Workman was born in Burlington, North Carolina, and was 24 years of age at the time of this project. He received a B.A. with Honors in Psychology from the University of North Carolina (1973), a M.A. from Western Carolina University (1974), and the Doctor of Education degree from The University of Tennessee in August 1977.

Mr. Workman worked for one year as a School Psychologist in Western North Carolina prior to entering The University of Tennessee in 1975. From 1975 to 1977 he was employed as a School Psychologist with the Little Tennessee Valley Educational Cooperative. Mr. Workman's interests focus on the areas of child and adolescent behavior therapy, behavioral self-control, and program evaluation. He has presented four papers in these areas at National Conventions and has authored or co-authored four articles in the Journal of Psychology, Behavior Therapy, and the Journal of School Psychology.

Mr. Workman is a full member of the National Association of School Psychologists, and a full member of the Association for the Advancement of Behavior Therapy. Beginning September 1, 1977, Mr. Workman will be employed as Psychologist/Program Director with the Interpersonal Development Project at the Little Tennessee Valley Educational Cooperative.