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APPLIED BEHAVIOR ANALYSIS IN THE CLASSROOM:
ISSUES AND TECHNIQUES

by

Joseph Russell Patterson

A Dissertation Submitted to the Faculty of the
DEPARTMENT OF PSYCHOLOGY
In Partial Fulfillment of the Requirements
For the Degree of
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In the Graduate College
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A handwritten signature in cursive script, reading "Joseph R. Patterson", written over a horizontal line.

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ABSTRACT

This dissertation is a report on the process of moving a body of knowledge, gleaned from prior research in applied behavior analysis, into a special education setting. These activities are conceptualized as the dissemination of the process of inquiry, that is, the application of the scientific method by the teacher in order to evaluate teaching activities and attain specified educational goals. The groundwork necessary for setting goals and making an environmental assessment is described. The process of implementing a teacher training program, setting up a token economy, managing that economy, restructuring classroom curriculum, implementing record keeping systems, designing observational instruments, collecting observational data, and using that data for feedback and decision making are described. In addition, the experimental comparison of two group contingent procedures versus individually contingent token reinforcement in a multiple-baseline design is described and discussed in terms of data on student classroom participation, deportment, and social interactions.

The dissertation is introduced with an extensive literature review of the technology for feedback with an emphasis on the selection of variables relevant to behavior change and the technology for measuring those variables in the natural environment. The technology for change is reviewed from the literature with brief definitions of the more important principles of behavior followed by an in-depth look at the importance of teacher attention, token economies, teacher

training, and group contingent reinforcement for applied behavior analysis in the classroom.

A series of seven intervention strategies introduced into an extremely chaotic classroom for emotionally disturbed boys over a three month period is described and the results presented non-statistically in a variety of graphical presentations. These data are grouped under the topics; token economy management, teacher attention, student deportment, teacher curriculum management, student academic performance, and effects of group contingent reinforcement. The data are presented for both group means and individual performance and include; number of tokens earned, observed teacher attending behaviors, observed student deportment behaviors, records of number of assignments made by the teacher and number of assignments completed by students.

The discussion provides a perspective on the importance of research for problem solving in educational crisis situations. The importance of the token system as a diagnostic tool which allows assessment of ongoing student and teacher behaviors is emphasized. Teacher social attention as an important variable in student deportment and academic performance is validated and discussed in terms of interactions between teacher attention and other aspects of classroom management such as token economies and curriculum design. The problems of maintaining changes in teacher behavior are given consideration. The necessity of recording student academic performance as well as deportment behaviors in educational settings is stressed and the token

economy is discussed in terms of its function as a tool for individualizing curriculum. Factors accounting for the apparent success of the group contingency games for improvement of student behavior are proposed and important differences between "good" and "bad" group contingencies are described.

Directions for future research in applied behavior analysis in the classroom are presented. The importance of descriptive, as opposed to experimental, field studies is re-emphasized. Some strategies for best field work are suggested. Some aspects of the use of token economies as a means for changing both student and teacher behaviors are presented for further examination. Finally, the importance of the dissemination of the techniques of applied behavior analysis to the field practitioner (the teacher) is restated with a strong plea for application of known principles to real social needs--now.

CHAPTER 1

INTRODUCTION

Psychological consultation to the classroom, as carried out in the project reported here, is best conceptualized as the dissemination of the process of inquiry, for it is the process of research and not the products of research which have direct relevance to the practitioner (Wetzel, 1975). This process is, simply, the scientific method applied by the teacher in practical research activity to evaluate those activities in attaining specified educational goals. The objective of this consultation was to introduce various principles and techniques from the field of applied behavior analysis so that the teacher could use them in the classroom and change the behaviors of the students. In this regard, research in applied behavior analysis has supplied two major bodies of technical information. The first is the technology for feedback, that is, the methods which allow the teacher to measure the occurrence of relevant events over time and note changes as a consequence of various teacher activities. In this way, data became the means for assessing and diagnosing current situations and monitoring change over time. The second body of technical information includes techniques for changing the physical or social environment antecedent or consequent to the behaviors of interest. These techniques are the products of many prior replications of the applied research process which prevent each teaching situation from being an entirely trial and

error process (although, trial and error are never completely removed from application in unique contexts). The techniques for change suggest events that are important to change and thus supply direction for collection of data relevant to the feedback process.

Technology for Feedback

Wetzel and Patterson (in press) reviewed the technical developments in classroom behavior analysis as presented primarily in the Journal of Applied Behavior Analysis from 1968 through 1974. Two important aspects of the feedback technology's development are made clear from that review: (1) the selection of variables judged relevant to change in the classroom determines the kinds of data needed for adequate description of ongoing activities and evaluation of change; (2) the technology for measurement of these relevant variables imposes limitations on the kind and quality of data that may be produced.

Selection of Relevant Events

One common class of behavior measured in applied behavior analysis in the classroom has been inappropriate child behavior. These behaviors were either so labeled in the studies or otherwise defined as undesirable. About 75% of the studies in JABA observe, record, and manipulate inappropriate behavior. Most of these studies distinguish one or more subcategories of inappropriate behavior; disruption which typically includes speaking out of turn, loud noises, inappropriate materials use, moving furniture, swearing, and fighting; out-of-area

which is generally limited to out-of-desk but also includes reading-circle, rug-time, etc.; off-task which is sometimes the absence of on-task behaviors such as not looking at the teacher, not looking at the materials with which one is supposed to be working, not looking at a peer who is reciting, or the presence of incompatible behaviors such as playing with inappropriate materials, scribbling, doodling, gazing out the window, and turning around the desk.

Seventy-seven percent of the studies reviewed by Wetzel and Patterson (in press) measured appropriate child behaviors. Subcategories of appropriate behavior are: (1) participation which includes hand raising, asking questions, making relevant comments (with permission), helping peers, recitation, and working at the chalkboard; (2) on-task defined as looking at the teacher, looking at materials, reading appropriate materials, attending to a reciting peer, working on workbooks, math problems, etc.; (3) social most often includes appropriate peer interactions, verbalizing to peers, cooperative play, sharing, peer tutoring, etc.; (4) academic output usually includes number of problems solved or work sheets finished; (5) language frequently includes grammatical units and verbal utterances.

Teacher attention is the next most commonly studied classroom behavior [54% of the studies reviewed by Wetzel and Patterson (in press)]. About a fifth of these studies make no further distinction between types of teacher attention. The remainder of the studies scored teacher verbal attention and distinguish one or more subcategories. Among these, approval is generally limited to praising

comments of the teacher directed toward the child. Disapproval includes scolding or reprimands. Instruction has been defined as directions, directives, lecture and feedback on task performance. Teacher physical contact was recorded in nine of the 48 studies reviewed with six of those differentiating approval (hugs, kisses, pats on the head, etc.) and disapproval (restraint, slaps, pushes, drags, etc.).

Peer behavior was recorded in nine of the 48 studies reviewed by Wetzel and Patterson (in press). Undifferentiated peer attention (other than physical contact) was recorded in six studies and differentiated into verbal approval and disapproval by three studies.

Among settings observed, ten of the 48 studies in this review recorded across undifferentiated settings in what appear to be traditional classrooms. The most commonly distinguished setting was independent seat or desk work (29 of 48 studies). The next most common setting was structured lessons (21 of 48 studies). The remaining settings include free play, small group independent work, and individual lessons.

The selection of these behaviors and events for recording was criticized by Wetzel and Patterson (in press) for being exclusively representative of the aims of "traditional" classroom procedures and behavioral goals. This tendency to restrict research focus to a relatively few categories of traditional classroom behavior was traced to certain theoretical concerns, aspects of research convenience, and technological limitations. If feedback technology is to serve in the real improvement of educational practices it must not be used only

for simple demonstration of reinforcement control, limited to settings which make data collection easy. Further, the description of complex events should not be limited by the behavior recording technology.

The Technology for Measurement

Applied researchers seldom have the option of choosing a response easily and reliably quantified and, as a result, must try harder to describe and evaluate the effects of their efforts. Adequate specification of functional treatment variables is required for tracing the results of an experiment to the experimental manipulations. Wolf suggests that important variables are often omitted from reports of research in applied settings because the researcher is only interested in the impact of the complete "package" of variables (Wolf, 1973). According to Sidman (1960, p. 61) "such descriptions may be omitted from published reports because their relevance is not recognized at the time, or because fine details of a technique may be too lengthy and confusing to describe in print." The complete specification of treatment variables requires the quantification of many events. For example, to specify better the variables involved in the application of a token economy, measures of the teacher's behavior may be necessary (Mandelker, Brigham, and Bushnell, 1970). The requirement for more detailed specification of treatment variables leads, in turn, to the requirement for more sophisticated data collection instruments capable of generating the required information. In addition, sophisticated multiple-baseline designs are often necessary for research in applied settings. These designs also require sophisticated observation and

recording technologies capable of simultaneously recording multiple behaviors. Thus, advancement in observation and recording becomes crucial as researchers attempt a more complete specification of treatment variables; attempt to check for generality of treatment effects across behaviors, subjects, and settings; and attempt to measure multiple behaviors for multiple-baseline research designs.

Bijou (1970) notes several aspects of applied behavioral research which shape the researcher's behavior. One of these is the necessity to develop technology for the human measurement of human behavior. Several procedures have been used by applied researchers to quantify observed behaviors, but paper and pencil recording of time-sampled events is by far the most frequent and apparently the most successful of all the data collection procedures developed for applied research. Bijou, Peterson and Ault (1968) reviewed observational technology, summarized various procedures used in classrooms, and outlined some provocative suggestions for their application.

The technology for the human measurement of human behavior in the classroom had expanded exponentially by the time Wetzel and Patterson (in press) reviewed the literature. That review presents samples of the technology in a simple-to-complex order according to: (1) the degree of inclusion of both social stimulus and response events; (2) number of behaviors recorded for each subject; (3) number of subjects observed; (4) number of settings studied; and (5) complexity of the time-sampling strategy.

Examples of simple scoring instruments may be found in reports by Barrish, Saunders, and Wolf (1969); McAllister et al. (1969); and Harris and Sherman (1973). These instruments have been developed to record attending and disruptive behaviors of whole classrooms. In the Harris and Sherman (1973) study, two inclusive categories of inappropriate behavior, talking-out and out-of-seat, emitted by any child in the classroom were recorded at one minute intervals. The advantages of such a system are that the whole class can be watched by a single observer, and the recording is simple enough to obtain high reliabilities with relatively untrained observers. The disadvantages of the system are: the data are group mean data and do not adequately describe individual behavior; such long sampling intervals are insensitive to high rate behaviors; no data are available on appropriate behavior; and social stimulus events such as teacher and peer behaviors are not measured.

Subject sampling instruments avoid averaging group behavior by observing one subject during the first time interval, another subject during the next interval, and so on. After all the subjects are observed in this fashion, the series of observations is repeated until all the subjects have been observed an equal number of times. Examples of this type of observation and recording system may be found in Wodarski et al. (1972); Kazdin and Klock (1973); Hall, Lund et al. (1968) and Broden, Hall et al. (1970). The advantages of subject sampling techniques are that data on a number of individual subjects may be

obtained, generalization of treatment effects across subjects described, and multiple-baseline designs used. Limitations of sampling techniques include: loss of data through sampling; observer bias induced by fixed order of observations; and, difficulty of observing different subjects every five to ten seconds.

Discontinuous scoring techniques involve observing the subject for the sample interval and then not observing for an interval during which the observed behaviors are recorded on the score sheet. Examples of this scoring technique may be found in Bijou, Peterson, and Ault (1968); Coleman (1970); Kazdin (1973); Herman and Tramontana (1971); and Ringer (1973). The advantages of discontinuous scoring are: (1) observations may be randomized across subjects because the observers have time to find each new subject prior to each new observation interval; (2) reliability is often improved because more time is allowed for scoring; (3) contextual influences from preceding sample intervals may be diminished. A major difficulty with such systems is the loss of observation time which may be as much as 50% of the total time (Coleman, 1970; Kazdin, 1973).

Complex observational instruments have been devised to record a greater number of behaviors of a subject as well as record more complex interactions between the subject, his teacher, his peers, and setting events in his environment. Examples of observation instruments that measure multiple behaviors of a single child as well as social interactions with teachers and peers may be found in Buell et al. (1968); Sajway, Twadosz, and Burke (1972); Pinkston et al. (1973)

and Walker and Buckley (1972). There are several advantages to these observation techniques: (1) recording multiple behaviors of a single subject allows description and functional analysis of collateral behavior changes that may be effected through treatment of a single behavior; (2) collection of data on multiple baseline design; (3) the data generated by recording social interactions allows greater specification of treatment effects; (4) records of peer behavior also allow measurement of collateral social change brought about by changes in the target subject's behavior; (5) specification of settings in which target behaviors occur allows tests for generalization of behaviors from treated to untreated settings. The disadvantage of these recording procedures is that only a single subject's behavior is recorded. Further, the advantage of increased data is offset to some extent by the increased difficulty of observing and recording multiple behavior which makes observer training more difficult.

Even more complex observational systems allow data collection on multiple behavior of more than one subject as well as teacher and peer social interactions. This is accomplished by using a subject sampling strategy to observe and record multiple behaviors of multiple subjects. Examples of these techniques may be found in O'Leary (1969); Thomas, Becker, and Armstrong (1968); and Solomon and Wahler (1973). The advantages of these methods are the same as those listed above with the addition of more information on more subjects. The disadvantages are primarily related to the increased difficulty in data collection.

The number of behavior categories scored and the requirement for subject sampling procedures each add to the difficulty of observation and recording. Highly trained observers are needed to obtain acceptable observer agreement requirements. The researcher should certainly weigh the utility of each bit of additional data against the additional difficulties encountered in data collection.

Besides these observational methods, there are a number of rather straightforward record keeping systems which the classroom teacher can use to monitor the students' and the teacher's own behaviors. These include simple attendance records, activity records, records of the number, type, and difficulty of curriculum assignments made, and records of the number, type, and difficulty of assignments completed by the students. In fact, it is this type of record which will verify whether changes in observed behaviors, such as on-task, are actually leading to improvement in academic performance, which is, of course, the primary goal of most public school classrooms.

The Technology for Change

The process of applied research cannot be understood without grasping the techniques for changing the physical or social environment antecedent or consequent to the behavior, that is, the ability of the researchers to make real changes in a real social context.

"The process of applied research is a process of change and the researcher is the changer" (Wetzel, 1975, p. 87).

The Principles of Behavior

The principles of the behavioral approach are statements describing demonstrated relationships among behavioral and environmental variables. This approach further assumes that the principles of behavior are relatively simple and few in number. The complexity of human social behavior evolves from the complexity and variety of the environmental conditions under which these principles have been operative in the individual's history. The behavior analyst attempts to establish a complex behavioral phenomenon as a compound of previously substantiated functional relations. "These statements, which have been accumulating steadily over the past sixty years, are the facts of the science of psychology as generated by an experimental analysis of behavior" (Bijou, 1970, p.67). These principles have been organized by Reynolds (1968) into the following groups: Acquisition and extinction of operant behavior; Stimulus control of operant behavior; Conditioned reinforcers; Schedules of reinforcement; Respondent behavior and respondent conditioning; Aversive control; and, Emotion and motivation.

The concepts and principles of behavior analysis as applied directly to the classroom teaching situation and described by Skinner in The Technology of Teaching (1968) have come to be called "behavior modification" by many, although there are valid reasons for contemporary practitioners to avoid that terminology (Repucci and Saunders, 1974). In a recent review of behavior modification in special education, Kazdin and Craighead (1973) point out that most of the research in the

application of behavior modification in special education has employed the principles of operant conditioning (for an exhaustive review, see Bandura, 1969).

Kazdin and Craighead (1973) list five basic principles, conceptualized consequences, which may be used to change operant behavior. Two of the principles, positive and negative reinforcement, may be employed to strengthen, or increase, the frequency of a behavior. Positive reinforcement is the occurrence of a positive stimulus following a response and negative reinforcement is the disappearance of an aversive stimulus following a response which leads to increased probability of the response in those stimulus conditions. On the other hand, if a response results in an aversive stimulus, punishment by application, or the disappearance of a positive stimulus, punishment by removal, then the probability of that response occurring in the future in that stimulus situation is decreased; the response has been weakened. Extinction is the process whereby a response which has been reinforced is no longer reinforced and thus the response decreases in frequency.

Schedules of reinforcement, that is, the relationship between the frequency of the response and the frequency of the contingent reinforcement determine many characteristics of behavior. These include the rate of acquisition of a new behavior, the maintained rate of an old behavior, the resistance of the behavior to extinction, and the patterning of the occurrence of the behavior over time. Reinforcement schedules may be continuous or intermittent. Intermittent

schedules may be further subdivided into interval schedules, ratio schedules, fixed schedules, variable schedules, and mixed schedules.

Other important concepts in operant learning are: Shaping, or learning by successive approximations; Chaining, in which separate responses come to occur in sequences; Modeling, in which the behavior is demonstrated for the learner; Prompting or cueing, which involve presentation of a partial response or additional discriminative stimuli; Propping, which is physically moving the organism through the response; Imitation, in which the learner emits a response after observing a model; Discrimination, the process whereby an organism comes to respond to stimuli, marking the occasion of reinforcement for responding; and Generalization, the responding in the presence of stimuli other than those which served as training discriminative stimuli.

"Teaching, according to Skinner, is a situation in which the teacher arranges the contingencies of reinforcement to expedite learning by the child. The teacher is the arranger, and since she generally works in the classroom by herself, we may think of her as the Lone Arranger" (Bijou, 1970, p. 68). Bijou gives two cautions about arranging the educational environment. First, that consequences not be used indiscriminately and that contrived reinforcers such as tokens, candies, points, stars, etc., be avoided unless the usual reinforcers available in the classroom are not meaningful (i.e., demonstrated to not be functional) to the child. Second, that the

scheduling of stimulus materials, antecedent events, not be forsaken in the search for control of behavior through contingent reinforcement.

Applied Behavior Analysis in the Classroom

Much of the history of applied behavior analysis in the classroom can be described as the search for reinforcement control of student behaviors in the classroom. A host of early studies demonstrated the functional relationship between teacher attention and student academic and deportment behaviors. After the demonstration of the effectiveness of token economies for improving the behaviors of mental patients, the use of, and research on, token economies in school classrooms spread rapidly. With the advent of token economies in classrooms, the possibilities for management of reinforcement contingencies were greatly expanded. One outcome of these developments was exploration of the powerful social control of group contingent reinforcement. The necessity that the teacher mediate the application of behavioral technology has led other researchers to describe and research practices most effective in modifying and maintaining the appropriate teacher behaviors.

Teacher Attention

A series of studies carried out in preschools demonstrated the effectiveness of contingent teacher attention in modifying isolate play (Allen et al., 1964; crying (Hart et al., 1964); and crawling (Harris et al., 1964). Similarly, teacher and peer attention were

manipulated by Zimmerman and Zimmerman (1962), Patterson (1965), and Hall and Broden (1967) to reduce problem behaviors and increase appropriate responses of children enrolled in special classrooms. Reversal designs were used by Hall, Lund, and Jackson (1968) to demonstrate the functional control of teacher attention on study behavior of first and fifth grade students. Madsen, Becker, and Thomas (1968) went one step further and carried out a component analysis of rules, praise, and ignoring as controlling variables for a number of classroom behaviors. They concluded that rules alone had little effect, ignoring inappropriate behavior and showing approval for appropriate behavior were very effective in achieving better classroom behavior, and showing approval for appropriate behavior was the key to effective classroom management.

Token Economies

The basic assumption of token economies is that tokens become conditioned secondary reinforcers, that is, they acquire reinforcing value by association with a variety of back-up reinforcers (Ayllon and Azrin, 1968). In an extensive critical review of token research literature, Kazdin and Bootzin (1972) list a number of advantages in using generalized conditioned reinforcers, tokens, to change behavior. (1) Tokens bridge the delay between the target response and back-up reinforcement; (2) tokens permit the reinforcement of a response at any time; (3) tokens may be used to maintain performance over extended periods of time when the back-up reinforcer cannot be parcelled out; (4) tokens allow sequences of responses to be reinforced without

interruption; (5) tokens maintain their reinforcing properties because of their relative independence of deprivation state; (6) tokens are less subject to satiation effects; (7) tokens provide the same reinforcement for individuals who have different preferences in back-up reinforcers; and (8) tokens may take on greater incentive value than a single primary reinforcer. In addition to these advantages, classroom research with token economies reviewed by O'Leary and Drabman (1971) indicate that: (1) token economies provide a structured environment which supplies clear stimuli for specified responses and provide clear and immediate feedback for those responses; (2) token economies provide a structure for teacher behavior which requires specification of goals, selection of target behaviors, and rules for well-defined responses to desired student behaviors; (3) token economies structure the frequency, duration, and content of student-teacher interactions; (4) token economies provide easy opportunity for record keeping which serves as a diagnostic measurement device allowing assessment of both student and teacher behaviors in relation to the system; (5) token economies often lead the managers in search of reinforcing back-up activities which can enrich the classroom curriculum by providing additional learning experiences beyond just serving as reinforcement for other behavior.

Token reinforcement systems have been used extensively in classroom settings, especially to deal with behaviors that were difficult to change through the arrangement of contingent teacher attention and praise. Walker and Buckley (1968) used token reinforcement to

increase in classroom attending of a single subject. O'Leary and Becker (1967) decreased classroom disruptive behaviors of a whole special education classroom. Bushness, Wrobel, and Michaelis (1968) demonstrated that token contingencies could be used to improve writing, reciting, participation, and completion of projects by preschool children. Similarly, Wolf, Giles, and Hall (1968), and Broden and Hall et al. (1970) showed that tokens could be used to improve the academic performance of children in a remedial education program. O'Leary et al. (1969) analyzed the various procedures that were confounded with the token reinforcement contingencies in previous studies. The effects of classroom rules, structured educational lessons, teacher praise, and token reinforcement were examined on disruptive behaviors in an elementary classroom. The authors concluded that token reinforcement was effective in reducing disruptive behavior, whereas rules, lesson structure, and social reinforcement were not. However, token reinforcement was less effective than simultaneous introduction of rules, praise, ignoring, and token reinforcement (O'Leary and Becker, 1967).

In application, a token reinforcement system has many requirements, which if ignored, may lead to the failure of the system. O'Leary and Drabman (1971) conclude that, in general, tokens should be readily understood, easy to dispense, easily transportable, be identifiable as property of a particular child, require minimal bookkeeping by the teacher, be dispensed in a manner which will divert attention as little as possible, and be dispensed frequently to insure shaping of desired

responses. Back-up reinforcers may be determined by rank ordering the children's choices of preferred activities. High frequency behaviors can sometimes serve as back-up reinforcers (Premack principle). A major requirement of a token system is that the contingencies of social reinforcement in the classroom, teacher and peer behavior, must be congruent with the token contingencies.

One of the most frequent criticisms of a token economy is that children will acquire the expectation that they should always receive tangible reinforcers for any work they do. However, this problem can be minimized by programming for generalization. O'Leary and Drabman (1971) give several suggestions in this regard. The teacher should provide a good academic program and not concentrate on disruptive behaviors. The teacher should give the child many opportunities to succeed and should show excitement when the child succeeds. The teacher should have the child aid in the selection of behaviors to be reinforced and help in the specification of contingencies. The children need to be taught to evaluate their own behaviors. The teacher should emphasize reinforcers intrinsic in academic success. The token system should involve all important persons. Tokens should be withdrawn gradually with privileges introduced as reinforcers. Finally, the child should be reinforced in a variety of situations and cues discriminating reinforced and non-reinforced situations reduced.

Group Contingent Reinforcement

With the development of token economies, the effects of making reinforcement contingent on group performance has been researched in the classroom. The procedures have usually involved setting behavioral criteria for the whole group (i.e., less than ten disruptions per period for the whole group; each member completing ten math problems) which lead to token reinforcement for all members of the group. Classroom research has shown that group contingencies are often easier to administer (Long and Williams, 1973), more effective than individual contingencies in the elimination of disruptive behavior (Hamblin, Hathaway, and Wodarski, 1971; Herman and Tramontana, 1971; Long and Williams, 1973), leads to more stable individual behavior (Long and Williams, 1973), and increases the frequency of spontaneous peer tutoring (Hamblin et al., 1971).

One procedure for the management of group contingencies has been called the "good behavior game" (Barrish, Saunders, and Wolf, 1969). This procedure, involving team assignments and group contingencies for the inhibition of inappropriate responses, has been found to be effective in eliminating inappropriate classroom behaviors with elementary school children (Barrish, Saunders, and Wolf, 1969; Medland and Stachnik, 1972; Harris and Sherman, 1973). The technique has not been reported to increase active appropriate behaviors such as performance or participation except in limited instances (Medland and Stachnik, 1972). Harris and Sherman's (1973) group contingency finding of no consistent or strong relationship between performance, attention,

study and disruptive behaviors is consistent with that of Ferritor, Buckholdt, Hamblin, and Smith (1972) who report that individual contingencies aimed at elimination of disruptive behaviors were ineffective in increasing academic performance in third grade students. Another discrepancy in the research on group contingencies has been the failure to measure the type of peer social control which, one might suspect, is elicited in group contingent situations. Of seven group contingency studies which attempted to decrease high frequency disruptive behavior, three (Barrish et al., 1969; Medland and Stachnik, 1972; Harris and Sherman, 1973) noted possible unwanted types of peer behavior but did not present data on that behavior. A single study (Hamblin et al., 1971) which applied group contingencies in an attempt to accelerate academic performance noted increased peer tutoring. These findings indicate that the type of peer influence elicited in group contingent situations may be dependent upon the type of behavior targeted (appropriate or inappropriate) and the kind of change (increase or decrease that must occur) in the frequency of that behavior in order for the group to receive reinforcement.

Teacher Training

Historically, the research on applied behavior analysis in the classroom has first identified variables which functionally control specific child behaviors and then made these independent variables, such as teacher attention, the dependent variables in the next generation of studies. Tharp and Wetzel (1969) discuss the problems of effecting child change through adult "mediators." Kazdin and Bootzin

(1972), O'Leary and Drabman (1971), and Kazdin and Craighead (1973) emphasize the importance of effectively modifying teacher behaviors in programs aimed at improvements in student behavior. Development of teacher training programs (Hall and Copeland, 1971) and the necessity to experimentally control teacher behavior for research on student's behaviors have produced data on the importance of instruction, feedback, and reinforcement in any program designed to alter teacher behavior. In other words, the same learning principles used to change and maintain student behavior also apply to teacher behavior.

Many applied behavior analysis working with teachers have relied upon academic procedures (lectures, readings, examinations) for training. Such methods impart knowledge about the behaviors of interest without any guarantees that the teachers can perform appropriately when in contact with the students. Hall et al. (1970), and Hall et al. (1971) demonstrated successful application of contingent attention to desired student behaviors after formal education, but such programs are certainly not feasible for the average teacher.

Behavioral training methods have been extended to the problems of teacher behavior by Panyan, Boozer, and Morris (1970) who showed that feedback on performance increased the daily use of operant training methods by non-professional personnel in a state institution for retarded children. Using another form of feedback, Sandargas (1972) and Thomas (1971) increased teacher praise rates by having them record their own daily praise rates from classroom videotapes. Guided practice was used in a relatively early study by Hall, Lund, and

Jackson (1968) who cued the teacher to attend by holding up a colored card when there was a behavior that needed praise. O'Leary et al. (1969) used feedback plus social reinforcement to ensure that experimental instructions to teachers were carried out. Some programs have been able to reinforce the staff with tangible reinforcers, such as salary increases, vacations, and workshift preferences (Ayllon and Azrin, 1968), however, those reinforcers are seldom available in teacher training programs. McNamara (1971) used token reinforcement (backed up with beer payoffs in one case) to train teachers to ignore disruptive classroom behavior and attend to appropriate behavior of the students. Cossairt, Hall, and Hopkins (1973) examined the effectiveness of systematic use of instructions, feedback, and a combination of social praise and feedback in increasing the teacher praise for student attending behavior. This study broke new ground by measuring and recording behaviors of all concerned, including the often omitted experimenter's verbal interaction with the teacher, thus examining the complete chain of behaviors from experimenter through teacher to student. Feedback plus social praise produced more teacher praise for student attending behavior. The entire "package" of instruction, feedback, and social praise produced the most praise for student attending behavior.

Once teachers have learned to apply basic behavioral principles, procedures are needed to ensure that these behaviors are maintained and generalized. The assumption that teacher behaviors are maintained by improved behaviors of the students may be incorrect, in fact, other

factors are usually operative that lead to extinction of desirable teacher behaviors and even support undesirable teacher practices. In order that behavioral skills be maintained, teachers need to be trained to evaluate their own behavior in respect to their teaching goals. The ability to evaluate their own behavior requires that teachers be given the "technology for behavioral awareness" (Wetzel, 1975). This is the feedback technology which allows the practitioner (teacher) to become aware of the course of behavior over time and to evaluate consequences of behaviors in the real world. The effects of supplying teachers with the technology for behavioral awareness (the process as opposed to the products of behavioral research) has had scant research examination.

The Non-experimental Study of Behaviors in the Natural Environment

Consultation to the classroom using an applied behavior analysis approach, although dedicated to research as defined by Wetzel (1975), is not constrained to "research" every important variable introduced. In fact, that would be a practical impossibility. There are many variables, such as teacher attention, which have been repeatedly demonstrated to be potent events which, if modified, will have considerable effect on children's classroom behaviors. As Tharp and Wetzel (1969) point out, there are real differences between basic, or laboratory research and research into the techniques for the applications of the basic findings. These authors quote Staats' statement, "When a principle has been verified so many times that it

may be said to be true, we no longer see the study as a test of the principle plus a test of the specific conditions involved in the study, but only as a test of the specific conditions" (Staats, 1968, p. 568). In addition, consultation is, unfortunately, often a crisis intervention which in the natural environment requires immediate action based upon the consultant's professional appraisal of immediate need. The consultant need not bring his powerful research tools to bear on the obvious before making some decision for action. This statement does not reduce the importance and necessity of data-based description.

"Psychology, like the other natural sciences, depends for its advancement upon both descriptive accounts and functional analysis of its primary data" (Bijou, Peterson, and Ault, 1968, p. 175). Applied behavior analysts have tended to ignore this statement and, until recently, have had little appreciation for an ecological viewpoint (Willems, 1974). The literature is lacking in ethological studies of human behavior in educational environments. Part of the difficulty has been in relating descriptive and experimental data from past studies. Bijou et al. (1968) point out that the data from descriptive and experimental field studies can be interrelated at the level of data and empirical concepts if both sets of data are derived from frequency-of-occurrence measures. They propose that the methodology for a descriptive field study be predicated on three basic assumptions: (1) the primary data of psychology are the observable interactions of a biological organism and environmental events, past and present; (2) theoretical concepts and laws are derived from empirical concepts

and laws, which are in turn derived from the raw data; and (3) descriptive field studies describe interactions between behavioral and environmental events. Following from these basic assumptions, the procedures for the conduct of a descriptive field study must include: (1) specification of the situation in which the study is conducted; (2) definitions of behavioral and environmental events in observable terms; (3) measurements of observer reliability, and (4) procedures for collecting, analyzing, and interpreting the data.

The applied analysis of classroom behavior will greatly benefit from objective data-based descriptions of the variety of behaviors occurring within a wide range of possible educational environments. Field descriptions will stimulate new and better directions in applied educational research by providing definitions of new behaviors and stimulus events. Field research will also stimulate the development of advanced recording technology for measuring these events. With such data as a base, applied behavior analysts will have a better idea as to the range of human behavior for later functional analysis.

Making Real Changes in the Real World

The work reported here was not initiated with the goal of producing a dissertation. It was, rather, a response to a request for help from a large institution engaged in education of problem children. It was an attempt to improve those children's lives through modification of their classroom behaviors. The process of modifying their behaviors required that the behaviors of many people, including the

author, the teachers, the administrators, and several university student assistants also be modified.

This is a report on the process of moving a body of knowledge, gleaned from prior research in applied behavior analysis, into a special education setting. The groundwork necessary for setting goals and making an environmental assessment is described. The process of implementing a teacher training program, setting up a token economy, managing that economy, restructuring classroom curriculum, implementing record keeping systems, designing observational instruments, collecting observational data, and using that data for feedback and decision making will be described. In addition, the experimental comparison of two group contingent procedures versus individually contingent token reinforcement in an across-settings, multiple-baseline design, will be described and discussed in terms of data on student classroom participation, deportment, and social interactions.

CHAPTER 2

METHODS

Setting

The consultation and research reported here were carried out at an institution described as "a social service agency which provides treatment services for children who are dependent, neglected, disturbed, or in need of supervision." The consultation and research were aimed at one of three classrooms for children who were residents of the institution. The classroom was located in an old residence separate from the main body of the institutional plant and included three small adjoining rooms. A basement and an attic had been partially sealed from access through the classroom. The general appearance of the facility was rundown. The walls were painted a dingy grey or white and the paint was chipping off in spots. Some of the windows had been broken and were boarded over. The plaster was cracking, especially around the doors, and periodically had to be swept up in the classroom. Children's desks were of the single-piece lift-top type. There was one small table and a counter with a sink along one wall. Other teaching materials consisted of a set of preschool wooden blocks, a slightly damaged autoharp, an old television set, and a few abused magazines and children's books. There were no examples of student work or crafts displayed. The blinds were constantly closed.

The inside of the classroom was in disarray due to repeated vandalizing by the students.

Upon initiation of consultation, educational activities included one daily 20-minute group lesson on a curriculum topic such as history or social studies. The remainder of the 9:00 a.m. to 3:00 p.m. day was filled with individual desk work on workbook sheets, one-to-one work with the teacher or aide in reading or math, two 20-minute recesses, and a one-hour lunch break. The atmosphere could be generally described as "chaotic" and "out of control." Students wandered aimlessly, destroyed property, left the classroom, screeched, howled, swore, and fought each other. Several times per day the teacher or aide would have to call the office to enlist the assistance of a "charge person" who would physically restrain or remove an especially violent student.

Subjects

Subjects for the study were 10 boys enrolled in this special education classroom. Ages ranged from 11 to 13 years ($x = 12.24$) and academic performance varied from about second to fifth grade levels. Prerequisites for enrollment in the classroom were that the child be at least two grade levels below public school peers and that his classroom behavior be generally unacceptable for public school attendance. Psychiatric diagnoses included character disorder, neurosis, and childhood schizophrenia. Six of the boys were residents of the institution while the other four lived in foster homes. One boy was intermittently prescribed various drugs in attempts to improve his behavior, although

those records were not made available to the consultants and therefore are not included in the results or discussion of the research.

The teacher was a young woman experiencing her first year in a special education classroom. The aide was also a young woman with a minimal amount of special education experience. (Throughout this report the teacher and aide will be referred to as "teachers" unless there is some reason to differentiate.)

Procedures

Figure 1 presents the time-line for the various consulting activities carried out from week five through week fifteen of the school year. Note that vertical entries on Fig. 1 are instances of "spiked" interventions; that is, consulting activities of discrete and relatively short term nature. "Continuous" activities, denoted by horizontal lines in Fig. 1 are ones, which once initiated, became part of the ongoing operations of the classroom.

Entry Procedures

The initial contacts between the representative of the institution and the consultation team were carried out during weeks four and five of the school year. Entry stage activities included: (1) a meeting between the consultants and the Education Director (the classroom teachers' immediate supervisor) and the Education Program Coordinator (responsible for implementing improvements in the management of the classroom); (2) two meetings between the whole consulting team (including college students), the Education Director, the Education Program

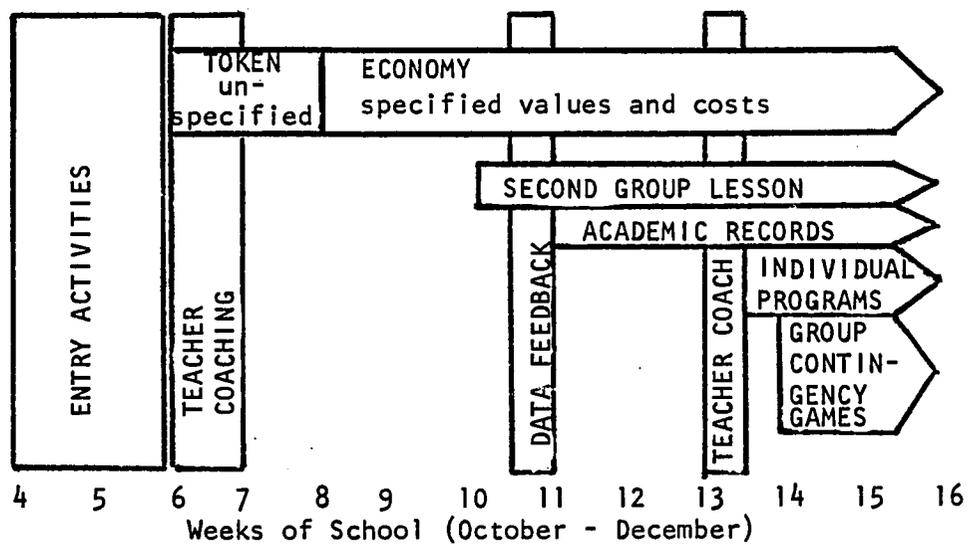


Fig. 1. Time-line for Consultation Activities.

Coordinator, and the teachers from all the classrooms in the institution; (3) a meeting between the Education Director and the Consultants; (4) a meeting with the Institution Executive Director; and (5) observation periods in the classroom.

The meetings with the Education Director and the Education Program Coordinator were conducted at the institution. The consultants attempted to get these administrative and supervisory personnel to operationalize the various problems they perceived so that specific actions could be prescribed to rectify those problems. The consultants utilized various behavioral interview techniques such as asking for concrete behavioral examples, asking for descriptions of antecedent and consequent events, and surveying the reinforcers available to teachers and students within the environment. The meetings with the teachers followed a similar format with the addition of a brainstorming session held with all the teachers. This brainstorming was conducted along the lines described by de Bono (1970). In this procedure, all possible issues were free-associated by the group and categorized according to problems and solutions. Each category was then rank-ordered by the group and the final rankings listed on the blackboard.

At the final meetings of this entry stage, an outline of the first consulting activities was presented to the Education Director and the Executive Director for formal approval. Simultaneous with these last meetings, the consultants made preliminary observations in the classroom. The consultants observed the classroom for about one

hour on three separate days, once in the morning and twice in the afternoon. The consultant (observer) sat quietly in the corner of the room and took notes. The consultant did not speak to or make eye contact with any of the students of the teacher. When students were especially persistent in asking what the consultant was doing, the consultant would state, "I am working now" without prolonged eye contact or show of affect. This procedure was effective in making the observer "invisible" and reduced attention-seeking disruptions due to his presence in the classroom.

Intervention 1

The first intervention activities in the classroom began on week six. There were essentially two strategies employed, teacher coaching and unspecified token system implementation.

The teacher coaching lasted for three days. The consultant spent approximately 90 minutes each day cueing the teacher and aide to attend to "appropriate" behavior. Appropriate behavior had been described by the teachers as those behaviors considered desirable in the classroom. These included such behaviors as: working at desk quietly, sitting down when told, cleaning up, raising hand to ask questions or make statements, participating in group lesson activities, paying attention to the teacher, and refraining from disruptive behaviors. The consultant stood in an unobtrusive place in the classroom, watched for performance of any of these desired behaviors (or approximations thereof), and cued the teachers by nodding, pointing, or soft verbal instruction to attend. The consultant also drew the

teachers aside to give praise for their performance and to instruct or demonstrate variety in the types of attending behaviors they could use to improve student performance of appropriate behaviors. Similarly, the consultant cued the teacher and instructed and modeled ways of ignoring inappropriate behaviors.

Simultaneously with this coaching, a simple token system was initiated. Three by five inch index cards were taped to each student's desk with his name and the date printed at the top. On the first day of token system intervention, the students returned from morning recess to find these cards on their desks. The teacher told the students to sit in their desks and she began immediately to explain how the system would work. As she explained, the aide circulated about the classroom dispensing points for the desired behaviors. The instructions to the students were as follows:

We are going to have a new point system in our classroom. The cards taped to your desks are for us to give you points. Each time you get twenty-five points, you can get one of these candy bars (the teacher held up a large clear plastic bag full of small chocolate bars). You can get points for coming into the classroom promptly, sitting down at your desk, raising your hand to ask a question, asking good questions, for working on your assignments, for being quiet, for answering questions, for cleaning up the classroom, and for helping each other (the teacher pointed out each of these behaviors listed on a large poster which was taped to the wall in front of the classroom). You must save your point card so we can know if you have got enough points to get one of these candy bars. If you lose your card, you lose all the points on it and you must get another card from us before you can earn any more points. Are there any questions?

The teacher and aide immediately began instructing and prompting the appropriate behaviors. Table 1 is the list of good behaviors. Good behaviors were lavishly reinforced with points so that within

Table 1. Targeted Behaviors and Token Pay-off Values in the Token Economy on November 1.

<u>Behaviors</u>	<u>Token Values</u>
Sitting Down on Arrival in Classroom	2
Sitting Down at Desk when Lesson Begins	2
Raising Hand in Group Lesson	2
Raising Hand for Help on Own Work	3
Completing a Unit of Work Independently	10
Completing a Unit of Work with Help	6
Following Directions	2
Completing Group Math Lesson	10
Completing Group Lesson	10
Reading Independently	5 to 10
Cleaning up Work Area	5
Cleaning Blackboard at End of Day	3
Handing in Study Plan, Work Folder, and Point Card	4

fifteen minutes several students had earned a candy bar. The candy bar was dispensed immediately when a student reached 25 points and he was allowed to eat it at his desk if he desired. Whenever the teacher dispensed points they labeled the behavior being rewarded, told how many points they were giving, noted the total points that the student had at that time, and gave social approval such as smiles and hugs. The style was loud and happy. For example, "Oh, wow, Kelly! You sure have been working hard on your math. Here's five points for good work! That makes 20 points. Just five more points and you get a candy bar. Keep up the good work!" The teacher then marked the card and initialled the entry.

In the meantime, all inappropriate student behaviors were ignored to the best of the teacher's abilities. Whenever a student paid points to obtain a payoff, those points were marked off by the teacher.

Data Collection, Intervention 1

As these first intervention strategies went into effect college student observers were being trained and a reliable observation instrument was designed to measure Teacher Attention and Child Inappropriate behaviors. During training, the student observers watched the classroom, selected categories of behavior, attempted to reach consensus on operational definitions of these categories, designed a workable scoring sheet format and scoring procedures, and reached acceptable levels of interobserver agreement (70% agreement was considered acceptable).

The number of token points earned by the students was tallied by the teacher or aide at the end of each day beginning on week seven (one week after initiation of Intervention 1). The token records were then collected, tallied, and graphed by members of the consultation team.

Intervention 2

At the beginning of Week 8 the token economy was made more specific; that is, the various categories of child appropriate behavior which the teachers had been consequenceing with token points were given specified values. This was accomplished by ranking the teacher's judged importance of the behaviors and the frequencies of the behaviors as noted by the consultant and the observers. For example, the behavior sitting in seat when instructed was considered to be very important by the teachers but noted as fairly frequent by the observers. Therefore, that behavior was given a relatively low point value. On the other hand, the behavior raising hand to speak was not judged to be of such crucial importance by the teachers, but was noted as a relatively low frequency behavior and, thus, was given a slightly greater point value. Beyond these rather simple guidelines, the assignment of point values to various behaviors was done by subjective assessment of the effects of the tokens during the first unspecified token delivery period. These point values were added to the posted list of "good" behaviors and explained to the students.

Payoffs for token earnings were also given specified point values at this time. Table 2 lists payoffs available and point values

Table 2. Back-up Reinforcers for the Token Economy (Pay-offs)
on November 1.

<u>Pay-off Activity</u>	<u>Cost</u>
Playing Records	25
Reading Stories	15
Reading Newspapers	50
Operating the Duplicating Machine	75
One-to-one Interaction with the Teacher	20
Playing the Autoharp	50
Painting	50
Science Activity	75
Art Activity	50
Puzzles, Dot-to-dot Pictures, etc.	20
Cooking Activity	50
Modeling Clay	20
Toys and Games: EM Football Game	50
Chutes and Ladders	50
DD's Bow and Arrow	50
Clean-up Supply	25
Television	50

for each. There were several important changes made in the back-up reinforcement system at this time. First, the number of possible payoffs was greatly expanded from a single edible extrinsic (e.g., candy bar) to a variety of extrinsic reinforcers (e.g., trinkets). In addition, a number of activity or intrinsic reinforcers (e.g., cooking) were added to the list. Second, point costs for the available reinforcers were spread across a fairly large range. For example, a cookie or candy bar remained a low cost item. A special activity such as cooking which was very attractive to the students, but difficult and time consuming for the teacher was a high cost payoff. The guidelines used in assigning point values were: (1) observed attractiveness (potential reinforcement strength) of the payoff; (2) difficulty of delivery of payoff; (3) requirement that there be a range of costs so that no student would be deprived of all reinforcement due to low token earnings. At the same time, the system encouraged token savings and delay of gratification by having especially attractive costly payoffs available at less frequent intervals; (4) requirement that payoffs themselves have educational value. The token system was designed to enrich the children's experiences and the teachers were reminded to develop new and interesting activities. They were given help in this area by University students who designed and supervised payoff activities. The purpose of these activities was to demonstrate the reinforcing potential of learning situations, rather than carry the load of back-up for the token system.

Data Collection, Intervention 2

Observational data on teacher and student behaviors were still being developed during this period. Points earned were continually tallied for each student and generated a data base for minor adjustments in the point values of target behaviors and costs of payoff activities.

Intervention 3

The third intervention involved the addition of a 20-minute group lesson time in the afternoon. This change was instituted in response to several needs, one being the teachers' request to avoid overdependence on workbooks for curriculum. The addition of a second group lesson must be considered an intervention because of its possible effects on opportunity to gain token points and the different set of behaviors required for point earning in group lessons as opposed to individual work.

Data Collection, Intervention 3

Data on teacher attention to the categories of student behaviors and data on student inappropriate behaviors began accumulating on the first of November (end of Week 9). Table 3 presents the behavior category definitions used to collect these data.

Figure 2 shows an example of the scoring sheet used in these data collection. Scoring procedures were as follows: the observer arrived in the classroom and went immediately to a place where behaviors could be observed but in which the observer would be least

Table 3. Behavior Category Definitions for Teacher Attention and Student Inappropriate Behavior Scoring Sheet.

<u>Behavior Category (Code)</u>	<u>Definition</u>
<u>Teacher Attention</u>	
Praise (VP+)	Verbal (V) comments such as, "Good job, nice work, I like the way you are doing that, etc." Physical Contact (P) such as hugs, kisses, etc.
Reprimand (VP-)	Verbal Comments (V) such as, "Stop that, don't be silly, you better watch out, etc." Physical Contact (P) including pushes, shoves, slaps, restraint, etc.
Attention (A)	All teacher behavior which does not fit into the above definitions. Includes verbal comments, questions, and instructions as well as gestures such as pointing at, smiling at, frowning at, etc.
Token (T)	Dispensing token points.
<u>Student Inappropriate</u>	
Out of Area (O)	Child out of area where he has been assigned.
Mouth Noise (N)	All non-language sounds such as shrieks, howls, boos, and hoots.
Disruptive Motor (D)	Behavior which interferes with activities of other students and/or teacher. Physical aggression such as pushing, hitting, and shoving. Also disruptive or destructive use of materials such as slamming doors, throwing objects, tearing up papers, etc. The Disruptive category takes precedence over other categories of student inappropriate behaviors.
Speaking Out (S)	All off-task and setting-inappropriate verbal behavior. Includes swearing, name calling, and argumentation as well as unsolicited statements such as calling to the teacher without raising hand.

CHILD DEVELOPMENT LABORATORY
Classroom Behavior/Teacher Attention Observation

Date _____ Recorder(s) 1) _____
 Time: Start _____ Finish _____ 2) _____

Setting _____
 Instructions/Coding Key _____

T. A. App.				Child Inapp.				T. A. Inapp.			
VP+	VP-	A	T	O	N	D	S	VP+	VP-	A	T

Fig. 2. Observation Scoring Sheet for Teacher Attention and Student Inappropriate Behaviors.

obtrusive. The observer always remained standing. The observer scored each instance of a student inappropriate behavior by placing that student's initials in the column for that behavior (note that this frequency counting system does not discriminate duration of occurrences). Each 20-minute observation period was divided into 5-minute blocks and the frequency of occurrences was scored within each block. A behavior continuing into the next block was scored again. The observer specified whether the observations were made during group lesson or individual work time and whether it was an AM or PM period.

Observer agreement was periodically checked by having two observers score at the same time. Occurrences of behaviors in each category within each five minutes were reduced to percentages by dividing the larger into the smaller number of recorded occurrences. These percentages were then averaged across the four 5-minute blocks within the 20-minute period to give observer agreement quotients for each behavior. Table 4 lists reliability quotients for each category of behavior.

Intervention 4

Intervention 4 was a data feedback session between the teachers and the consultants. This session occurred on the Friday preceding Week 11. In this session, the graphed data for teacher attention to student appropriate and teacher attention to student inappropriate behavior was shown to the teachers. These data were graphed individually for the teacher and the aide so that there was precise information on their own behaviors. In addition, point earnings data for

Table 4. Observer Agreement Quotients for Categories of Teacher and Student Behavior.

<u>Behavior Category</u>	<u>Agreement Checks</u>		
<u>Teacher Attention to Appropriate Behavior</u>	62%*	79%*	90%*
Praise (VP+)	96	81	36
Reprimand (VP-)	100	100	100
Attention (A)	46	76	0
<u>Teacher Attention to Inappropriate Behavior</u>	63*	83*	79*
Praise (VP+)	25	67	20
Reprimand (VP-)	50	100	10
Attention (A)	69	87	53
<u>Student Inappropriate Behavior</u>	63*	87*	74*
Out of Area	93	80	33
Mouth Noise	40	100	100
Disruptive Motor	76	67	45
Speaking Out	53	80	61

*Observer agreement coefficients are for summed observations within category, thus, agreement may be greater for overall category than for any behavior within that category.

individual students were graphed and major discrepancies between students and student variability was pointed out. The format for the presentation emphasized the teachers' behaviors which the consultants wanted to increase. The consultant recalled concrete events that had been observed in order to provide illustrations during the feedback session. The meaning of the graphs was explained and the teachers' questions answered. The consultant instructed the teachers to further increase attention to appropriate behavior and decrease attention to inappropriate behavior. They were also instructed to attempt to decrease student variability in point earnings and decrease major differences between students. Methods for following these instructions were described and the teachers praised for their cooperation and performance. This intervention was a "spiked" intervention in that it was completed in a single session. The teachers were not given continuous data based feedback over the next two weeks.

Data Collection, Intervention 4

The records of number of points earned by each student were continued. Observational records of teacher attention and student inappropriate behaviors continued. In addition, a record keeping system was devised in which the academic performance of the students and the curriculum management of the teachers could be evaluated. Figure 3 gives an example of the academic record form and how the information was recorded.

The number of work sheet assignments within each of several curriculum areas was recorded daily for each student. The number of

ACADEMIC RECORD																		
NAME _____																		
DATE	Language Skills				Math				Writing				Visual Perception				TOTALS	
	Assigned	Completed	Errors	Help	Assigned	Completed	Errors	Help	Assigned	Completed	Errors	Help	Assigned	Completed	Errors	Help	ASSIGNED	COMPLETED
MON																		
TUE																		
WED																		
THU																		
FRI																		
TOTAL																		

Fig. 3. Record Keeping Sheet for Student Academic Performance and Teacher Curriculum Management.

points possible for each work sheet completed was also recorded. At the end of the day, the number of sheets completed by the student in each academic area as well as the number of points earned in each area was recorded. In addition, the number of times the teacher had given assistance to the student and the number of errors made per sheet were recorded. These data were then graphed for each child to reflect two sets of relationships. One set illustrated the proportion of assignments made by the teacher to the number of assignments completed by the student. The other set reflected the proportion of points earned to the number of points possible. These data allowed analysis of effects of manipulations of teacher curriculum management (number and type of assignments made over time) as well as effects of manipulations of the token point value on completion of curriculum assignments.

Intervention 5

The fifth intervention began on the Monday following the four-day Thanksgiving vacation. The consultant began to observe the classroom each morning and afternoon during group lesson to collect baseline data for Intervention 7 described below. Seven weeks had passed since the initial teacher coaching (Intervention 1) and two weeks had passed since the teachers had been given data feedback on their attention to student appropriate and inappropriate behaviors (Intervention 4). The data on teacher attention and student deportment indicated a deterioration was placing undue burden on the token system as a motivational structure, because teacher attention to inappropriate deportment and failure to properly attend to appropriate behavior was operating

at cross-purposes to the token system and endangering its effectiveness as a behavior control device. In addition, the student behavior showed such a deterioration immediately after vacation (predicted by the teachers) that emergency measures were deemed necessary to regain earlier levels of performance so that the next intervention, a complex multiple baseline experiment, could be carried out. For these reasons teacher coaching was begun again. The procedures for teacher coaching were identical with those described for Intervention 1 except that all coaching was carried out in the morning individual work time. Again the teachers were cued to attend or ignore and given instruction in style of delivery.

Data Collection, Intervention 5

Individual points earned, teacher curriculum management, student academic performance, and observations of teacher attention and student deportment were continued. In addition, a new set of time-sampled interval observations of four students were initiated during the two daily group lessons. These procedures will be described under Intervention 7 below.

Intervention 6

Intervention 6 involved manipulation of the token system to improve the academic performance of three students. The data that had been collected on work sheets assigned, work sheets completed, token point value of assigned work and token points earned were shown to the teachers. The number of points available through completion of

language skills was doubled for Ed, points possible through math were doubled for Kelly, and the teacher was instructed to make the number of assignments to Randy more consistent across days.

Data Collection, Intervention 6

All data collection previously described was continued.

Intervention 7

Intervention 7 was designed to test the relative effectiveness of the individually contingent token points for appropriate classroom behavior in comparison with two procedures for managing group contingent token points to increase appropriate classroom behavior and decrease disruption during the two group lesson times. The experimental design was a single-subject multiple baseline design in which multiple behaviors were recorded for each subject in two separate classroom activity periods (AM group lesson and PM group lesson). Four of the 10 students were selected by the teachers as representing the two worst behaved (Subjects 1 and 2) and two of the best behaved (Subjects 3 and 4). These four students were observed for 20 minutes during each of the group lesson periods. Each was observed in random order for 30 seconds using a 10-second interval scoring procedure. Each student was observed for three 10-second time intervals on an average of every two minutes thus giving ten observations per child per session. Four categories of behavior could be recorded during any one 10-second interval. The first two categories were appropriate and inappropriate behavior by the child. The third category was input

from the teacher or aide and involved social stimuli directed to the child. The fourth category involved social input directed to the child by his peers. The behaviors recorded were defined as follows:

1. Appropriate: On Task: Student is attentive to teacher or materials during the lesson; Participation: Student asks relevant questions, makes a relevant comment, answers a question about materials or story, reads aloud to group at teacher's request, volunteer to read, answers question, holds up hand to ask question or make relevant statement.

2. Inappropriate: Out of Area: Leaving desk without permission; Off Task: Not attending to teacher during group lesson, not looking at book if supposed to be reading, attending to materials other than those which he is supposed to be working with; Disruptive: Irrelevant comments, cat-calls, disruptive noises, hitting, name calling, swearing, inappropriate use of materials that disrupt others.

3. Adult Social Input: Praise: Directed to individual child being observed; Reprimands: Directed to individual child being observed; Other Verbalizations: Instruction, questions, commands, comments directed to the student being observed.

4. Peer Social Input: Praise: Laudatory or encouraging comments directed to individual student being observed; Reprimands: Negative or derogatory comments, teasing, laughter, etc., directed at the individual student being observed; Other Verbalizations: Comments or conversation directed to individual student which do not fit the other categories of verbal attention described above.

The observer used a scoring sheet (Fig. 4) and a 10-second interval timer with an earphone to record at the beginning of the interval whether the student was On-task, Off-task, or Out-of-area. A code for the first Participation behavior within that 10-second interval could be noted in the Appropriate row as could a code for the first Disruptive behavior be added to the Inappropriate row. The first social input from an adult or peer was recorded in the last two rows. Three reliability checks were made with another observer on days 9, 10, and 13 of this study. Mean reliability scores were: (1) On-task, Off-task, Out-of-area: 99%+ (range 99-100%); (2) Participation 79% (72-93%); (3) Disruption 75% (50-100%); (4) Adult verbal 74% (64-93%); (5) Peer verbal 33% (0-100%).

Baseline I and Baseline II were contingency management conditions which consisted of the teachers dispensing points and reinforcing backups on an individually contingent basis as had been the classroom token procedure for the preceding six weeks.

Group Contingent Reinforcement for Participation (Treatment A) involved dividing the class into two teams with two of the target students (one of the best and one of the worst behaved) on each team. Fifty points were offered to each member of the group based upon a criterion of participation initially determined by baseline performance plus a small increment. Each team was given a mark on the blackboard by the teacher for each instance of participation by a member of that team. If both teams exceeded criterion (25 marks), both teams won.

CHILD PSYCHOLOGY LABORATORY
GENERAL 10-SEC INTERVAL RECORD

Fall 1975

SUBJECT _____ RECORDER(S) 1. _____

DATE _____ TIME: START _____ FINISH _____ 2. _____

Page _____

TASK AND/OR SETTING _____

INSTRUCTIONS AND CODING KEY _____

OBJECT(S)	1	2	3	4	5	6	7	8	9	10	11	12	TOTALS
2 Min.													
4 Min.													
6 Min.													
8 Min.													
10 Min.													

COMMENTS:

Fig. 4. Scoring Sheet for 10-Second Interval Observational Records.

If neither team reached criterion, the team with the greatest number of marks won.

Group Contingent Reinforcement for Elimination of Disruptive Behavior (Treatment B) was a replication of the "Good Behavior Game" (Barrish et al., 1969) and consisted of dividing the class into teams as in Treatment A but offering 50 points to each member of a team based upon keeping the total number of disruptive acts below a criterion determined by baseline frequency (10 disruptive acts). If both teams kept below criterion, both won. If both exceeded criterion, the team with least marks won.

CHAPTER 3

RESULTS

The first meeting between the consultants, the institutional supervisors, and the teachers produced four goals for the consultation activities reported here. These four goals were: (1) improvement of instructional efficiency; (2) improvement of classroom behavior management; (3) development and demonstration of a viable teacher in-service training program; and (4) development and implementation of techniques for educational diagnosis in the classroom. The results reflect attempts to attain these goals and the degree to which those attempts were successful.

Data are presented here on the effects of the consultation activities in six areas: (1) token economy management; (2) teacher attention; (3) student deportment; (4) teacher curriculum management; (5) student academic performance; and (6) effects of group contingent games.

Token Economy Management

The first unspecified token economy was established without benefit of prior baseline and operated without benefit of prior baseline and operated for one week without data collection. Figure 5 shows mean daily token earnings for Weeks 7 through 15.

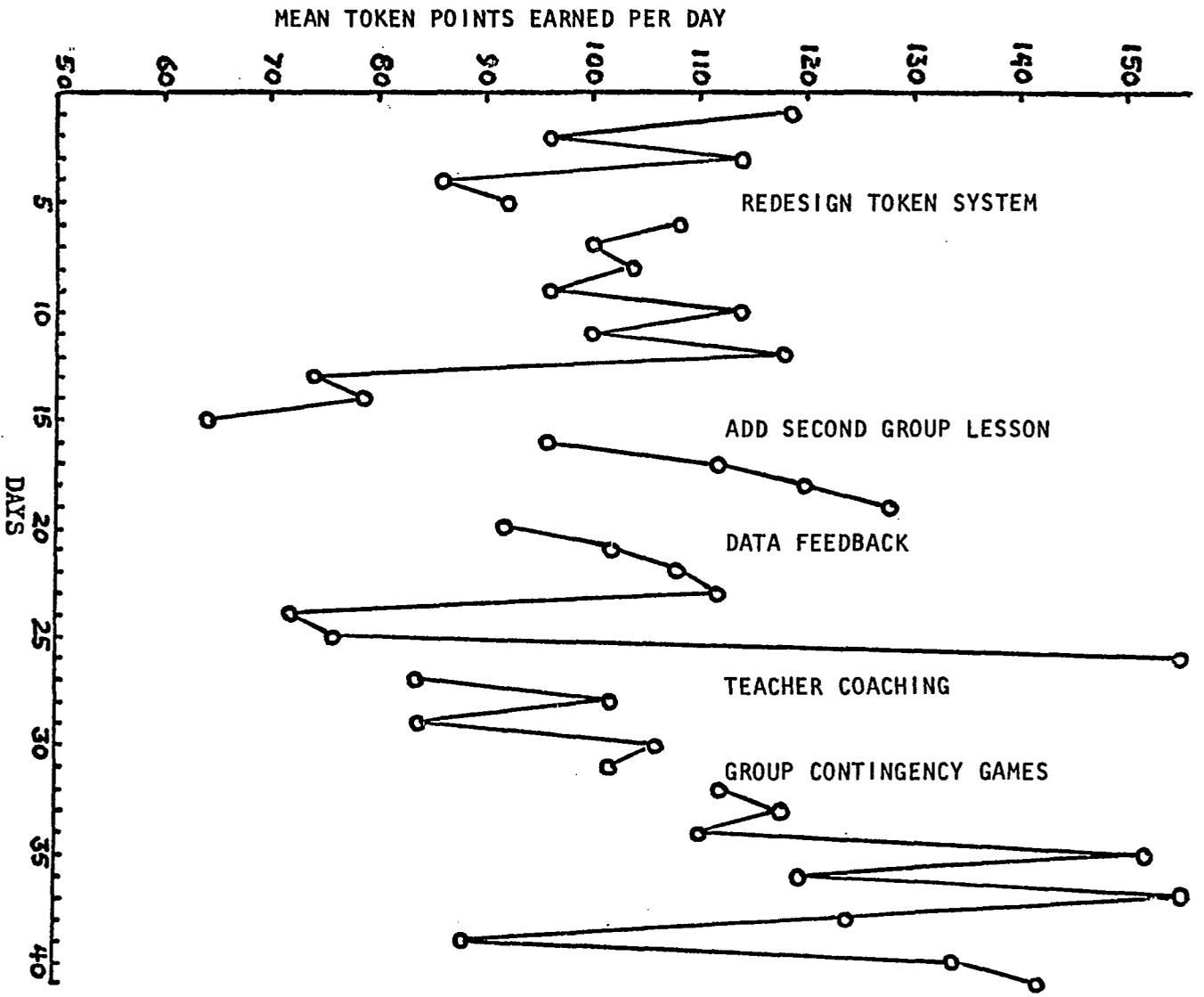


Fig. 5. Mean Daily Token Point Earnings Across 41 Days of Token System Operation. Weeks 7 through 15.

Data for Week 7 are variable but with a downward trend from a mean of 120 on Monday to about 90 on Friday. Intervention 2, which involved point specification for target behaviors and payoff costs, began during Week 8. Data over the next two weeks (8 and 9) show stable earnings for Week 8 and then rapidly declining earnings in Week 9 which ends with a mean of slightly more than 60. The academic intervention, addition of a second group lesson in the afternoon (Intervention 3), is followed by four data points which show an increasing trend in daily mean earnings from 95 to nearly 130 points. Intervention 4, the one-shot data feedback session, is followed by seven data points which show increasing trends in earnings from the first to the last days of the week. Week 12, a pre-vacation three-day week, shows extreme variability in token earnings from about 70 on Monday to nearly 160 points on Wednesday. Intervention 5, teacher coaching, is followed by five variable data points with mildly increasing trend within a range of 80 to 105 points. Intervention 6, the token point manipulation for selected students, was begun also during Week 13. Those results will be presented later in a review of individual subject data. Finally the beginning of Intervention 7, the group contingency games in group lessons, is reflected in token earnings (calculated without addition of group contingent points) for Weeks 14 and 15. These last ten data points show variable but greatly increased mean token earnings ranging from a low of better than 80 to a high of better than 160. Notice that, with some variability, the

mean earnings for Weeks 7 through 13 cluster closely about a weekly mean of 100 points, whereas the means for the last two weeks (13 and 14) shift to about 125 points.

Actual management of the token economy involved examination of individual student token earnings over time in order to discover trends in individual data or major discrepancies in earnings among students. Some examples of these individual data are presented in Figure 6.

Note the similarity in patterns of token earnings for Jay, Duane, and Ed. All show variable but increasing earnings throughout the nine weeks (41 data points). Low points and high points are nearly identical for these three students. All three show increased earnings after introduction of the group contingency games in group lessons. Also note the similarity in earning patterns for Allen and Kelly. These two students show variable and declining earnings for the first seven weeks then increased, but variable, earnings after initiation of the group contingency games. Comparison of average earnings show that Allen and Kelly consistently earned less than 100 points per day (means approximately 70 and 60 respectively), while Jay, Duane, and Ed exceeded 100 points quite often.

Teacher Attention

Teacher attention to appropriate and inappropriate student behavior was a target of Intervention 1 (token economy and teacher coaching), however, there are no preintervention baseline data and no

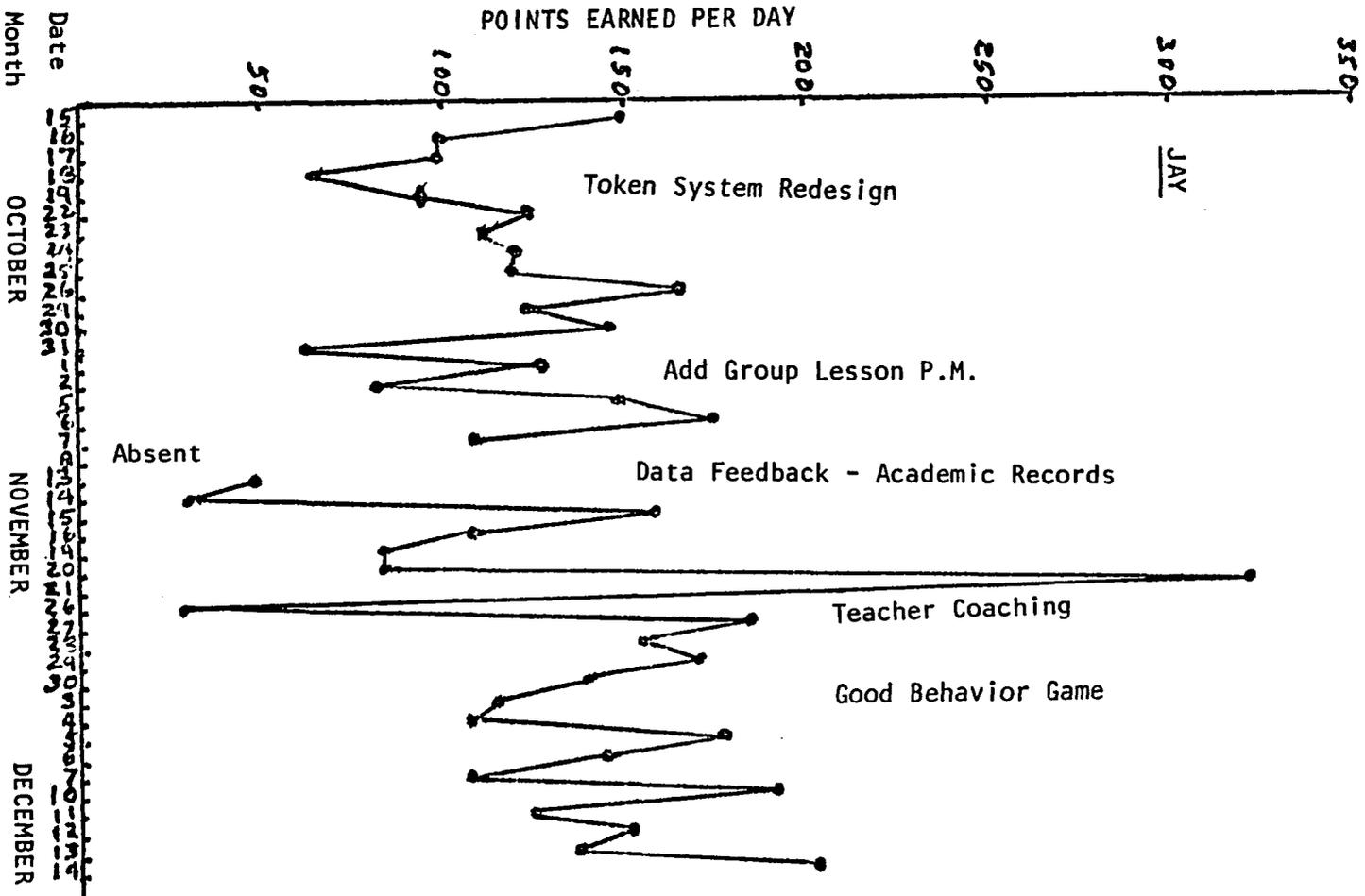


Fig. 6. Daily Token Earnings.

(a) Jay.

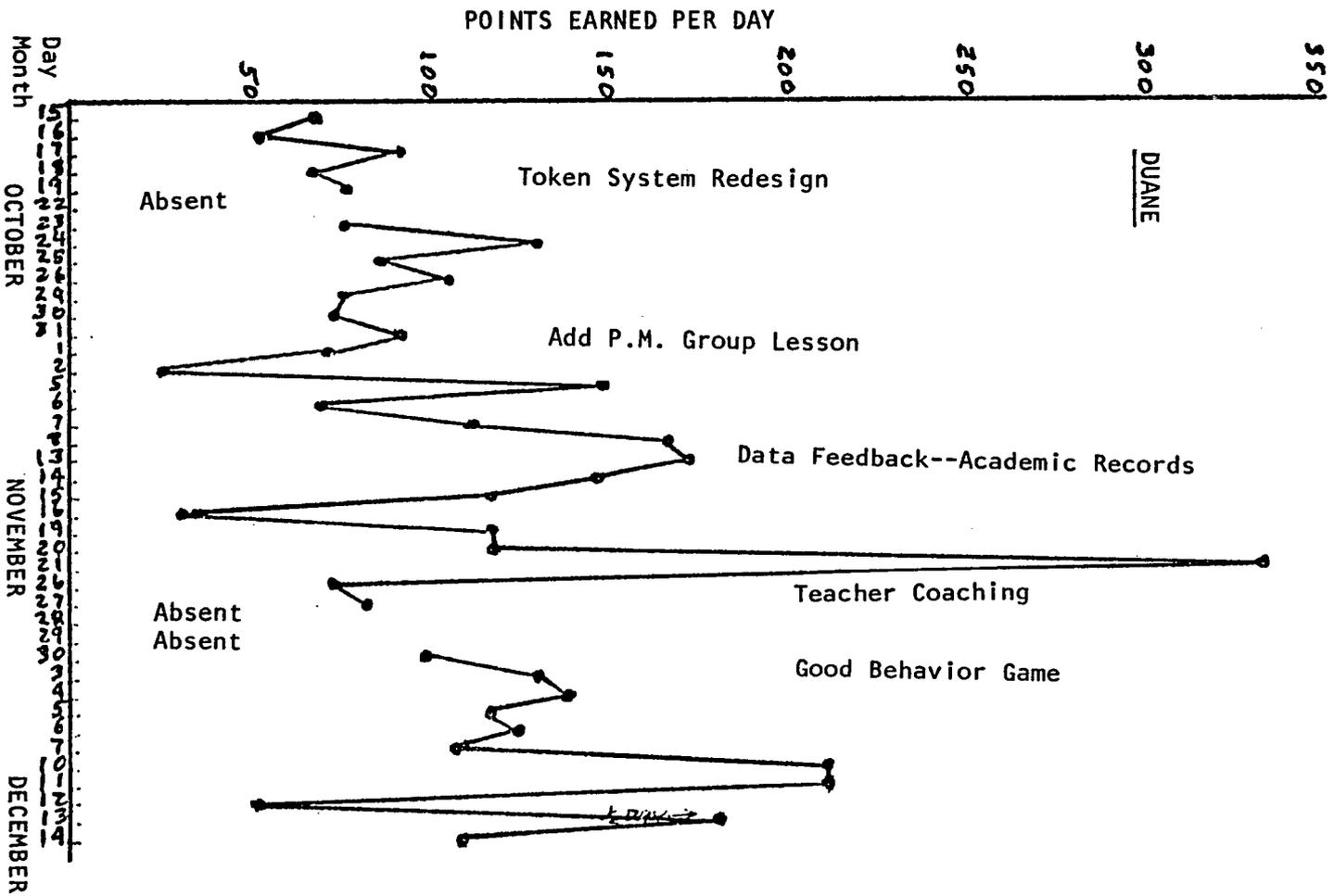


Fig. 6. Continued. Daily Token Earnings.
 (b) Duane.

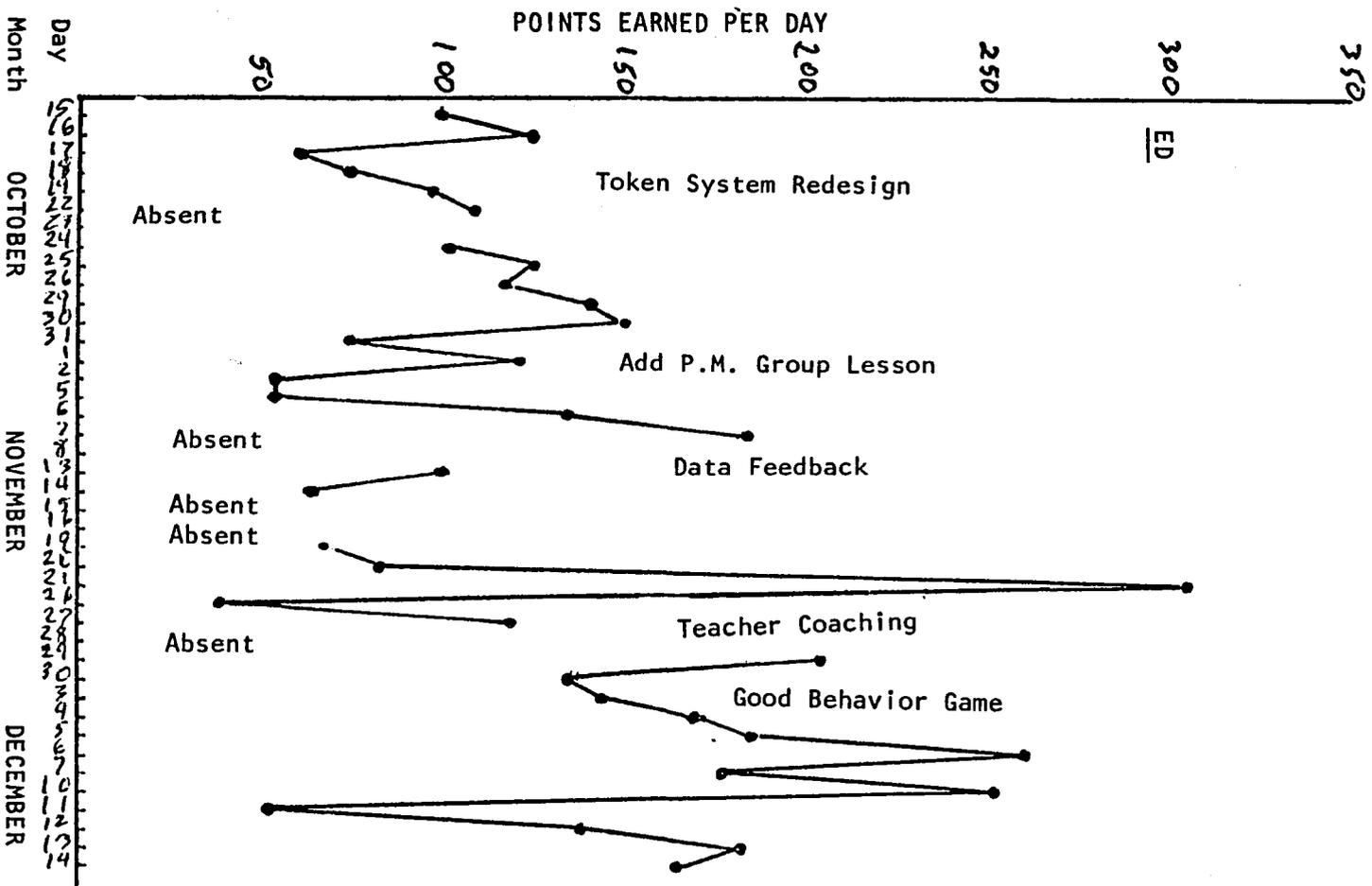


Fig. 6. Continued. Daily Token Earnings.

(c) Ed.

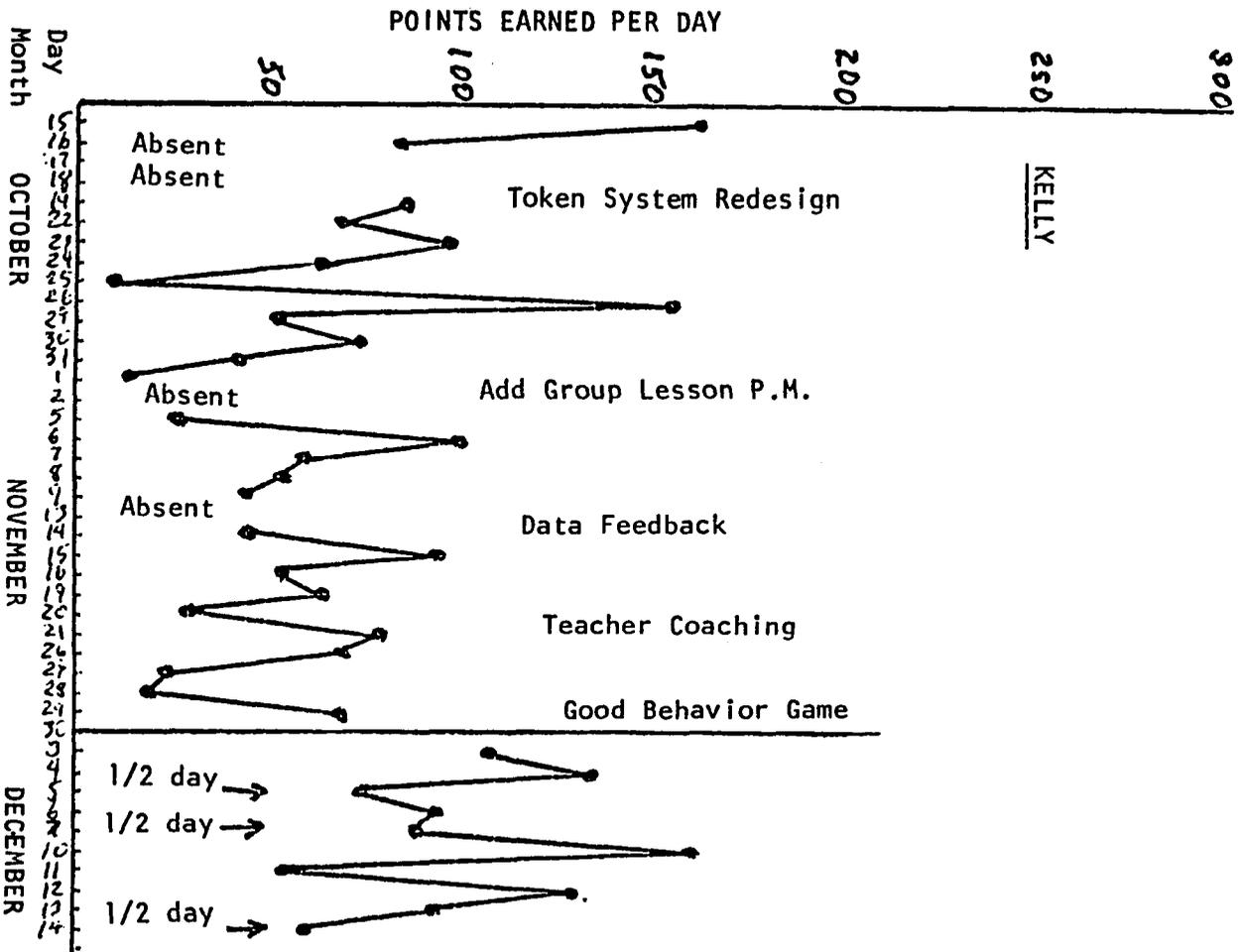


Fig. 6. Continued. Daily Token Earnings.
(d) Kelly.

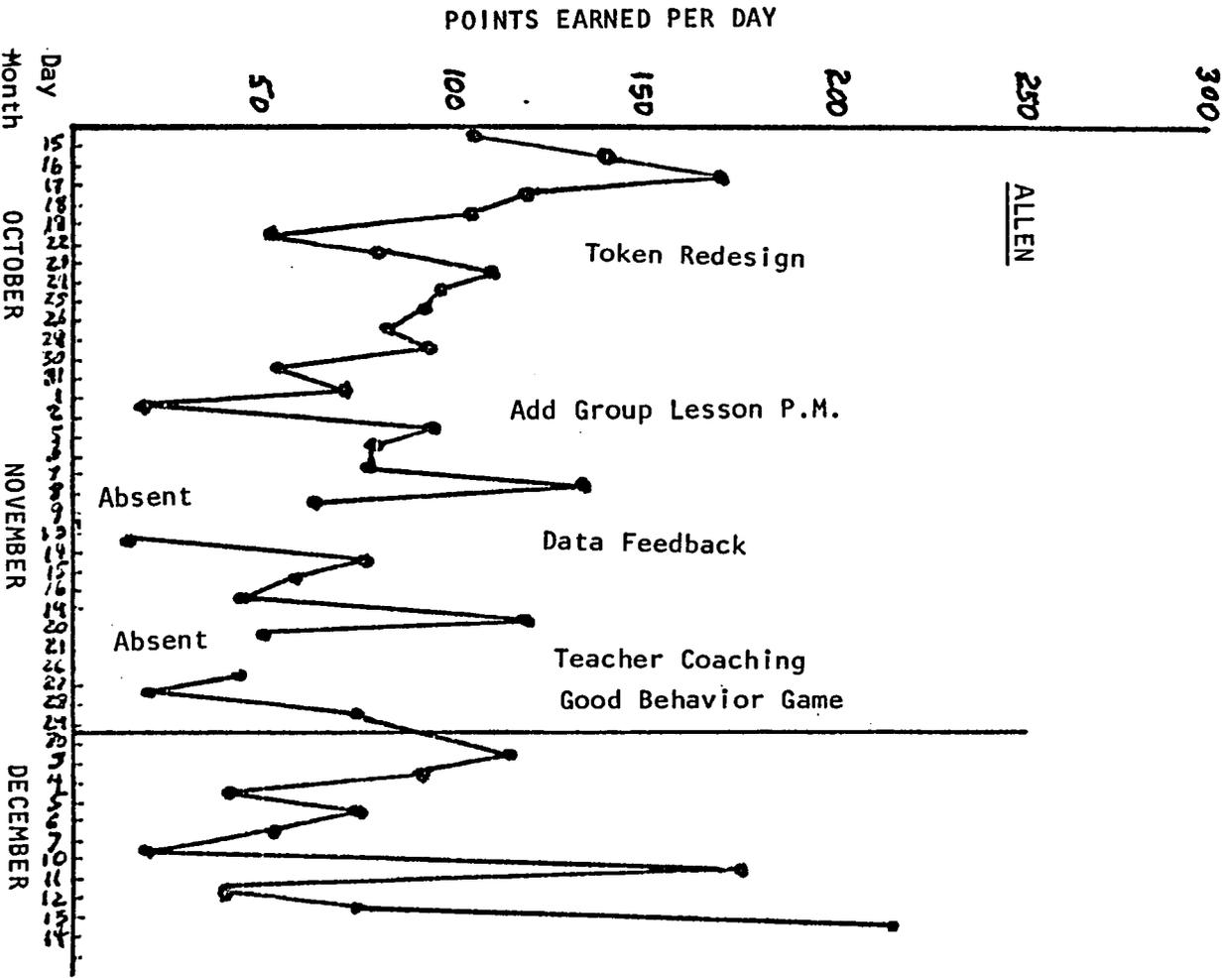


Fig. 6. Continued. Daily Token Earnings.
 (e) Allen.

data within the first four weeks of intervention (which also includes Interventions 2 and 3). The only data are anecdotal. The teachers reported much improved classroom deportment within a few days of intervention. The Education Program Coordinator claimed that percentage of teacher attention directed toward inappropriate student behavior had decreased from 80% to less than 30% during the first four weeks of intervention. Data on teacher attention began to be charted on November 1 (end of Week 9). Figure 7 shows the frequency of teacher attention (teacher and aide summed) to appropriate student behavior during two classroom settings; Group Lesson and Individual Work Time.

Teacher attention to appropriate student behavior is consistently greater during Individual Work Time than during Group Lesson. Teacher attention to appropriate behavior appears fairly stable for seven days (9 data points) prior to Intervention 4 (data feedback session with the teachers). Following the data feedback session, teacher attention to appropriate student behavior increases and then decreases to the preintervention base level, especially during Group Lesson.

Intervention 5, teacher coaching, is followed by increased teacher attention to appropriate student behavior; however, the trend deteriorates within the week during group lesson. The two data points during Individual Work settings show increased frequency of attention to appropriate behavior. The start of the group contingency games (Intervention 7) is followed by a robust increase in teacher attention to appropriate behavior during both settings. During two of the last

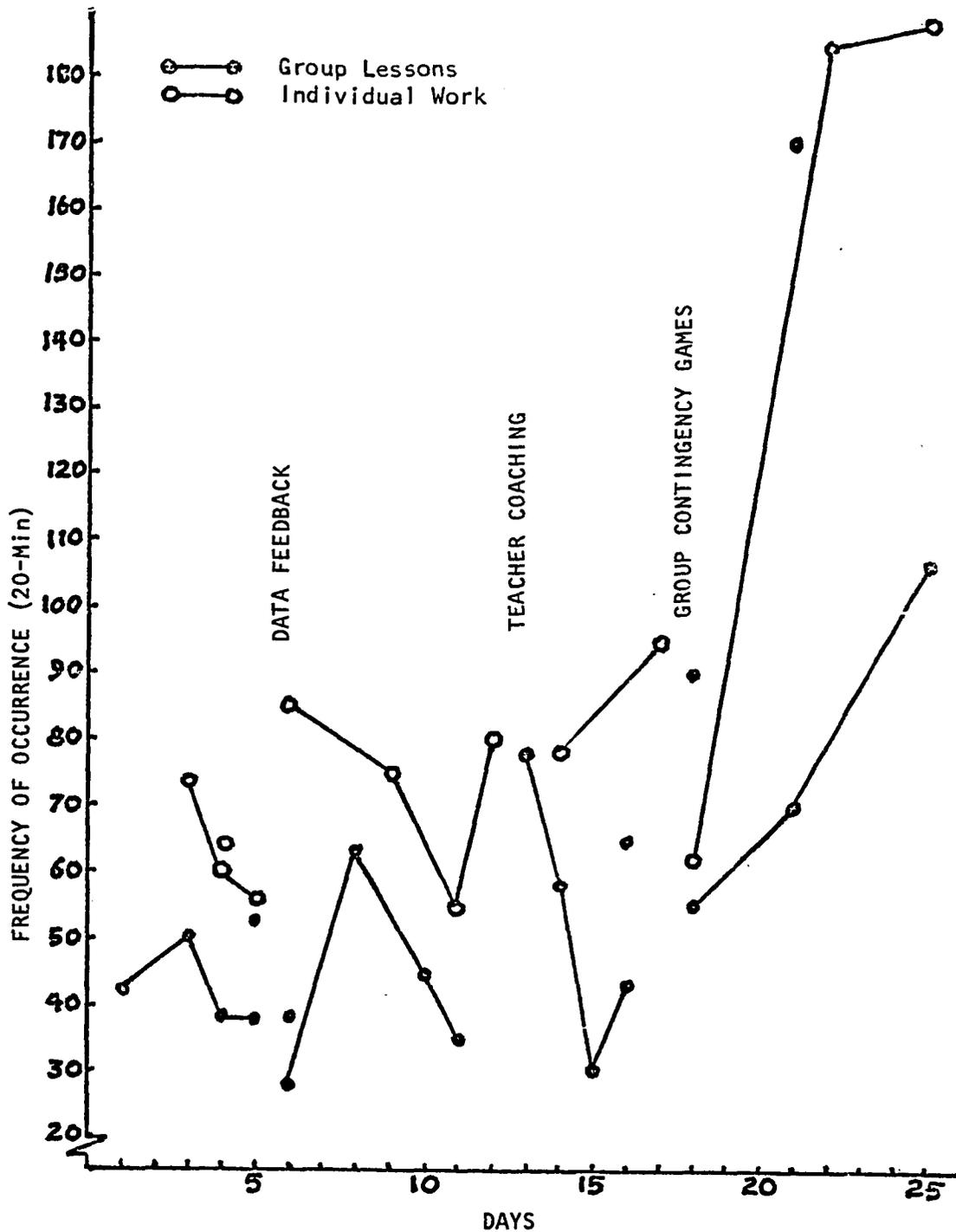


Fig. 7. Total Teacher Attention to Appropriate Student Behavior Recorded During 20-Min. Group Lesson and Individual Work Periods.

Unconnected points indicate a second observation made on the same day.

Individual Work periods, observers recorded more than 180 instances of teacher attention to appropriate behavior in the 20-minute observation period. This means that the teacher and aide were each attending to appropriate student behavior at a rate of 4.5 times per minute which is about 400% more attention to appropriate behavior than was recorded during the first week of data collection.

Teacher attention to inappropriate student behavior is shown in Figure 8. Again the lack of data before November 1 is unfortunate since the greatest change in teacher attention to inappropriate behavior, in the opinions of several competent observers, occurred prior to that date.

These data show that there were no major changes in teacher attention to inappropriate behavior following any of the interventions (3 through 7). There does appear to be a slight, but constant, decline in attention to inappropriate behavior throughout the last six weeks of intervention with slightly more attention being paid to inappropriate behavior during Individual Work periods.

Student Department

The data on student inappropriate behavior was collected at the same time as teacher attention data and thus did not start until November 1 (end of Week 9). Once again, this is unfortunate because several observers and the teachers reported that they could see major improvements in the frequency as well as severity of inappropriate student behaviors during the first few weeks after the token system

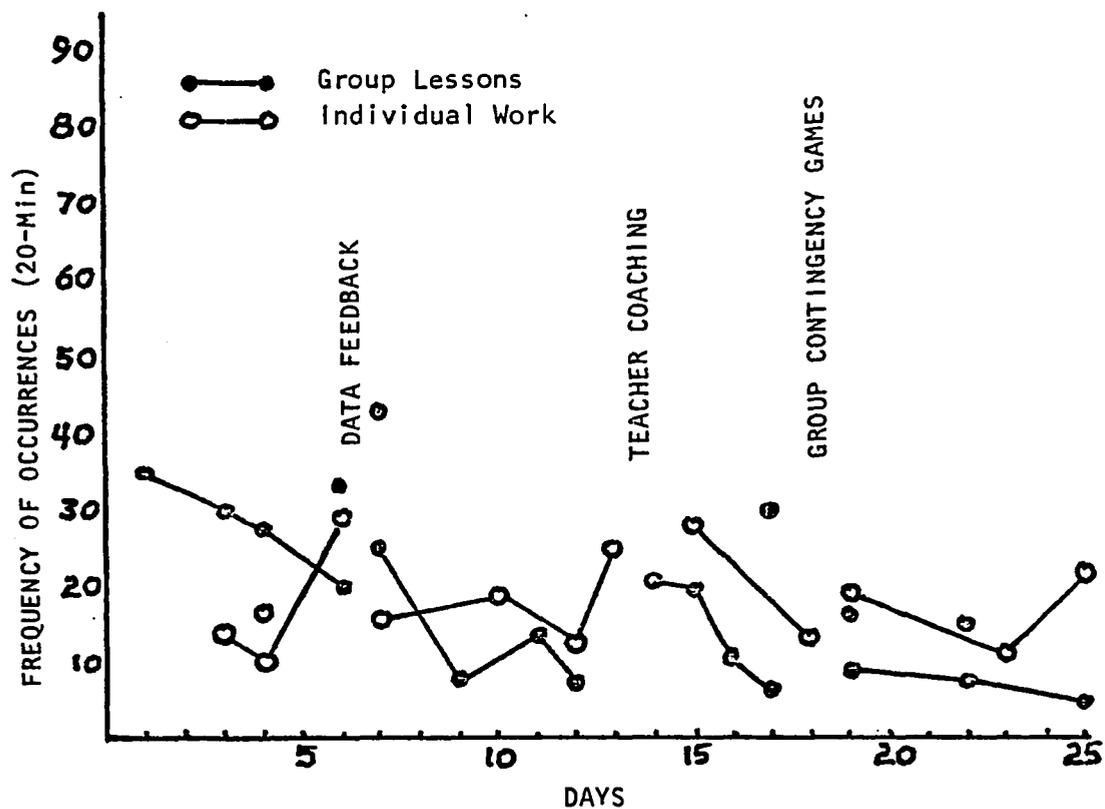


Fig. 8. Total Teacher Attention to Inappropriate Student Behavior Recorded During 20-Min. Group Lesson and Individual Work Periods.

Unconnected points indicate a second observation made on the same day.

and teacher coaching interventions. Intervention 3, the addition of an afternoon group lesson, was a direct result of improved conditions which the teachers felt necessary before that curriculum change could be made. Figure 9 shows total frequencies of inappropriate behaviors during 20-minute observations in two settings, Group Lesson and Individual Work Time.

The data graphed in Figure 9 show total inappropriate student behaviors to be consistently less frequent during Individual Work Time but following the same trends as shown by data from Group Lessons. The seven days prior to Intervention 4 (teacher attention data feedback session) show increasing frequencies of inappropriate behavior with one afternoon Group Lesson having nearly 120 occurrences of inappropriate behaviors in 20 minutes, or nearly six occurrences per minute. Immediately following the feedback session, inappropriate behavior during Group Lesson dropped to the same level as Individual Work periods, or about 50 occurrences in 20 minutes. The following seven days show inappropriate behavior in both settings increasing steadily. The Monday following Thanksgiving vacation was especially chaotic as reflected in the data. The teacher coaching (Intervention 5), which was then initiated, was followed by a constant decline in inappropriate behaviors in both settings. Following the initiation of the group contingency games in Group Lesson (Intervention 7), inappropriate behavior in Group Lessons stabilized around 50 occurrences in 20 minutes, or about 2.5 per minute. Inappropriate behavior during

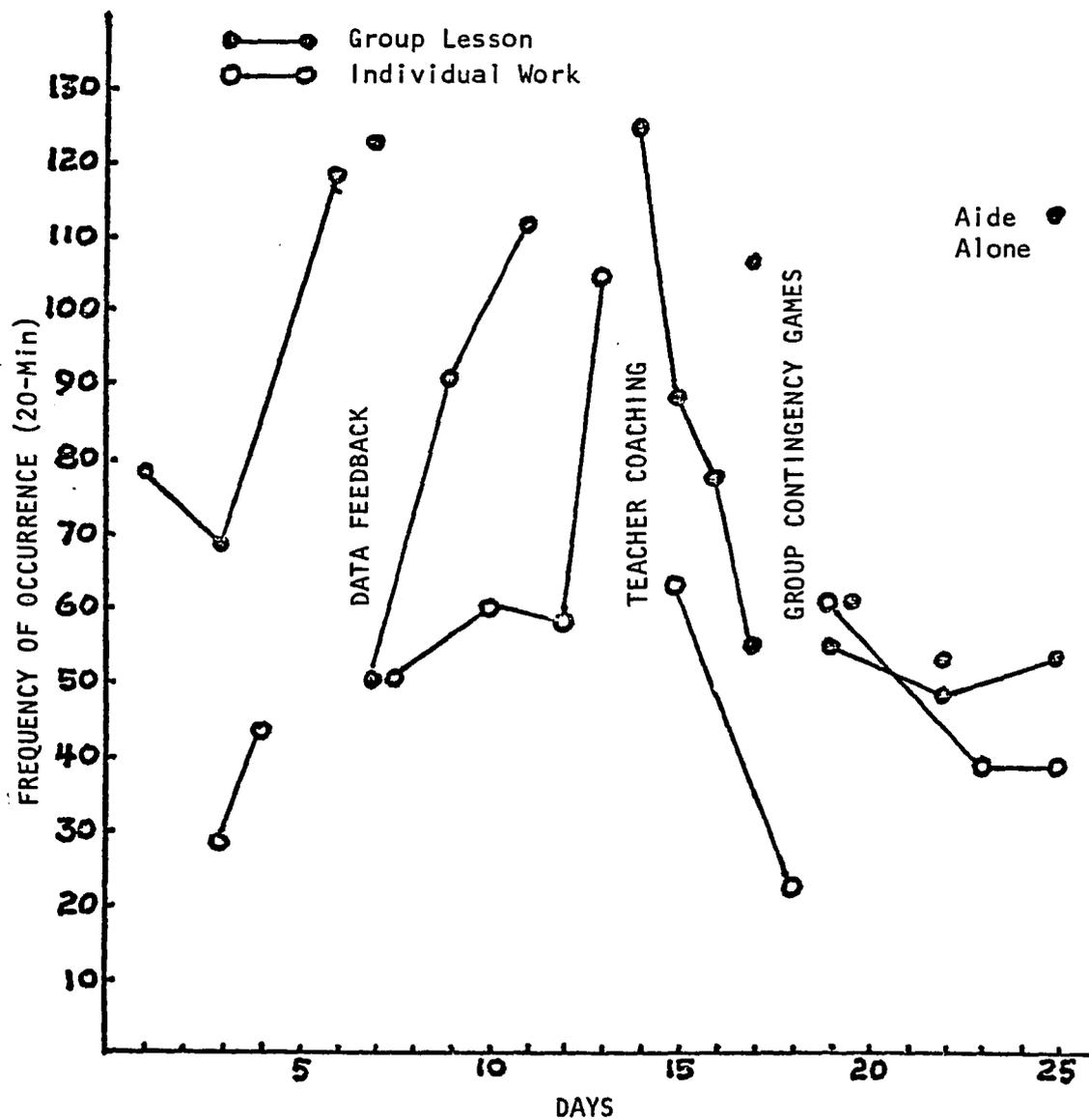


Fig. 9. Total Student Inappropriate Behavior Recorded During 20-Min. Group Lesson and Individual Work Periods.

Unconnected points indicate a second observation made on the same day.

that one session was very high. It should be noted that unconnected points in Fig. 9 indicate second observations made in a single day and illustrate some of the variability of behavior within the same day, especially between morning and afternoon sessions. The lowest points, mostly AM sessions, have been connected on the graph.

Recall that there were four categories of student inappropriate behavior (Speaking-out, Out-of-area, Mouth-noises, and Motor-disruption) and that these behaviors were scored for each student in the room. Analysis of these data for individual students show that there were changes in the topographies of inappropriate behavior which are obscured by summed categories. Figure 10 presents data on inappropriate behaviors of two of the most disruptive students (Jay and Tony) during Group Lesson.

Both students displayed high frequencies of disruptive motor behaviors during the first two weeks of November. Jay's data indicate that the teacher feedback session (Intervention 3) was followed by a decrease in disruptive motor behavior with one extreme point on December 12 (that data point will be further clarified in the presentation of the group contingency game data). Tony's data indicate a fairly high level of motor disruptive behavior with a decreasing trend up to the beginning of the group contingency games. With the one exception in Jay's data, disruptive motor behavior was eliminated during group lessons with implementation of the group contingency games. Out-of-area and mouth-noises show similar trends in both students' data. Speaking-out data follows a different curve for both

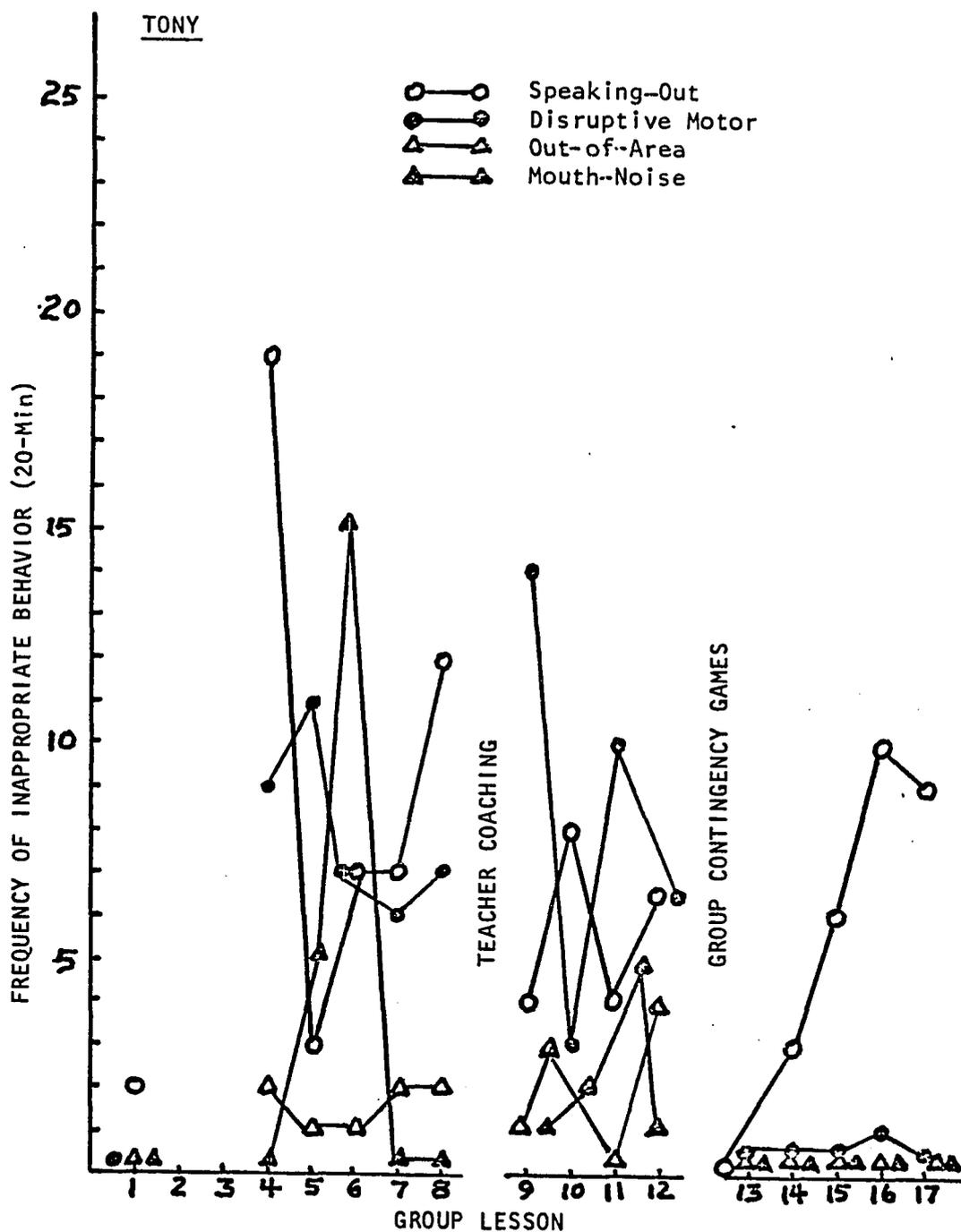


Fig. 10. Inappropriate Behaviors Recorded During 20-Min. of Group Lesson.

(a) Tony.

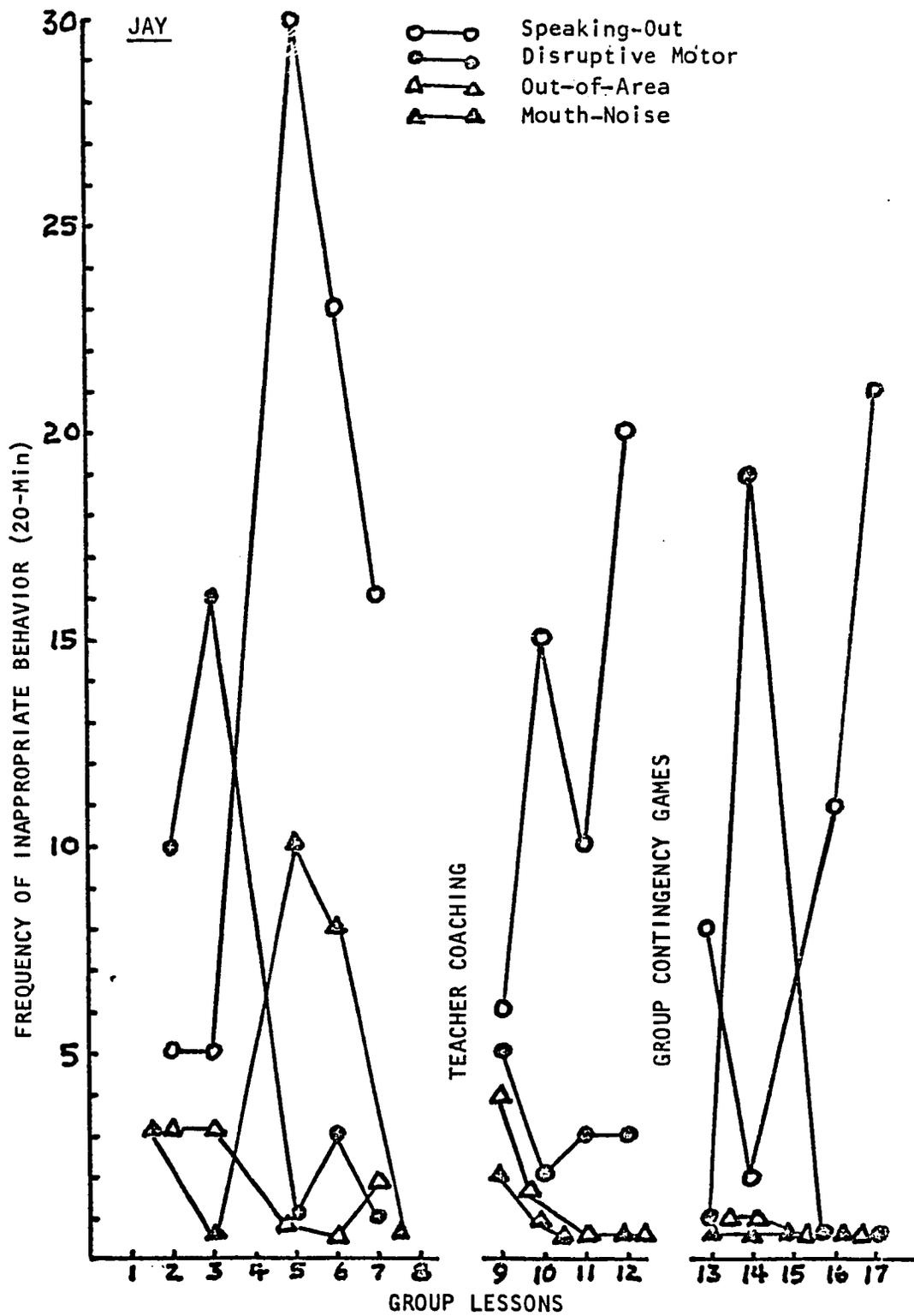


Fig. 10. Continued. Inappropriate Behaviors Recorded During 20-Min. of Group Lesson.

(b) Jay.

students. Starting at very high frequencies on November 13 (immediately after Intervention 3), occurrences of speaking-out gradually decline for both students until the group contingency games start. After that date, speaking-out increases in frequency again.

Teacher Curriculum Management

The addition of a second group lesson to the daily classroom schedule was the result of the teachers' judgement that the students' behaviors were at a point where the lesson could be added without overtaxing the teachers' management capabilities. The addition of this lesson is not reflected by noticeable changes in any of the data. The payoff activities which served as backup reinforcers for the token system also served as added curriculum. By mid-November, all payoffs were desirable activities rather than extrinsic items such as food or trinkets. These payoff activities were scheduled three times a day and usually lasted for a 20-minute period. Activities included cooking, field trips, art, running the ditto machine, watching T. V., listening to records, playing the autoharp, presenting a play, using the video-tape camera, and talking about personal problems privately with the teacher. Few of these activities had been available to the students prior to the establishment of the token system and none had been available on a regularly scheduled basis.

With the establishment of an adequate record keeping system (Intervention 6), the teachers' curriculum management with the token economy could be more carefully monitored and adjusted for individual

students (note that these data begin on Week 11 and run through Week 14. Data for Week 15, the last week of intervention, were lost). Figure 11 presents data on total academic points assigned and total academic points earned for two students, Randy and Tony.

The data for Randy show extreme variability in the number of academic points assigned up to the date marked as an intervention. These data also show Randy's performance to be inconsistent with the amount of work assigned. The intervention included presentation of these data to the teacher with the instructions to attempt a more consistent academic work assignment for Randy. The data following this intervention show both teacher assignment and student performance becoming more stable and a trend toward less discrepancy between assigned and earned points.

The data for Tony indicate another type of academic manipulation possible within the token economy. Prior to the intervention data, Tony's token earnings are inconsistent and much less than the total assigned. The intervention involved doubling the number of points assigned to math work to stimulate completion of math assignments. This operation is reflected in the data by the increase in total academic points assigned as well as by an increase in the number of points earned through academic work done by Tony.

The academic data can provide an even more detailed description of individual performance within the token system as shown in Fig. 12. Figure 12 presents three views of Ed's academic curriculum management and his performance within that structure. First, the total number of

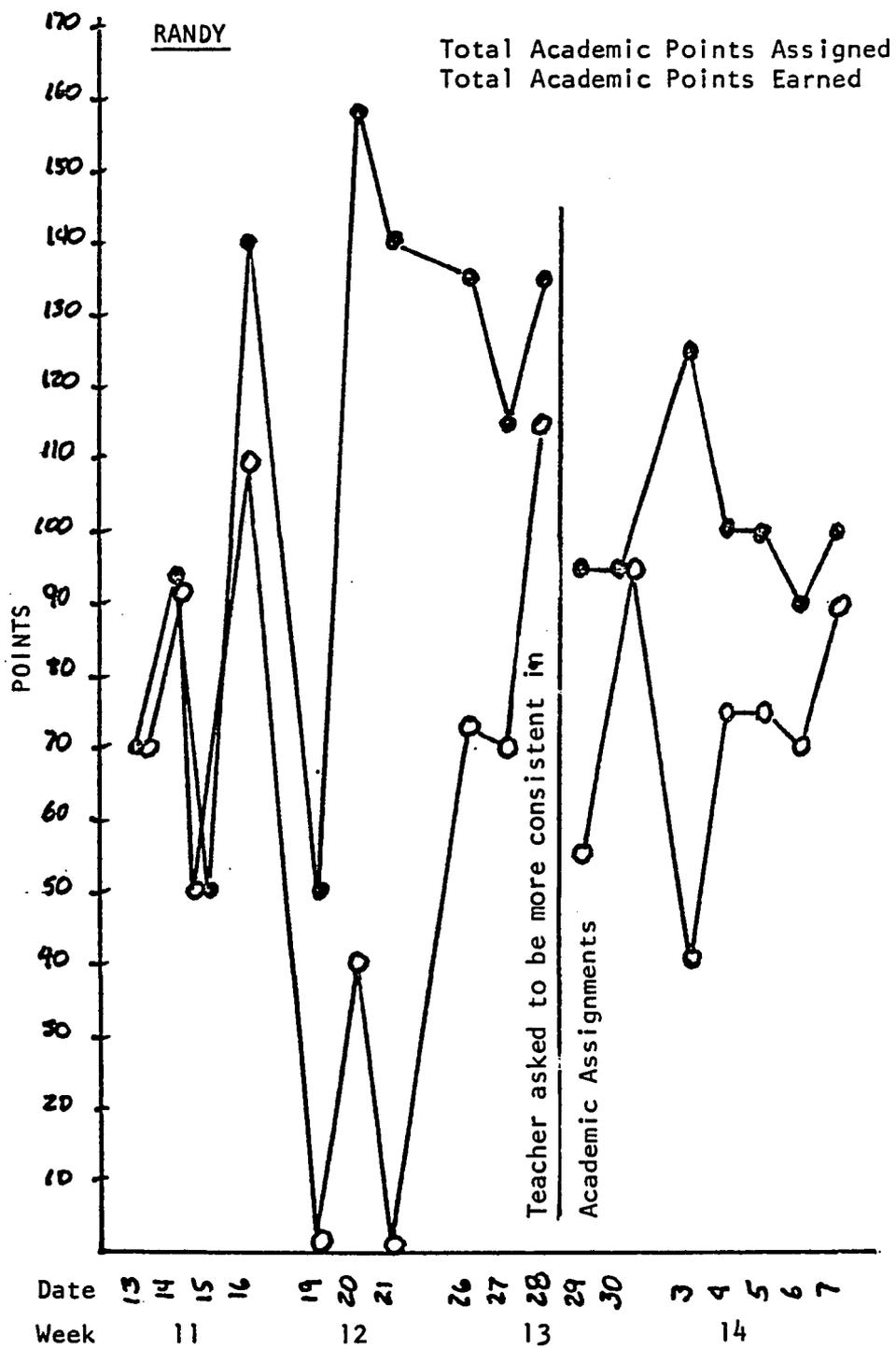


Fig. 11. Curriculum Management: Points Assigned and Points Earned.

(a) Randy.

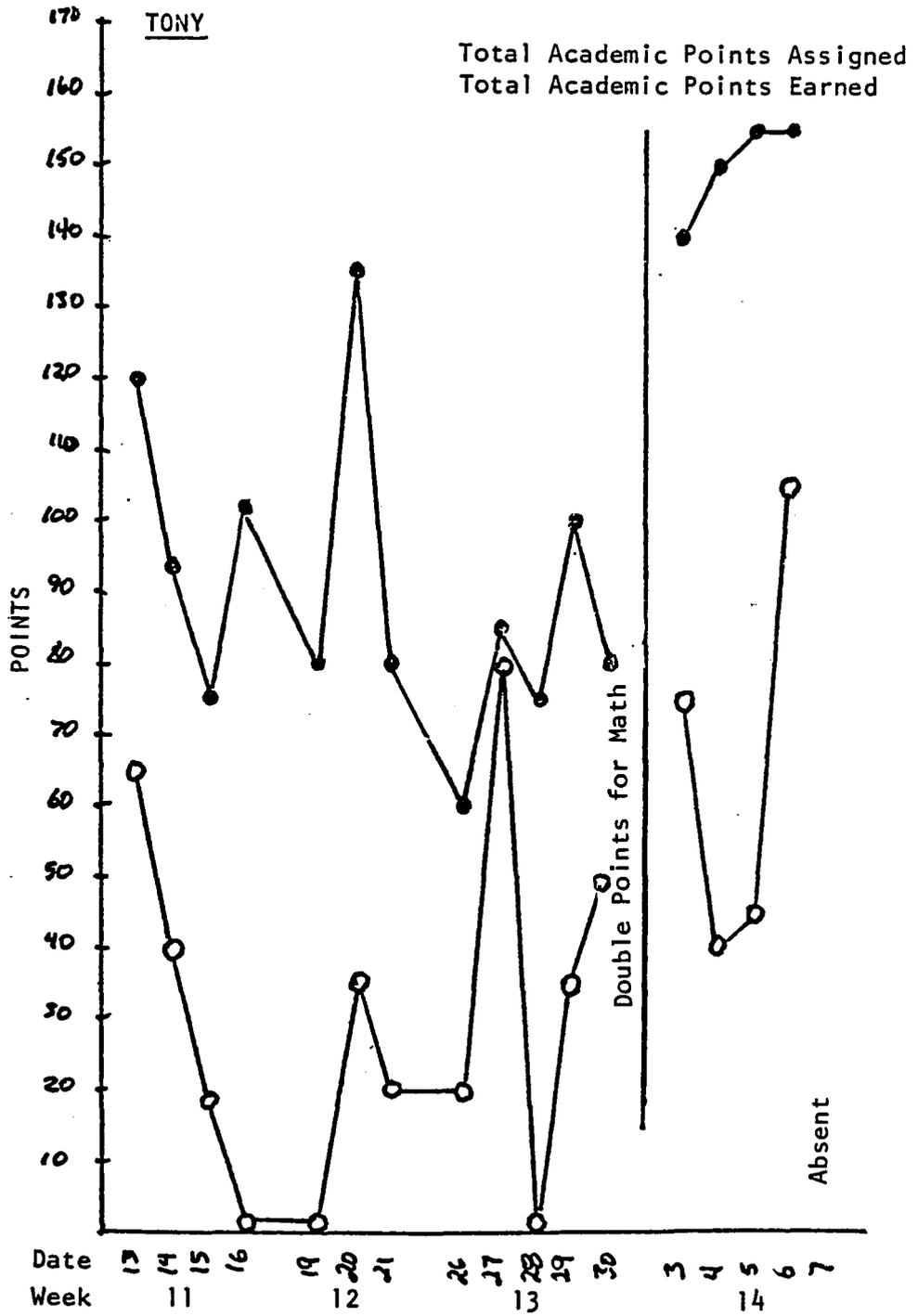


Fig. 11. Continued. Curriculum Management: Points Assigned and Points Earned.

(b) Tony.

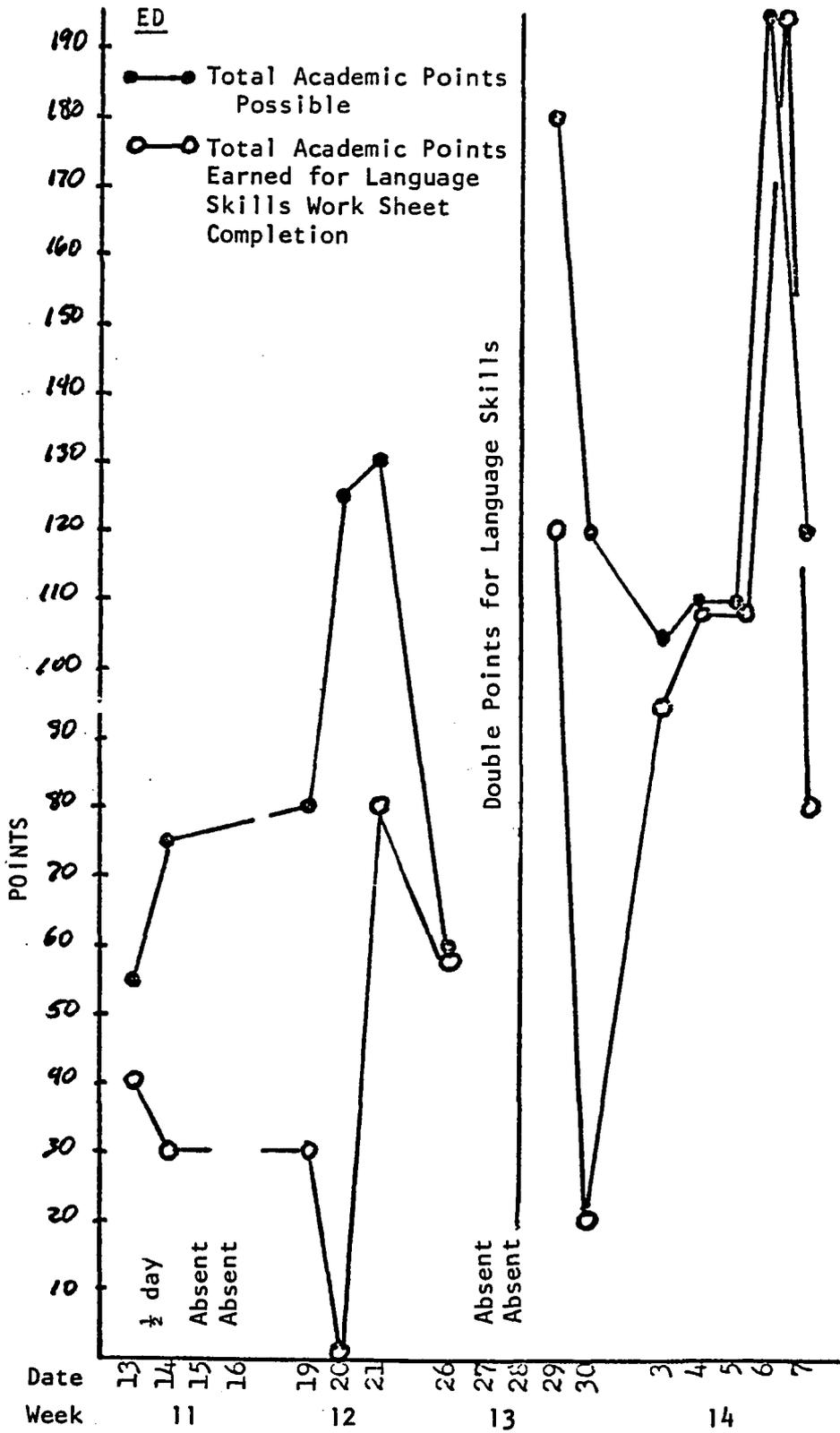


Fig. 12. Curriculum Management and Academic Performance for Ed.

(a) Points Earned in Language Skills.

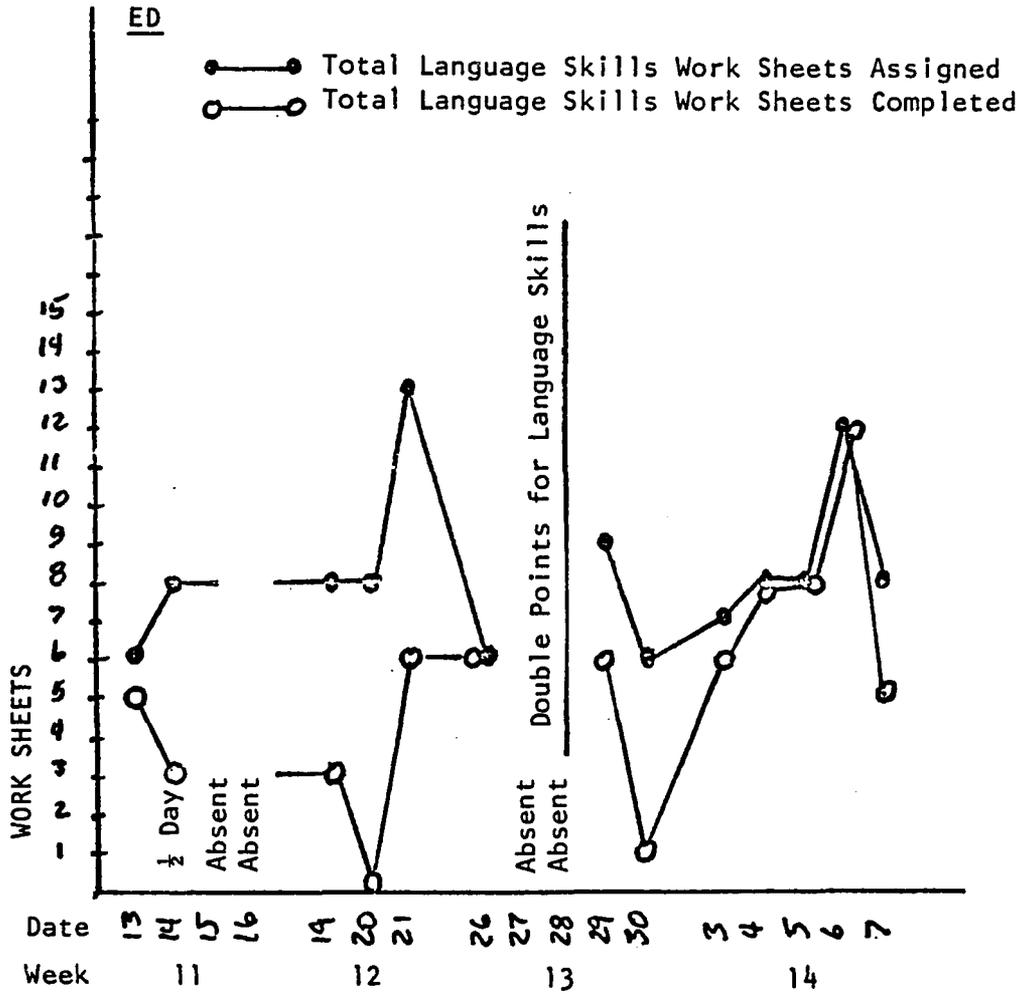


Fig. 12. Continued. Curriculum Management and Academic Performance for Ed.

(b) Language Skills Work Sheets Assigned and Language Skills Work Sheets Completed.

work sheets assigned (in any curriculum area) can be compared with the number of work sheets completed by Ed. After the point marked as intervention (double points for language skills assignments), the total number of sheets completed by Ed shows an increase and the discrepancies between assignments and completions are generally reduced. Second, the total number of language skills work sheets assigned and completed can be compared. These data are almost identical to those for total academic assignments which indicates that language skills assignments comprised the bulk of Ed's academic curriculum. Third, the token points assigned and earned in language skills curriculum reflect the effects of the intervention in that points assigned increased and points earned increased. The discrepancy between points assigned and points earned was also appreciably reduced.

The data presented in Fig. 13 describe curriculum management and academic performance for Kelly with both planned and unplanned interventions. The data on total work sheets assigned and completed show Kelly's performance to be rather dismal up to the unplanned intervention (talk with Education Director and removal of token point contingencies). These data show a corresponding decline in the number of academic assignments made for Kelly. The single day in which the point contingencies were removed shows no academic performance by Kelly. Reinstatement of the point contingencies is followed by increased academic performance. After token points assigned to math work were doubled, the number of assignments made by the teacher increases moderately and the number of assignments completed by Kelly

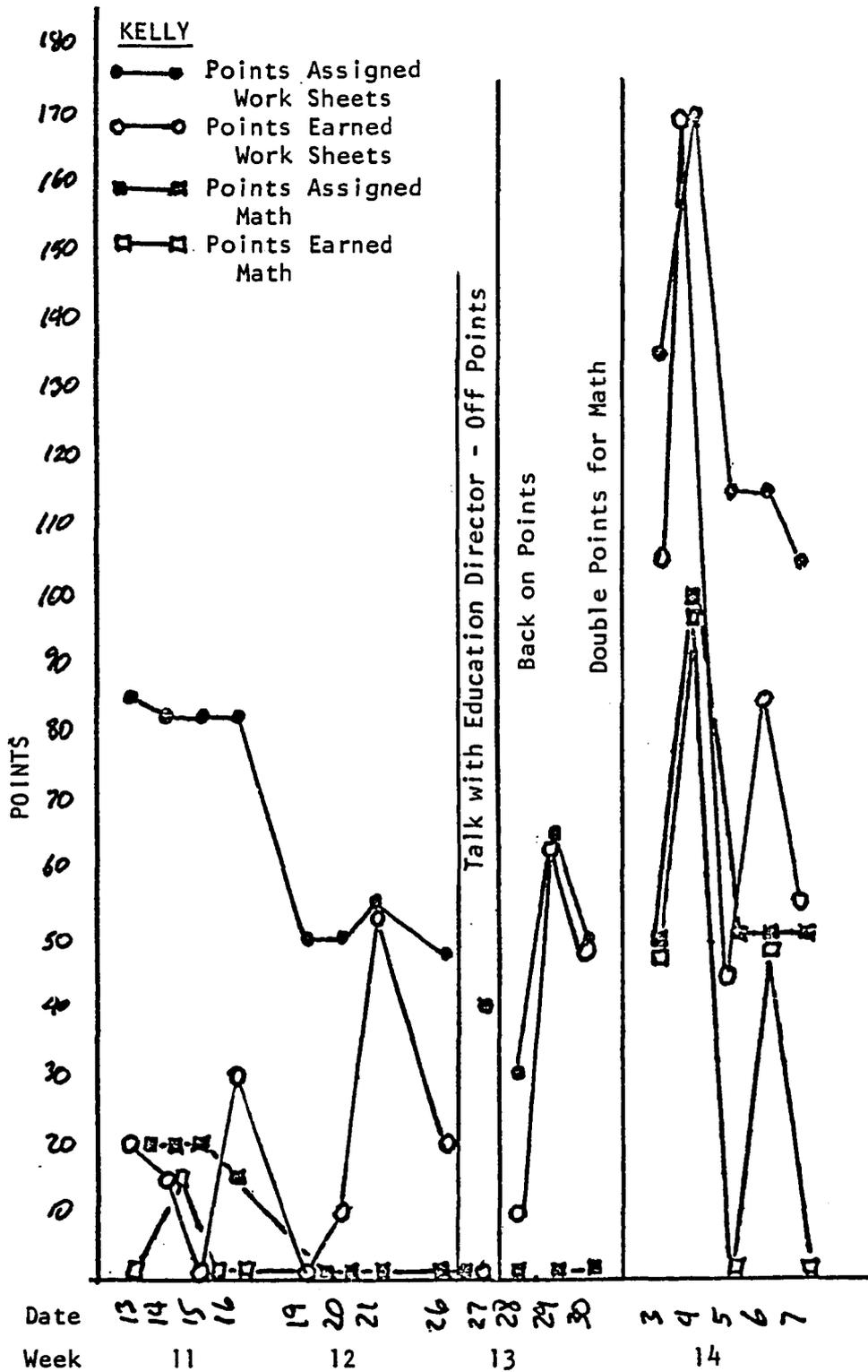


Fig. 13. Curriculum Management and Academic Performance for Kelly.

(a) Total Points Assigned and Earned on Work Sheets and Points Assigned and Earned in Math.

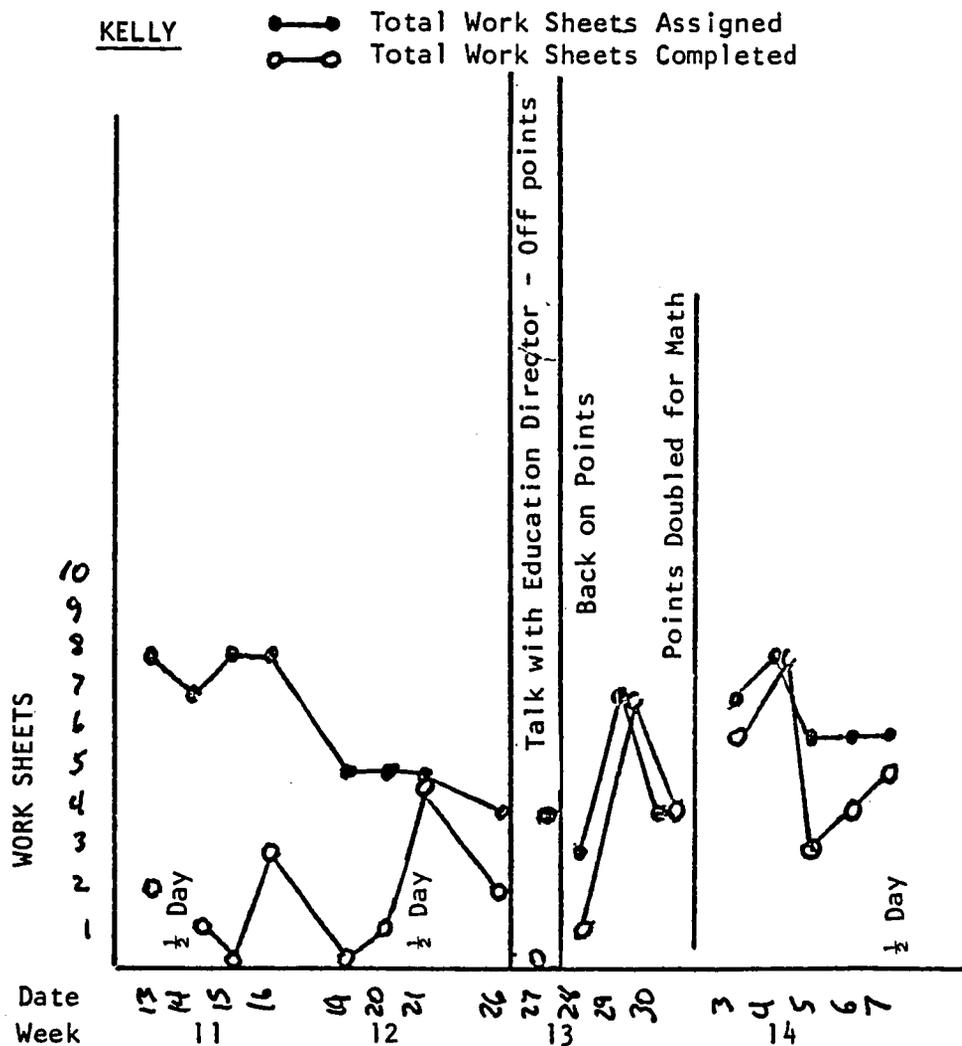


Fig. 13. Continued. Curriculum Management and Academic Performance for Kelly.

(b) Total Work Sheets Assigned and Total Work Sheets Completed.

increases appreciably. The second set of data in Fig. 13 provide a more complete picture of Kelly's curriculum and academic performance. Prior to the unplanned intervention, total academic points assigned for Kelly were low and declining. His point earnings were very low and variable. After the removal and subsequent reinstatement of the token point contingencies, Kelly's point earnings increase and closely follow the number of points possible. After points assigned to math were doubled, the total possible points in the system are, of course, greatly increased and Kelly's earnings also improve, but with some variability.

Student Academic Performance

Student academic performance was measured by number of work sheets completed. The record keeping system was implemented at the start of Week 11, five weeks after the first intervention. The students' work sheet production had been saved in weekly bundles from the first week of school. These sheets were summed and divided by the number of days each student had been in class that week to produce a daily mean for each week. From Week 11 through Week 14 daily total work sheet completions were recorded as well as the number of work sheets assigned to each student. Figure 14 presents mean data for the class across 14 weeks of school. The data show mean work sheet completion to be very high in the second week of school then dropping to an average of four to five sheets completed per day for the three weeks prior to the first intervention. After Intervention 1, mean work sheet production increases to slightly better than six sheets

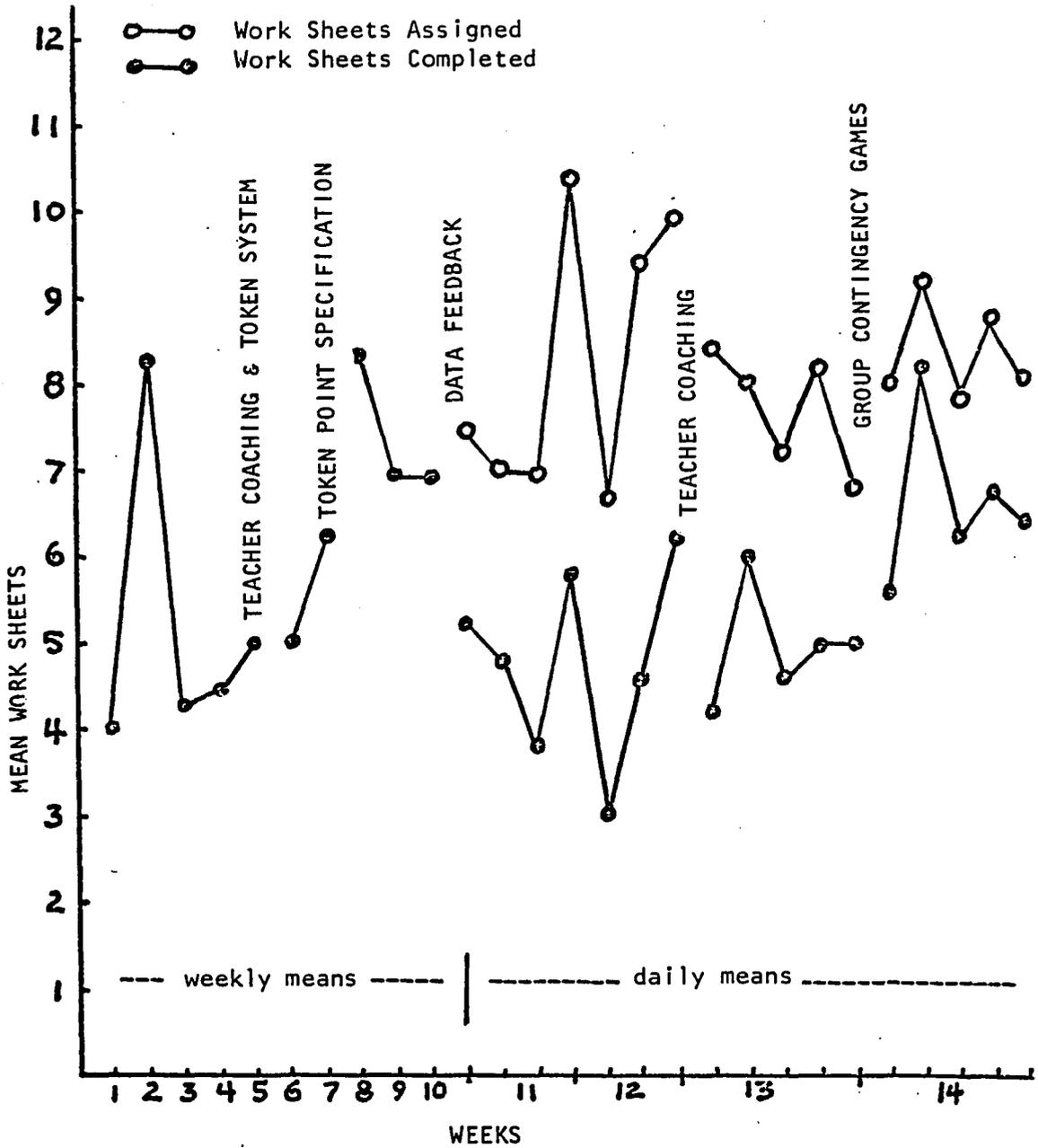


Fig. 14. Student Academic Performance: Group Mean Work Sheets Assigned and Completed.

per day. Following Intervention 2, mean work sheet completion increases to slightly greater than eight sheets per day in the first week and then drops to less than seven for the next two weeks. The one week of data following the addition of an afternoon group lesson shows no immediate decrease in number of work sheets completed even though this intervention reduced the time allotted to individual work assignments.

Data in Fig. 14 are differentiated into daily means for Weeks 11 through 14. The differences between assignments made and assignments made and assignments completed are also shown. Weeks 11 and 12, both short weeks, show decreased assignments completed but increasing trends from the first to the last day of the week. The mean differences between assignments made and assignments completed are 3.5 and 4.0 for Weeks 11 and 12 respectively. Following Intervention 5 and during Intervention 6 the mean number of assignments completed becomes slightly more stable around a mean of five per day. The mean number of assignments made shows a decreasing trend throughout the week and the mean difference between assignments made and completed is reduced to 2.7. Following Intervention 7, mean assignments completed increases to about seven sheets per day, the number of assignments made stabilizes around a mean of 8.5 and the mean difference between assignments made and assignments completed is reduced to less than 2.0.

Figure 15 presents data on mean daily work sheet completion for eight students. These data show very similar weekly work sheet

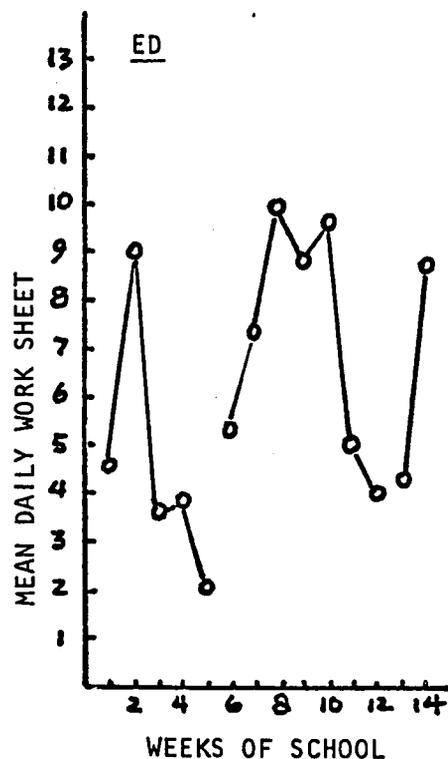
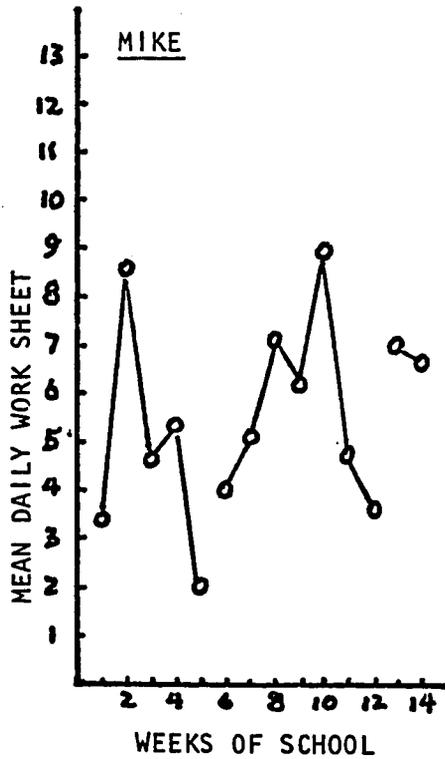
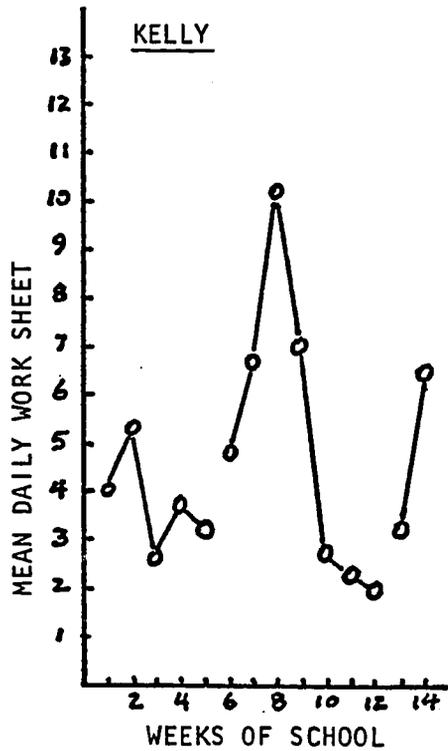
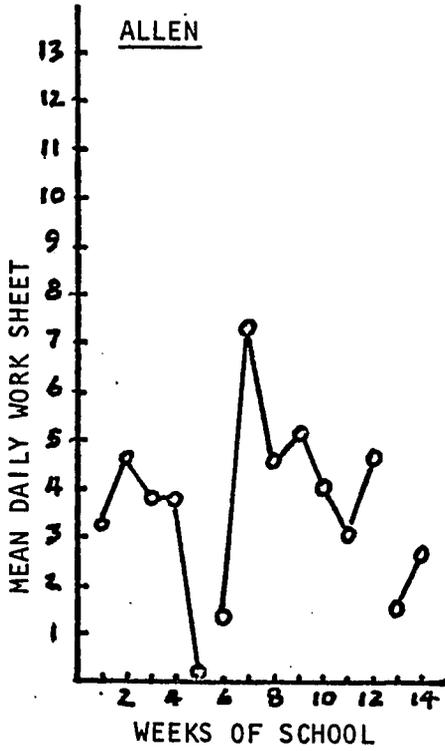


Fig. 15. Student Academic Performance: Individual Work Sheet Completion Plotted as Daily Means per Week.

(a) Allen, Kelly, Mike, and Ed.

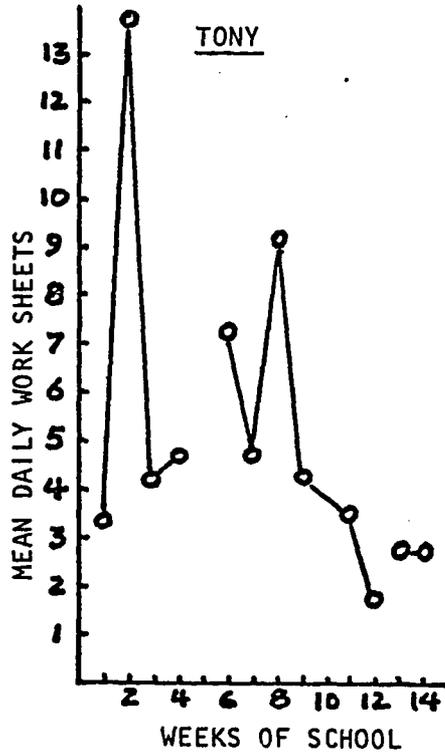
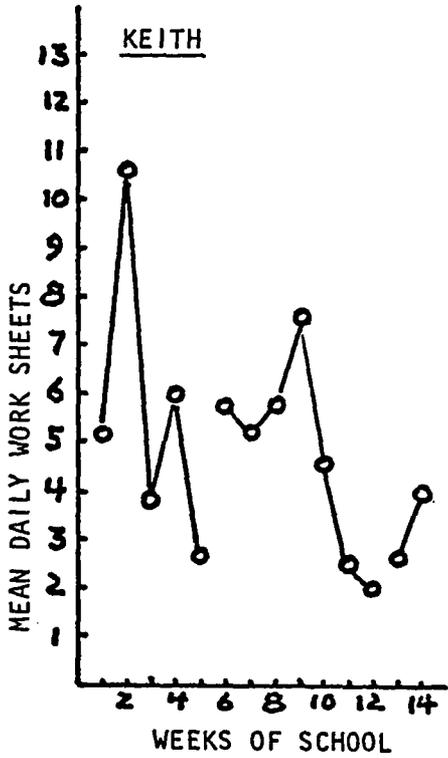
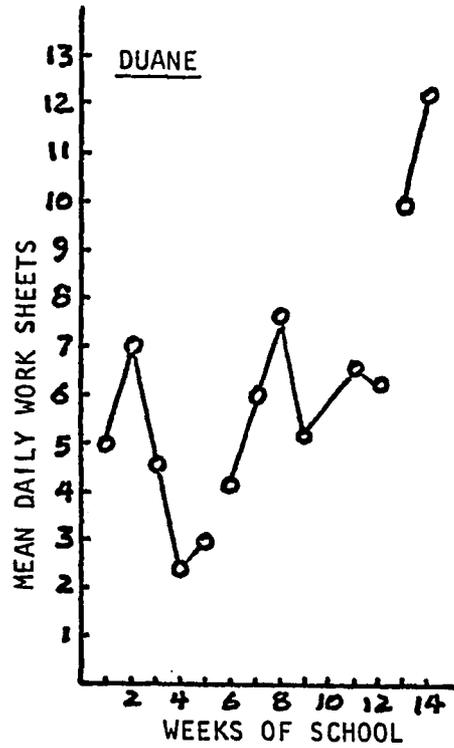
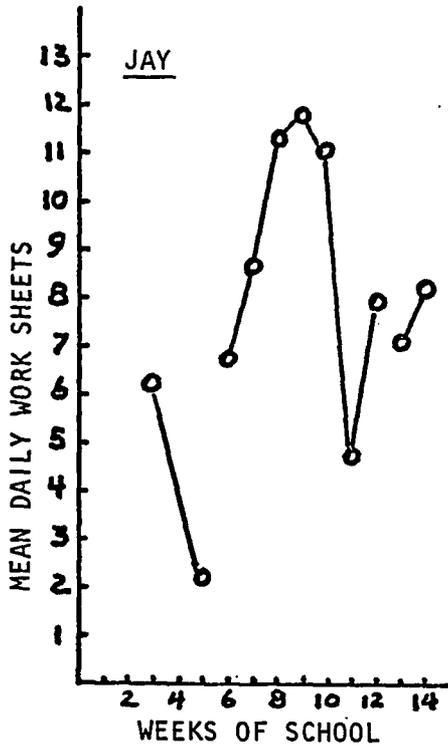


Fig. 15. Continued. Student Academic Performance: Individual Work Sheet Completion Plotted as Daily Means per Week.

(b) Jay, Duane, Keith, and Tony.

completion patterns for each of the students. The students had uniformly high production in the second week of school with a rapid decline through Week 5. Weeks 6 through 12 show first an increase and then a decline with greatest production occurring during Weeks 8, 9, and 10. There is a fairly uniform increase in production from Week 13 through 14 but earlier production levels are not reached except in one case.

Another view of student academic performance may be gained by a comparison of the number of academic points assigned (possible) within the token economy and the number of points earned. Data presented earlier (Figs. 11, 12, and 13) showed student performance as it related to specific token value manipulations by the teachers. Figure 16 presents data on points assigned and points earned by three students (Jay, Keith, and Mike). The difference between points assigned and points earned is decreased in the four weeks of data shown and, in two cases (Mike and Keith), the total number of points earned for academic work increases. These data also illustrate the rather extreme variability of points assigned for academic work and variability of performance which gained points within the system.

Effects of Group Contingency Games

Figure 17 shows the effects of the sequence of treatment conditions and reversals to baseline on the mean percentage of 10-second intervals scored Appropriate (on-task, participation) and Inappropriate (out-of-area, disruptive). Data for the morning lessons are shown in

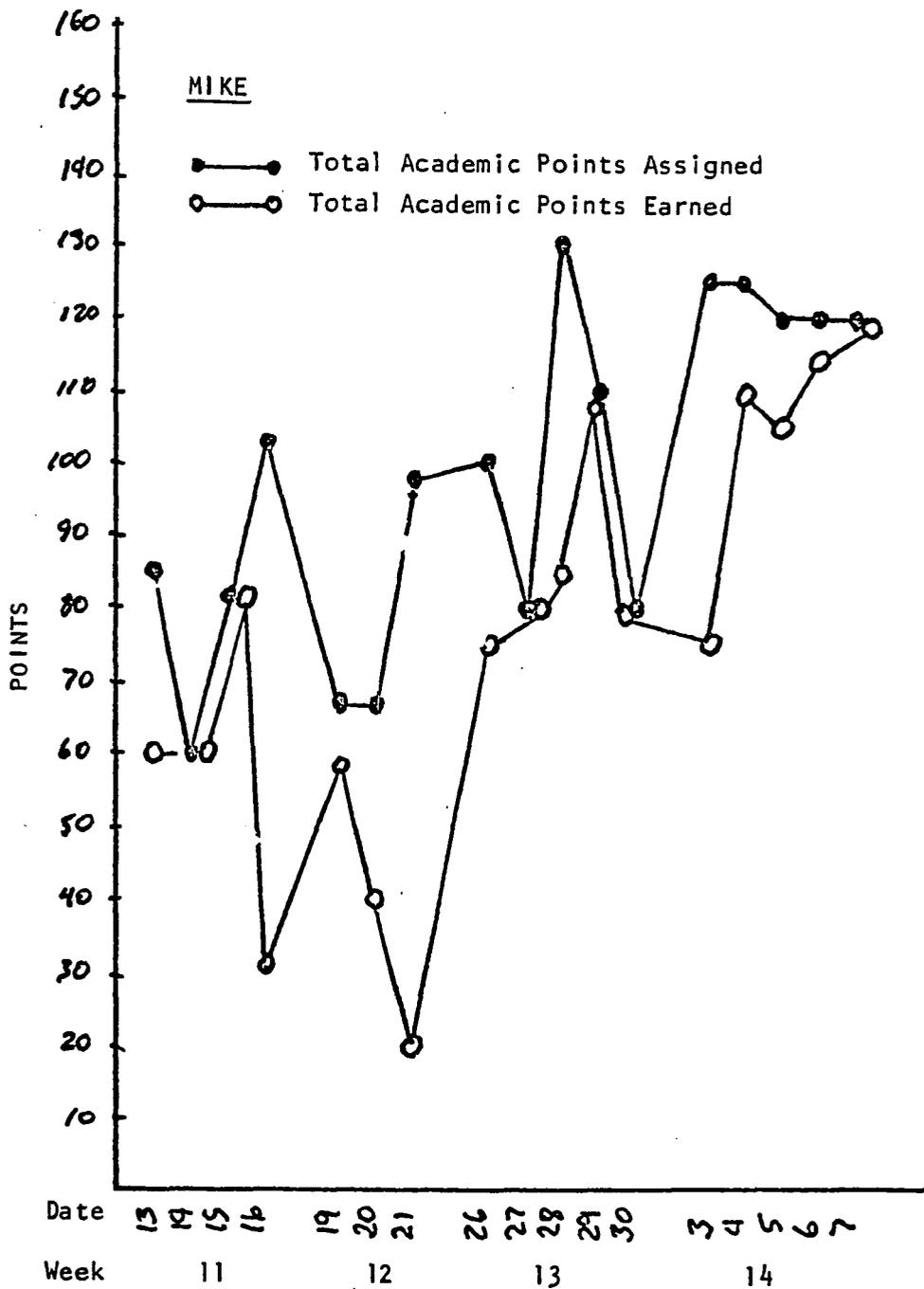


Fig. 16. Student Academic Performance: Academic Points Assigned and Academic Points Earned.

(a) Mike.

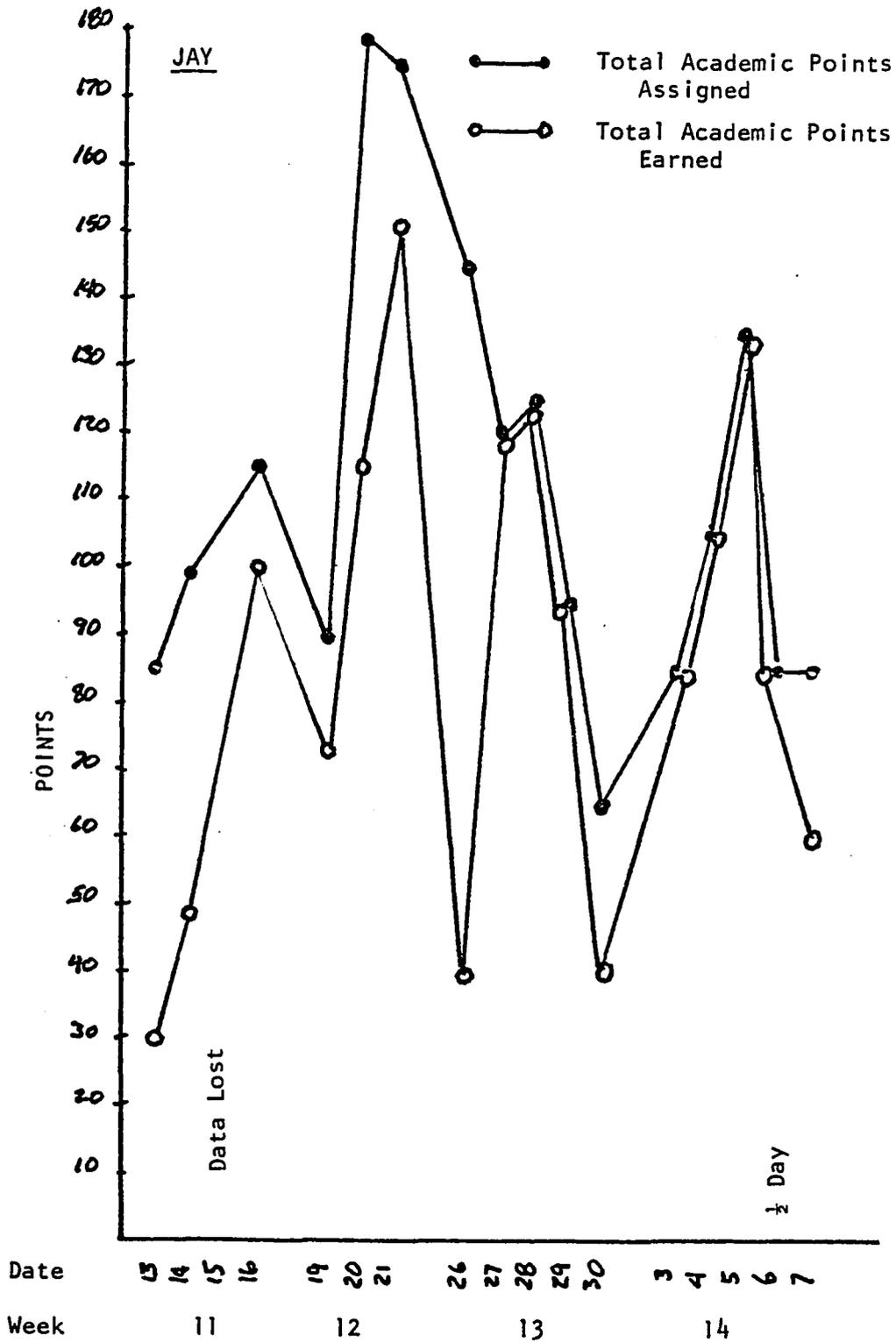


Fig. 16. Continued. Student Academic Performance: Academic Points Assigned and Academic Points Earned.

(b) Jay.

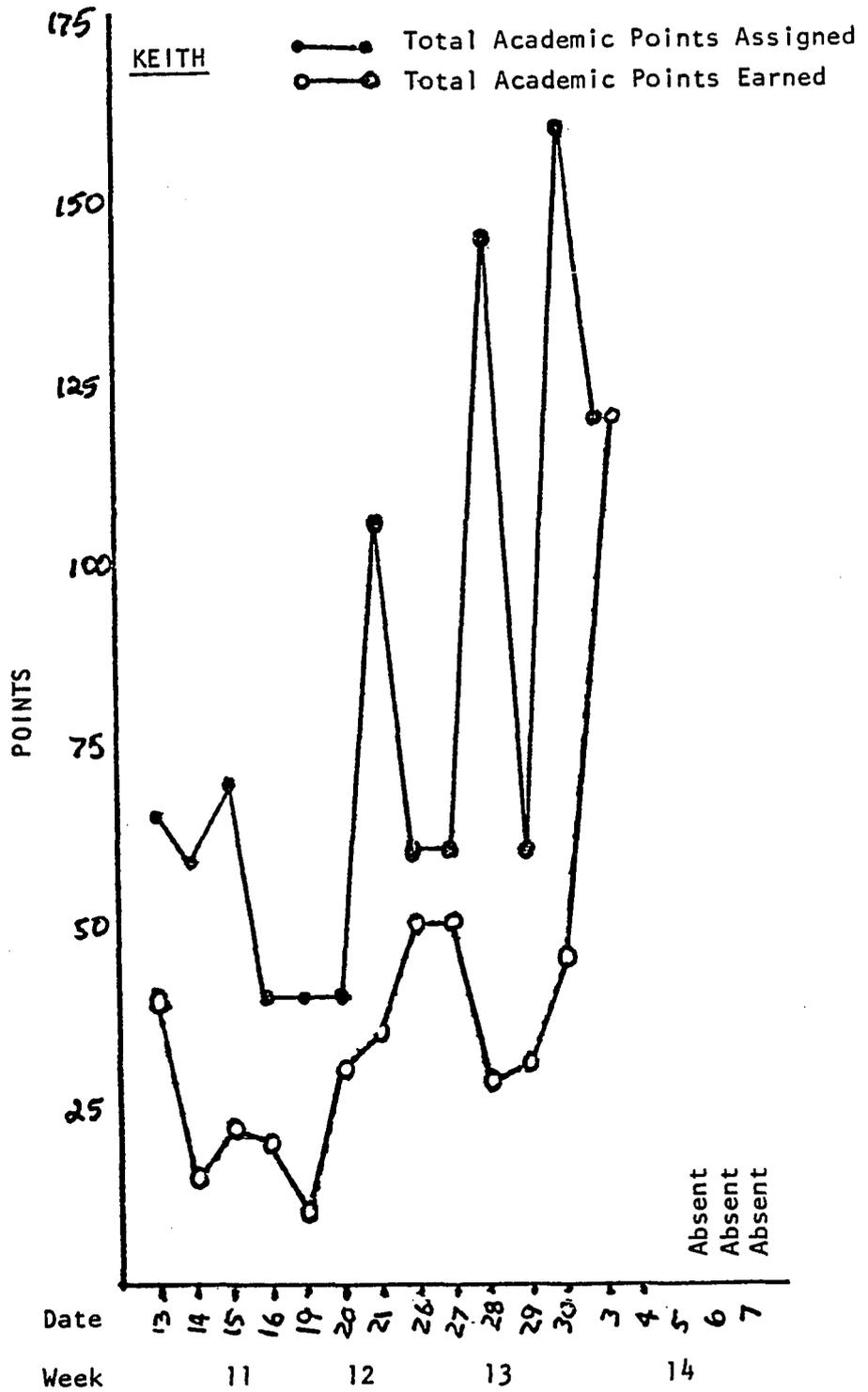


Fig. 16. Continued. Student Academic Performance: Academic Points Assigned and Academic Points Earned.

(c) Keith.

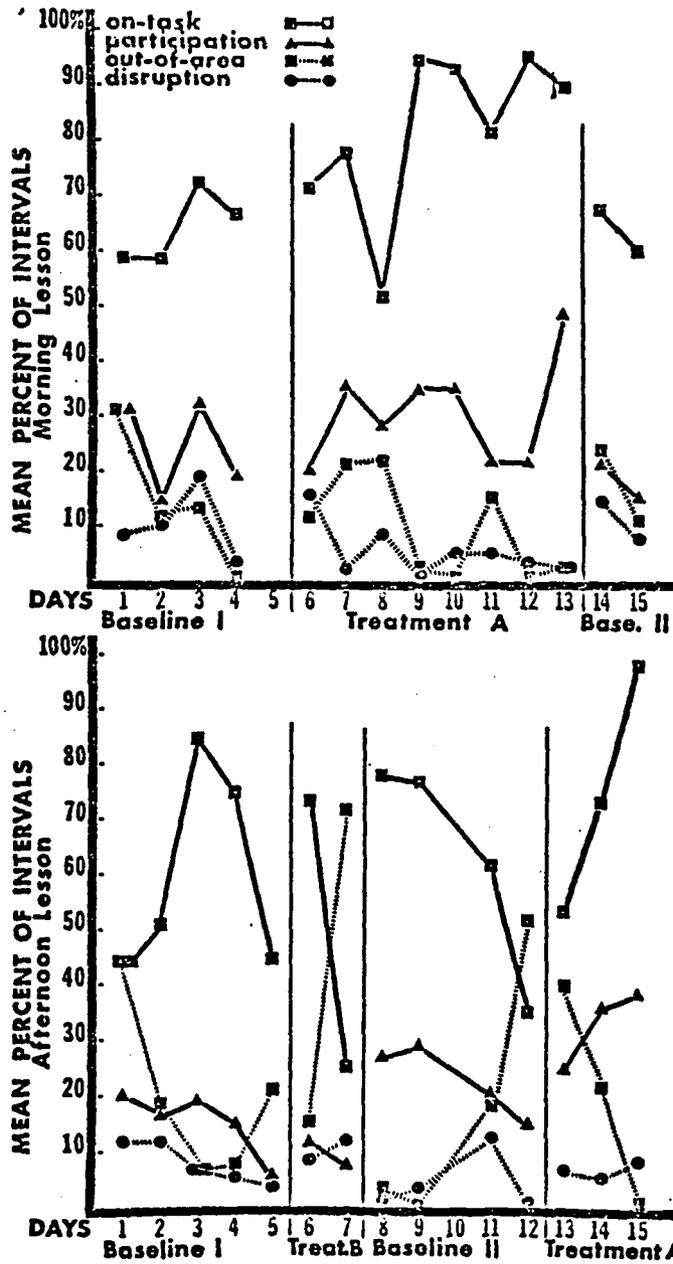


Fig. 17. Appropriate and Inappropriate Behavior during Morning and Afternoon Group Lessons.

the top graph and data for the afternoon lessons are shown in the bottom graph.

Baseline data collection began on the day following Thanksgiving vacation and was continued for four days in the morning and five days in the afternoon. These data show moderate improvement in classroom deportment, less disruption, and a substantial decrease in percent of time out-of-area in both lesson periods as individually contingent social and token reinforcement was applied by the teachers. There was only slight improvement, however, in time-on-task in the morning and erratic time-on-task in the afternoon. Both lessons had similar mean baseline levels of time-on-task (64% and 60% respectively). Participation did not improve during baseline and, in fact, deteriorated during the afternoon lesson.

Group contingent reinforcement for participation (Treatment A), introduced on Day 6 in the morning lesson, led to an increase in participation from a mean of 24% during baseline to a mean of 31% over an eight day period. The final day (Day 13) showed the students participating in nearly half (48%) of all intervals observed. Mean time-on-task also improved ($\bar{X} = 82\%$) with the last five days stabilizing around 90% time-on-task. The data from the morning lesson show a corresponding decrease in both categories of inappropriate behavior from Day 6 to Day 13. Mean disruption (5.5%) dropped to half its baseline average (11%) with final observations showing disruptive acts occurring in less than 3% of all intervals. Percent of time spent out-of-area declined steadily with four of the last five observations

at less than 3%. Day 8 was the only day that both teams did not exceed the criterion number of participatory responses. That morning session appeared to be influenced by the extreme disruption that occurred in the previous afternoon lesson.

Group contingent reinforcement for elimination of disruptive behaviors (Treatment B) was introduced in the afternoon lesson on Day 6. The first day of this contingency diminished inappropriate behaviors and led to moderate improvement in time-on-task in all but one student (S-2) who became so disruptive that he had to be removed from the classroom and whose team lost. When the contingencies were announced on the second day, all but two of the students (S-3 and one other) almost immediately began to disrupt and run out of the classroom. The data do not fully reflect the extremity of classroom disruption because data collection procedures precluded scoring disruption when the student was out of the observer's field of observation. The participatory responses and time-on-task seen on Day 7 in Figure 17 were contributed almost entirely by S-3 who was one of the two students who remained in the classroom on that day.

Treatment B was abandoned and the afternoon lesson returned to baseline conditions on Day 8. This return to individually contingent reinforcement in the afternoon lesson brought both time-on-task and participatory responses back to levels higher than Baseline 1. However, over four days these behaviors returned to near baseline level. Mean participation (23%) remained somewhat greater than Baseline 1 (16%). All inappropriate behaviors returned to near Baseline 1 levels

except on Day 12 in which the aide gave the lesson and elicited a higher rate of out-of-area behavior with concomitant reduction in time-on-task.

Group contingent reinforcement for participation (Treatment A), introduced in the afternoon lesson on Day 13 increased both time-on-task and participatory responses with the final day showing better than 96% average time-on-task and percent of intervals scored for participation (38%) exceeding all prior afternoon levels. Percent of time out-of-area was reduced to zero over the three days that the contingencies were in effect. Disruption remained at about 7% of intervals.

Return to individually contingent reinforcement (Baseline 2) on Day 14 in the morning lesson led to a return to Baseline 1 levels for time-on-task (64%), frequency of participatory responses (19%), and number of disruptive behaviors (11%). Some caution must be used in interpreting these data due to confounding variables (aide gave one lesson) and few data points. Table 5 summarizes the mean percent of intervals scored for appropriate and inappropriate behaviors during each treatment condition in the morning and afternoon lessons.

The effectiveness of the treatment conditions and reversals are further illustrated by the individual data for Subjects 1 and 2 who were chosen by the teacher as the two most disruptive students in the classroom. Figure 18 shows the percent of appropriate behaviors for each student during morning and afternoon lesson and Fig. 19 shows the percent of inappropriate behaviors for these students in both lesson periods.

Table 5. Mean Percent of Intervals Scored for Appropriate and Inappropriate Behaviors during Each Treatment Condition in Morning and Afternoon Lessons.

Behaviors		MORNING LESSON			AFTERNOON LESSON			
		Baseline I	Treatment A	Baseline II	Baseline I	Treatment B	Baseline II	Treatment A
Appropriate	On-task	64	82	64	60	49	63	75
	Participation	24	31	19	16	10	23	33
Inappropriate	Out-of-area	14	9	17	19.5	44	18.5	21
	Disruptive	11	5.5	11	8	10	4	7

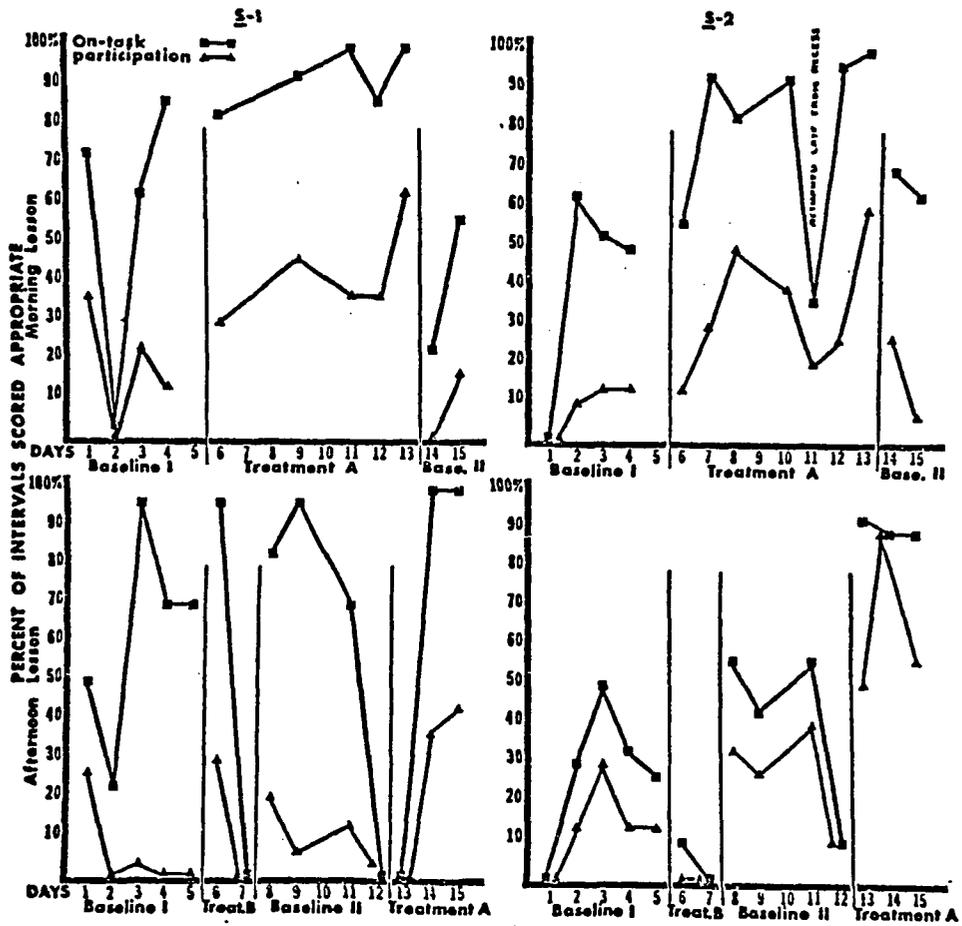


Fig. 18. Percent of Intervals Scored for Appropriate Behavior (Subjects 1 and 2).

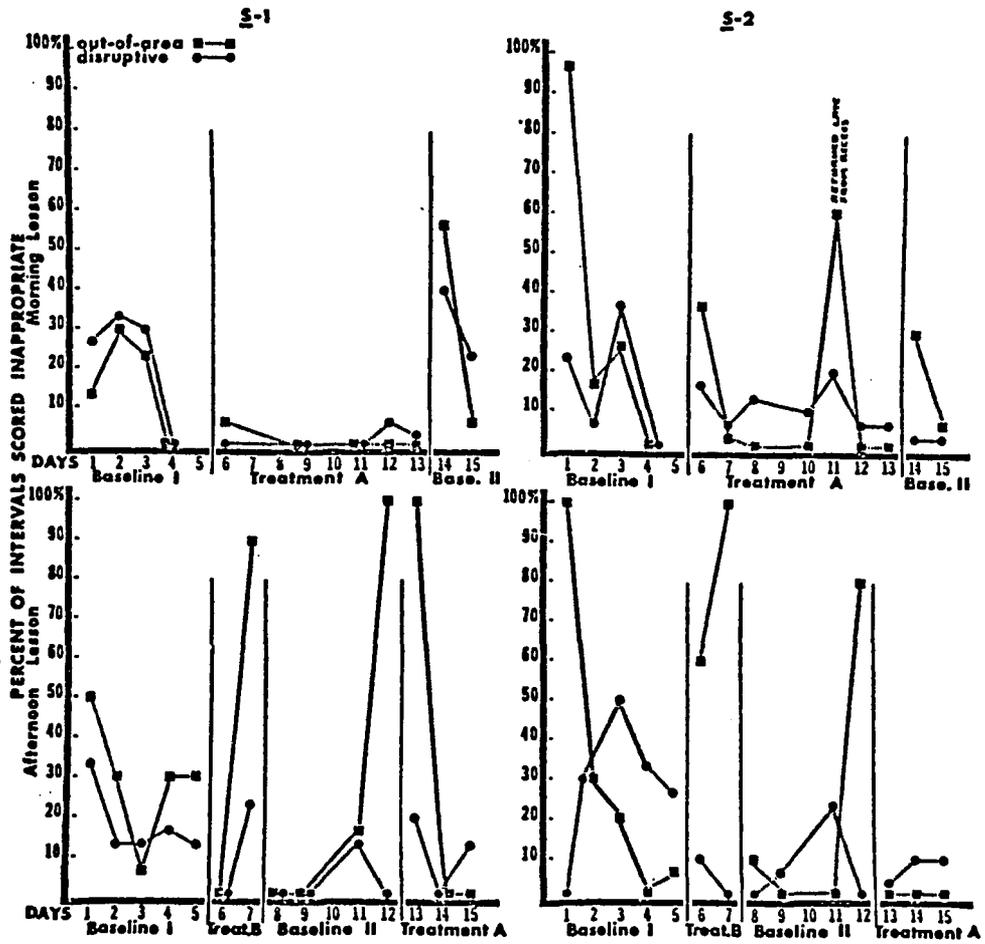


Fig. 19. Percent of Intervals Scored for Inappropriate Behavior (Subjects 1 and 2).

Objective measures of teacher verbal attention showed that the percentage of verbal praise remained constant across treatment conditions and that rather minor fluctuations in frequency were not related specifically to the treatment conditions but to the number of students present in the classroom.

Measures of peer verbal interaction should optimally reflect changes brought about by the type of group contingencies in effect, especially possible increases in use of aversive control. Due to inadequacies of the behavioral definitions used for observation, these data only reflect the treatment conditions to the extent that peer interaction increased with off-task behavior. Several effects of the treatment conditions can be reported anecdotally, however. The group contingent reinforcement for participation led to an increase in encouraging remarks from team mates. These comments, such as, "We can still win," "Let's keep going," "Let's play teams today" were either not directed specifically at the child being observed and thus not recorded, or were scored as unspecified verbal input since they did not fit the definitions for praise or reprimand. The group contingent reinforcement for elimination of disruptive behavior led to many disruptive remarks to the effect that they did not want to play if they were going to get marks against them.

CHAPTER 4

DISCUSSION

This paper describes events and presents data that were generated as a result of the application of behavior analysis technology to a rather severe set of educational problems. The consultation team was invited into the institution in an atmosphere of crisis and responded accordingly. The consultation activities involved research because the use of an empirically developed data base is at the very heart of applied behavior analysis as a problem solving strategy. The crisis atmosphere structured the activities of the consultants and the kinds of data that were collected. For example, the token economy and the teacher coaching were initiated simultaneously and without a prior period of refined objective observations. Such data would have provided a baseline against which immediate effects of the treatments could have been compared, but it must be remembered that data are not collected as an empty ritual or to demonstrate the obvious. In this case the classroom was "out of control" and the situation was desperate when the consultation began. To require that these circumstances continue so that the consultant could demonstrate the obvious effects of the obviously needed interventions would have taxed the teacher, the aide, and the administration far beyond their tolerances. Much as a doctor first applies a

tourniquet to stop the bleeding of an accident victim, so the consultant took immediate action in the classroom.

To follow this simple analogy further, once the victim's immediate death is averted by an obvious intervention, the business of monitoring his progress with other more sophisticated interventions may begin. This monitoring requires staff and instrumentation which is not readily available at the accident scene. Such was the case in this classroom consultation. The consultant took emergency action to stabilize the situation and then began to set into operation the mechanisms for more extensive monitoring. Furthermore, it must be noted that the observation team (comprised of University students) did not arrive fully trained or with all the necessary measurement instruments pre-designed and ready to use. Thus, we see that, although intervention in the form of establishment of a token economy and teacher coaching began about the middle of October, it was not until the first of November that systematic observation began to produce data on teacher and aide behavior and concomittant changes in student disruptive behavior. As progress was made in attaining immediately needed classroom changes, other goals were set and appropriate monitoring procedures implemented.

The data presented here describe effects of five different intervention strategies (techniques of consultation) on a number of teacher and student behaviors. These consultation strategies included: (1) two periods of teacher coaching; (2) establishment of an unspecified token economy, specification of that economy, and manipulations of costs and values within that economy, (3) curriculum

changes (i.e., addition of new tasks, materials, etc.); (4) record keeping and observational data collection for data feedback to the teachers; (5) group contingent reinforcement in a game format which reinforced either participatory behaviors or elimination of disruptive behaviors. The dependent measures were: (1) teacher attention to appropriate and inappropriate student behaviors; (2) teacher curriculum management; (3) teacher token economy management; (4) student academic performance. Data within several of these major areas have been differentiated into subcategories for a more refined analysis. These data will be discussed under four headings: (1) token economy management; (2) teacher attention and student deportment; (3) curriculum management and student academic performance; and (4) group contingency games.

Token Economy Management

The records of number of points dispensed to each of the students begins on October 15, one week after establishment of the first crude "candy bar system" (the emergency token economy). Within that first week extensive efforts were made to change the payoffs as quickly as possible from frequent, immediate, edible rewards to less frequent, delayed, activity payoffs requiring a greater number of points. Simultaneous action was taken to set up a system so that the teacher could record the number of points dispensed without undue burden. It must be remembered that in a consultation of this nature many of the niceties of research, such as extensive records, are a

practical impossibility until adequate simple record keeping systems can be devised and the frequency of inappropriate (disruptive) student behaviors reduced so that the teacher has the available time to keep such records.

By way of introduction, five important characteristics of a token economy have been noted: (1) tokens as generalized secondary reinforcers; (2) the token system as structured environment providing clear stimuli and feedback for student behavior; (3) the token system as structured activity for the teacher requiring specification of goals, defined responses to targeted student behaviors, and restructuring of student-teacher interaction patterns; (4) the token system with attendant management of required payoff activities as media for enrichment of educational experiences; and (5) the token system with appropriate record keeping as a diagnostic tool which allows assessment of ongoing student and teacher behaviors in relation to the system. It is this last point that will be discussed in some detail as it pertains to the data generated in this study.

The use of a token economy (and the data that it readily produces) as a diagnostic tool is an application of feedback technology needed for application of the research process (Tharp and Wetzel, 1969). For our consultation, this feedback began to come in on the fifteenth of October (Fig. 5, p. 53). We can see by looking at the mean data that there was a decline in points dispensed through that week. Examination of individual point charts indicate which students were prime contributors to this mean point reduction. There are

several plausible explanations for these findings. The students might have been satiating on the available payoffs; the process of thinning the payoff schedules might have been progressing too rapidly; the amount of delay between point earning and payoff may have been increased too rapidly; or, other factors outside the token system may have been militating against the token system's effectiveness in controlling behavior. The point of the feedback technology is not necessarily to immediately pinpoint "cause" but to provide a measure of events over time and let the decision makers know that changes are occurring and what direction the change is taking.

In a strict research environment one variable may be changed at a time with close scrutiny of the feedback in the hopes of isolating the most important factor. In an applied setting with goals of a broader nature, the results are more important than simple variable isolation. Thus, the token system was redesigned on the nineteenth of October with a number of minor modifications aimed at the factors mentioned above. The teacher was also given suggestions about how to reduce the deleterious effects of extra-token system influences which would reduce its overall effectiveness. More importantly, the individual data on tokens earned was used to point out differences among students and trends for individuals which the mean data obscure. For example, data for Keith (Fig. 16) show him earning from 80 to 150 points per day with the mean for the week being about 115. Duane (Fig. 6) showed an almost identical earning pattern but with a range from 53 to 94 and a mean of about 70. These discrepancies were

pointed out to the teachers for several reasons. First, the discrepancies might indicate recurrent overlooking of Duane's performance. That being the case, the inequity would need to be rectified. Secondly, the low point earner might need additional prompting, cueing, and social reinforcement in order to bring his performance more in line with his peers. Thirdly, the token system would have to be carefully examined so that rewards remained available to the low point earner and thus prevent extinction of appropriate behavior while some rewards remained expensive enough to continue to motivate the high point earner. Finally, the difficulty of tasks assigned to the high point earner might be gradually increased while those for the low point earner lessened slightly to insure maximal performance.

The mean data on token point earnings (Fig. 5) present an inconclusive, but certainly suggestive, picture throughout the last 36 days of the consultation. After the first token system redesign, mean earnings leveled off at just better than 100 points for the first week and then plunged to a mean of 63 in the week ending on November 2. Examination of teacher attention data (Figs. 7 and 8) shows low frequencies to attention to appropriate behavior and, on the first of November, attention to inappropriate behavior exceeding attention to appropriate behavior. These data would certainly indicate that teacher attention was at cross purposes to the token system at that time. The following four weeks show a recurring trend in mean points earned which confirmed the teacher's subjective reports of loss of control after each weekend. Interestingly enough, the high and low points in

mean earnings closely coincide with the high and low points of teacher attention to appropriate behavior during those weeks. Finally, the data from the last two weeks indicate mean point earnings (excluding group contingent points) appreciably increased while the group contingency games were being applied to the group lesson settings. These data further augment data on teacher attention to disruptive student behaviors, data on frequencies of student disruptive behaviors, and data on occurrences of participatory behaviors among a selected sample of the students as multiple indices of the beneficial effects of the group contingency games to be discussed later in this report.

Teacher Attention and Student Deportment

The data presented on teacher and aide attention to student appropriate and inappropriate behavior during two classroom settings (Group and Individual Lesson times) show relatively stable frequencies of both teacher and student behavior during the first two weeks of November (12 observations of the teacher, 10 observations of the aide). Recall that this is the situation beginning after the first two weeks of token economy management with an introductory three days of intensive teacher coaching from the consultant. Although attention to inappropriate student behavior was generally maintained at a fairly low frequency, the difference between frequency of attention to appropriate and inappropriate behaviors was not great and, on three instances, the teacher attended to more inappropriate than appropriate behavior. It might be asked whether this attention to inappropriate

behavior was a function of greater frequency of "bad" behavior on those days. Examination of the summed data for inappropriate behaviors shows that this is not the case for the aide's attending behavior. However, on at least two of the occasions in which the teacher attended to more "bad" than "good" behavior, there were contiguous high frequencies of "bad" behavior. Which was the "cause" of which is, of course, a moot question. Both of these occasions were during the Group Lesson time in which the data shows the aide to be less active on both measures.

Further examination of summed inappropriate behavior shows that on the first occasion Disruptive Motor behavior (the most severe form of disruption) was high and on the second occasion, Speaking-out was extremely high. This analysis could be carried further through available data on individual students to discover the primary "culprits" who were acting up and gaining so much of the teacher's attention, but that was not the primary concern of the consultant. The major issue at that point was to increase the teacher and aide's attention to "Good" behavior and decrease attention to "bad" behavior regardless of the vagaries of the students' day-to-day deportment. That is, the teachers' attention to the student behavior needed to come under the control of "good" student behavior, and that change was the goal of the next consultation activity.

The observational data gathered during the first two weeks of November provided the content for a feedback session with the teacher and aide (described earlier). The results (Figs. 7 and 8) illustrate

the effects of this strategy. The six observations over the following five days show a fairly strong and immediate increase in attention to appropriate student behavior with a concomitant decrease in attending to inappropriate behavior. However, this effect was a rapidly deteriorating one for attention to appropriate behavior. The data indicate, however, that attention to inappropriate behavior was decreased and remained low throughout the remaining observations.

The data on student inappropriate behavior does not show the kinds of effects that were desired, that is, inappropriate behaviors remained at levels equal to or higher than before the intervention. Several explanations for these effects might be postulated. First, the intervention was what could be termed a "spiked" intervention, that is, it was a one-shot affair in which the teacher and aide saw an illustration of their past behaviors and received instructions on future behavior. These instructions and data on more recent behaviors were not repeatedly presented. Therefore, the instructed teacher behaviors became less frequent as the previously common teacher behaviors reappeared and increased in frequency in the presence of the former discriminative stimuli (student disruption). Second, the feedback session which included consultant attention to, and praise for, teacher attention to appropriate child behavior can be conceptualized as a functioning reinforcer for that set of teacher behaviors. The following period can then be seen as an extinction phase in which the teacher reverted to baseline levels of attention to appropriate behavior. Third, the differing effects of the intervention on teacher

attention to appropriate versus attention to inappropriate student behaviors can be examined in light of the teacher discriminations required. It might be supposed that the teacher's ability to discriminate "bad" behavior would differ from the ability to discriminate (and respond to) "good" behavior. "Bad" behavior is usually salient in the classroom because it is aversive to the teacher and others. "Bad" behavior is often "bad" because of its very amplitude. "Good" classroom behavior, on the other hand, is often quiet and unobtrusive. Also, "good" behaviors were relatively less frequent for this group of children and did not appear very often in a fully developed form. "Good" behavior had to be recognized as first meager approximations. Finally, the two classes of teacher attending behaviors have very different topographies. Ignoring "bad" behavior (decreasing attention) is a passive act. Attending to "good" behaviors must always be an active behavior. It requires much energy to seek out fleeting approximations to desired student responses, praise them, and attempt to elaborate them through instruction and management of environmental setting events.

The next intervention was an attempt to remedy these problems. As noted earlier, the child inappropriate behaviors had not decreased appreciably in the five days of observation following the feedback session. In addition, Thanksgiving Vacation fell at the end of this period. On the Monday following the vacation, child inappropriate behavior was at a high frequency, especially Speaking-out. At this point the consultant began to coach the teachers during Individual

Work time (described in Procedures). Although coaching did not continue during Group Lesson, the consultant was observing and collecting data as a baseline for the next phase of intervention. It was felt that his presence would cue the teachers in the transfer of learning from one setting to the other. The coaching procedures offer some remedy to the problems mentioned above in relation to the "spiked" intervention. The consultant coached for two days, thus making the intervention more "continuous" than "spiked." The consultant continually prompted, cued, and modeled the desired teacher attending behaviors and smiled at, praised, and otherwise socially reinforced the desired teacher behaviors. Approximations to appropriate child behaviors were pointed out and the teacher encouraged to elaborate on every instance observed. Finally, the teacher and aide got continuous and immediate feedback for performance during this phase of teacher training.

The data on teacher attention and child behavior (Figs. 7, 8, and 9) show the effects of this treatment over the following five days. The five data points from Group Lesson settings show an inverted-U form for teacher attention to appropriate behaviors, teacher attention to inappropriate behaviors, and student disruptive behavior. The data from Individual Work settings, although limited, indicate a moderate increase in teacher attention to appropriate behavior with attention to inappropriate behavior remaining fairly low. Child inappropriate behavior shows a substantial mean decrease in both settings, although it is variable from day to day. It is interesting to note that the

prime contributor to total inappropriate behavior in both settings was Speaking-out (Fig. 10). During Individual Work settings, Motor-disruption dropped nearly to zero suggesting that the effect of the treatment might have been to reduce the severity of the inappropriate behaviors rather than frequency of inappropriate behaviors. These data demonstrate the importance of collecting multiple measures, not only on outcome variables, but also on treatment variables. Although the consultant observing the classroom could readily see the effects of the teacher coaching strategy, the summed frequencies of all inappropriate student behaviors do not reflect these changes.

The group contingency experiment was the final consulting activity in this classroom. Frequency data on teacher and student behaviors were collected throughout this experimental manipulation and provide additional information on the effects of the experiment. The data (Figs. 7, 8, and 9) show greatly increased teacher attention to appropriate behavior, slight decrease in already low frequency of attention to inappropriate behavior, and most importantly, a reduction and stabilization of student disruptive behaviors. What might account for these robust effects? Obviously, the research does not allow an unobscured answer because this intervention ended the consultant's contact with the classroom. In order to present such a picture we would have had to return to baseline conditions and then reinstate the group contingency games in an effort to replicate the results of its first application.

Assuming that the game introduction was the functional operation for the results obtained, what might account for its apparent strength? There are several factors which might have contributed. First, the principle investigator (the consultant) arrived to watch the Group Lessons twice a day, once in the morning and once in the afternoon. It might be supposed that his presence and general concern for the teachers' and students' behaviors served as a stimulus for redoubled efforts by the teachers. This supposition can be discredited to some degree when we recall that the previous intervention, coaching, had begun at the same time that the consultant began to take baseline data for the group contingency games intervention. Although there were effects in the desired direction, there was nothing to compare with the changes after the games began in Group Lesson. More likely, the explanation lies in the effectiveness of the group contingent reinforcement and the game format in decreasing inappropriate behavior and increasing appropriate behavior during Group Lesson. An examination of student inappropriate behavior (Fig. 9) shows that the frequency of disruptions were consistently higher during Group Lesson than during Individual Work time for the total time leading up to introduction of the group contingency games. Examination of single subject data (Fig. 10) shows that for at least two subjects (Jay and Tony) the game format totally eliminated all forms of disruption except Speaking-out which, although still scored, changed from such behaviors as name calling and swearing to blurting out the answer to a teacher's question without waiting to be called upon (an approximation of a desired behavior). The group contingent reinforcement in

this game format greatly increased student participation and provided ample opportunity for the teacher and aide to reinforce these appropriate behaviors. The most significant aspect of these results is the transfer to the nontreated Individual Work setting. These data are limited, however, and more research would be necessary to demonstrate clearly such generalized effects.

Curriculum Management and Student Academic Performance

The primary goal of most school classrooms is to train students in academic skills. On the other hand, most published reports on applied classroom behavior analysis have concentrated on deportment behaviors with little or no reference to treatment effects on academic performance. Ferritor et al. (1972) and Hamblin et al. (1971) have summarized these findings and have concluded that it may be erroneous to assume that decreases in student disruption will necessarily lead to concomitant improvements in academic performance. Indeed, these researchers conclude that the targeted behaviors, either deportment or academic, which lead to contingent reinforcement are likely to improve, but the improvements do not generalize to nontreated behaviors.

The techniques described here involved attempts to improve both deportment and academic performance by means of token reinforcement and social reinforcement for both classes of behavior. The token system and its accompanying records provided a number of academic performance measures, curriculum management measures, and the means to manipulate performance within the curriculum. First, the token system can be

(and should be) the vehicle for enrichment of the educational curriculum in the classroom by providing payoff activities which are both attractive to the students (reinforcing for other, less attractive, behaviors) and, at the same time, educational experiences in themselves (e.g., cooking, field trips, presenting class plays, etc.). Second, the records of token earnings through academic performance provides a diagnostic monitoring system through which the teachers can monitor their own curriculum management (assignments made) as well as gauge student academic performance as reflected in their token earnings. Furthermore, these data allow the teacher to individualize instruction by adjusting number and type of academic assignments made (Figs. 11, 12, 13, and 16). Third, the token system allows the teacher to adjust "values" of various classes of academic work so that a student who is especially lacking in a certain curriculum area will be more motivated to complete assignments in that area (Figs. 11, 12, and 13).

Data have also been presented here on the number of work sheets completed (Figs. 14 and 15). The data show that work sheet production generally improved during the course of this consultation. This is the most common kind of data presented in published reports which measure academic performance. It must be remembered, however, that increased number of worksheets completed was not a primary goal of this intervention. In fact, much of the effort of the consultant was aimed at reducing the workbook oriented instruction in this classroom (e.g., addition of second group lesson, daily payoff activities). One of the major effects of records of worksheets assigned and worksheets

completed was to provide feedback on the discrepancy between the number of assignments made and the number of assignments completed. The data show that the teachers were able to reduce this discrepancy in most cases.

Group Contingency Games

The so-called "good behavior game" which has been used in several normal elementary school classrooms to eliminate disruptive behaviors might be more appropriately termed the "bad behavior game." Its rules state what bad behaviors not to perform. Feedback is given when bad behaviors occur, and bad behavior leads to loss of reinforcement. The "good behaviors" are those response options the children have to replace bad behaviors, and the research has not shown that performance or participation is improved except in limited instances (Harris and Sherman, 1973; Medland and Stachnik, 1972; Ferritor et al., 1972). A real "good behavior game" in which a group is reinforced for classroom appropriate behaviors or academic performance has had limited research application.

The group contingency games intervention reported here compared a "good behavior game" with a "bad behavior game" and compared both against an individually contingent reinforcement baseline. The group contingent reinforcement of appropriate classroom participation (Treatment A) fulfilled the requirements for a "good behavior game" in that the good behaviors required to gain reinforcement were defined, performance criteria set, feedback was given for performance of good behaviors, and reinforcement was received only for good behavior.

Bad behavior was not discussed, noted, attended to, or in any way reinforced by the game.

The good behavior game was more effective in increasing appropriate behavior and in eliminating inappropriate behavior than either the baseline token system or the bad behavior game. In fact, the bad behavior game led to an unacceptable increase in bad behaviors and had to be abandoned.

It might be asked why these findings, especially the failure of the group contingencies for the elimination of disruptive behavior, differ from previous so-called good behavior games," studies which have been very effective in reducing disruption (Barrish, Saunders, and Wolf, 1969; Harris and Sherman, 1973; Medland and Stachnik, 1972). Part of the answer might lie in the different response repertoires of the subject populations. Previous applications of the so-called "good behavior game" have dealt with "normal" children, who, it might be assumed, would be better able than "disturbed" children to inhibit inappropriate behavior under inhibition contingencies and to possess alternative appropriate repertoires. Each of the previous studies has noted a small percentage of children whose disruptive behaviors seemed to be enhanced by the attention (behavior being noted, attempts to control by peers) that they received for disruptive behavior. The children in this study may have all been very similar to that small percentage reported in prior studies. Also, different response alternatives are offered under the different group contingencies. The so-called "good behavior game" asks that the child desist in some active inappropriate behavior (disruption) and engage in an appropriate

passive behavior (on-task, attending). The real "good behavior game" which reinforces participation offers the child active appropriate responses which are incompatible with a major percentage of inappropriate classroom behaviors.

It was hoped that objective measures of peer attention would demonstrate treatment effects on types of peer control generated by the different group contingencies. This was not the case, however, because the operational definitions used in peer attention measures were insensitive to the peer interaction changes that were effected. The measures that were taken were more indicative of the level of off-task behavior which varies with the treatment conditions. Peer interactions were observed to change with treatment condition to the extent that reinforcement for participation (the real good behavior game) increased the frequency of encouraging remarks made to team members. The students also made positive comments about team rewards for participation and negative comments about penalties for disruption, although quantitative data are not available to verify these observations.

It would appear that teacher attention or praise was not responsible for the differences in student behaviors between the treatment phases of the group contingency games study. The interval data on the subject sample for the study show teacher attention varying little across treatment conditions. The supplemental data on teacher attention collected during Group Lesson and Individual Work time, however, indicates that, indeed, teacher attention to appropriate behavior generally increased for the whole period of the study.

Although group contingent reinforcement has been shown to be very effective in the elimination of undesirable behaviors, inhibition of inappropriate behaviors is not necessarily beneficial or desirable unless some other more functional and appropriate repertoires are developed as a result. The data from this study suggest that, with some populations, the application of group contingencies for the elimination of disruptive behavior may not be successful and, indeed, may increase disruption. Therefore, there is a need for more extensive study of group reinforcement procedures to improve academic performance and classroom participation. Equally important is the further development and use of techniques to assess peer interactions which are elicited by such group contingencies.

Conclusions

This report suggests several important directions for applied behavior analysis in the classroom. It suggests the need for reawakened interest in descriptive field studies in educational environments. It proposes careful examination of token economies as a means of changing behaviors and individualizing curriculum in the classroom. It emphasizes the importance of the dissemination of the process of inquiry as well as the principles of behavior change. Finally, it leaves us with some immediate directions for future research.

Field descriptive studies that produce frequency of occurrence data from educational settings will provide operational definitions of new and important behaviors in a broad range of environments. Descriptive studies will also develop the technology for measurement

required for later experimental studies of these behaviors. The ecological view emphasized in descriptive studies will supply clues to important relationships between variables which can then be experimentally investigated. For example, descriptive studies with both planned and unplanned interventions, although lacking experimental design for replication of functional relationships, may provide replication of research findings from other studies and thus increase our confidence in those findings.

The use and misuse of token economies needs careful examination. This report has provided a detailed description of a token economy in a special education classroom. The token economy has been discussed as a powerful change technique which, when properly operated, can be used to modify both teacher and student behavior in a variety of ways. However, the token system is no panacea for classroom problems. There are many subtle complexities which, if not attended to, can lead to the eventual failure of any token system. Just as we would hope that much of our behavior falls outside the control of the purely economic considerations of our national token system, the classroom teacher must aim for independence of student behaviors from externally applied token contingencies. That is, the desired behaviors should gain reinforcement in the natural environment such that they do not require maintenance through teacher controlled token system contingencies. In fact, an environment which does not support the desired student behaviors will probably eventually destroy any token system employed in that environment. Therefore, the use of a token economy should be seen as a remedial step which can be used to improve

behavior patterns and environmental situations which have heretofore prevented the development of important learning behaviors of students and teaching behaviors of teachers.

There is great need for the dissemination of the process of inquiry and the principles of behavior into applied educational settings. The world has many problems involving the realization of human potential and reduction of human suffering. These issues need to be addressed through techniques using empirically developed procedures. To delay in order to experimentally examine every possible variable may be to commit a greater disservice to society than to attempt some change now. If the process of inquiry is given as much emphasis in the dissemination as the basic principles, then there will be some insurance against making large errors because the technology for feedback will tell us what we are doing and how we are progressing toward our goals.

Finally, there are some immediate research needs implied by this report. The process of dissemination of the applied behavioral approach into educational settings must be experimentally examined. We know of a number of behavioral principles which, if practiced in the classroom, will improve the social and academic behaviors of students. The problems of moving this body of knowledge into the educational environment are sometimes immense. Behaviors of many people, often far removed from direct interaction with students, must be modified to support the principles applied in the classroom. For example, aversive control of staff behaviors is a common practice in large institutions and is in direct conflict with the use of many of

the principles of behavior which require positive reinforcement control. Additionally, as behavior change beyond the immediate classroom becomes more important, the search for effective reinforcers becomes more difficult and more critical to eventual success. Fortunately, applied behavior analysis in the classroom has given many suggestions for the process of changing the larger social environment. What is needed now is a greater effort to use those techniques to disseminate the practice.

In the past, applied behavior analysts have tended to concern themselves with relatively few behaviors and relatively simple interactions. In that way, important functional relationships have been demonstrated. Now it is time for researchers to move on to more complex problems. This report has described methods for generating objective data on a great many interrelated variables. Results of research on group contingencies using a fairly complex multiple-baseline design have been presented. Future research on other such complex relationships using multivariate measures and more sophisticated multiple-baseline designs will help to clarify many important questions for classroom education. For example, the types of peer social interactions (e.g., cooperation or competition) generated by various individual and group contingencies needs immediate research attention, but only because of their importance to the conduct of education, but because of the implications such research would have for the larger social context as well.

LIST OF REFERENCES

- Allen, K. E., B. Hart, J. S. Buell, F. R. Harris, and M. M. Wolf, "Effects of Social Reinforcement on Isolate Behavior of a Nursery School Child, *Child Development* 35, 511-518 (1964).
- Ayllon, T., and N. H. Azrin, *The Token Economy: A Motivational System for Therapy and Rehabilitation*, New York, Appleton-Century Crafts (1968).
- Bandura, A., *Principles of Behavior Modification*, New York, Holt (1969).
- Barrish, H. H., M. Saunders, and M. M. Wolf, "Good Behavior Game Effects of Individual Contingencies for Group Consequences on Disruptive Behavior in a Classroom," *JABA* 2, 119-124 (1969).
- Bijou, S. W., "What Psychology has to Offer Education--Now," *JABA* 3 65-71 (1970).
- Bijou, S. W., R. G. Peterson, and M. Ault, "A Method to Integrate Descriptive and Experimental Field Studies at the Level of Data and Empirical Concepts, *JABA*, 175-191 (1968).
- Broden, M., M. Bruce, M. Mitchell, V. Carter, and R. O. Hall, "Effects of Teacher Attention on Attending Behavior of Two Boys at Adjacent Desks," *JABA* 3, 199-203 (1970).
- Broden, M., R. O. Hall, A. Dunlap, and R. Clark, "Effects of Teacher Attention and a Token Reinforcement System in a Junior High School Special Education Class," *Exceptional Children* 36, 341-349 (1970).
- Buell, J., P. Stoddard, F. Harris, and D. M. Baer, "Collateral Social Development Accompanying Reinforcement of Outdoor Play in a Preschool Child," *JABA* 1, 167-173 (1968).
- Bushnell, D., P. A. Wrobel, and M. L. Michaelis, "Applying 'group' Contingencies to the Classroom Study Behavior of Preschool Children," *JABA* 1, 55-61 (1968).
- Coleman, R., "A Conditioning Technique Applicable to Elementary School Classrooms," *JABA* 3, 293-297 (1970).
- Cossairt, A., R. V. Hall, and B. L. Hopkins, "The Effects of Experimenter's Instructions, Feedback, and Praise on Teacher Praise and Student Attending Behavior, *JABA* 6, 89-100 (1973).

- de Bono, E., Lateral Thinking: Creativity Step by Step, New York, Harper and Row (1970).
- Ferritor, D. F., D. Buckholdt, R. L. Hamblin, and L. Smith, "The Non-effects of Contingent Reinforcement for Attending Behavior on Work Accomplished," JABA 5, 7-17 (1972).
- Hall, R. V., and M. Broden, "Behavior Changes in Brain-injured Children through Social Reinforcement," Journal of Experimental Child Psychology 5, 463-479 (1967).
- Hall, R. V., and R. E. Copeland, "The Responsive Teaching Model: A First Step in Shaping School Personnel as Behavior Modification Specialists." Paper presented at the Third Banff International Conference on Behavior Modification, Calgary, Alberta, April (1971).
- Hall, R. V., C. Cristler, S. Cranston, and B. Tucker, "Teachers and Parents as Researchers Using Multiple Baseline Designs," JABA 3, 247-255 (1970).
- Hall, R. V., R. Fox, D. Willard, L. Goldsmith, M. Emerson, W. Owen, F. Davis, and E. Porcia, "The Teachers as Observer and Experimenter in the Modification of Disrupting and Talking-out Behaviors," JABA 4, 141-149 (1971).
- Hall, R. V., D. Lund, and D. Jackson, "Effects of Teacher Attention on Study Behavior," JABA 1, 1-12 (1968).
- Hall, R., M. Panyan, D. Rabon, and M. Broden, "Instructing Beginning Teachers in Reinforcement Procedures which Improve Classroom Control," JABA 1, 315-322 (1968).
- Hamblin, R. L., C. Hathaway, and J. Wodarski, "Group Contingencies, Peer Tutoring and Accelerating Academic Achievement," A New Direction for Education Behavior Analysis, Lawrence, University of Kansas Press, 41-53 (1971).
- Harris, F. R., M. K. Johnston, C. S. Kelly, and M. M. Wolf, "Effects of Positive Social Reinforcement on Regressed Crawling of a Nursery School Child," Journal of Educational Psychology 55, 35-41 (1964).
- Harris, V. W., and J. A. Sherman, "Use and Analysis of the 'good behavior game' to Reduce Disruptive Classroom Behavior," JABA 6, 405-417 (1973).
- Hart, B. M., K. E. Allen, J. S. Buell, F. R. Harris, and M. M. Wolf, "Effects of Social Reinforcement on Operant Crying," Journal of Experimental Child Psychology 1, 145-153 (1964).

- Herman, S. H., and J. Tramontana, "Instructions and Group versus Individual Reinforcement in Modifying Disruptive Group Behavior," *JABA* 4, 113-119 (1971).
- Kazdin, A. E., "The Effect of Vicarious Reinforcement on Attentive Behavior in the Classroom," *JABA* 6, 71-78 (1973).
- Kazdin, A. E., and R. R. Bootzin, "The Token Economy: An Evaluative Review," *JABA* 5, 343-372 (1972).
- Kazdin, A. E., and E. D. Craighead, "Behavior Modification in Special Education," in L. Mann and D. A. Sabatino (Eds.) The First Review of Special Education, Philadelphia, PA, Buttonwood Farms (1973).
- Kazdin, A. E., and J. Klock, "The Effect of Nonverbal Teachers Approval on Student Attentive Behavior," *JABA* 6, 643-654 (1973).
- Long, J. D., and R. L. Williams, "The Comparative Effectiveness of Group and Individually Contingent Free Time with Inner-city Junior High School Students," *JABA* 6, 465-474 (1973).
- Madsen, C. H., W. C. Becker, and D. R. Thomas, "Rules, Praise and Ignoring: Elements of Elementary Classroom Control," *JABA* 1, 139-150 (1968).
- Mandelker, A. V., T. A. Brigham, and D. Bushell, "The Effects of Token Procedures on a Teacher's Social Contacts with her Students," *JABA* 3, 169-174 (1970).
- McAllister, L. W., J. G. Stachowiak, D. M. Baer, and L. Conderman, "The Application of Operant Conditioning Techniques in a Secondary School Classroom," *JABA* 2, 277-285 (1969).
- McNamara, J. R., "Teacher and Students as a Source for Behavior Modification in the Classroom," *Behavior Therapy* 2, 205-213 (1971).
- Medland, M. B., and T. J. Stachnik, "Good-behavior Game: A replication and Systematic Analysis," *JABA* 5, 45-51 (1972).
- O'Leary, K. D., Establishing Token Programs in Schools: Issues and Problems. Unpublished Paper presented at American Psychological Association, Washington, D. C., August (1969).
- O'Leary, K. D., and W. C. Becker, "Behavior Modification of an Adjustment Class: A Token Reinforcement Program," *Exceptional Children* 9, 637-642 (1967).
- O'Leary, K. D., W. C. Becker, M. B. Evans, and R. A. Sandargas, "A Token Reinforcement Program in a Public School. A Replication and Systematic Analysis," *JABA* 2, 3-13 (1969).

- O'Leary, K. D., and R. S. Drabman, "Token Reinforcement Programs in the Classroom: A Review," Psychological Bulletin 75, 379-398 (1971).
- Panyan, M., H. Boozer, and N. Morris, "Feedback to Attendants as a Reinforcer for Applying Operant Techniques," JABA 3, 1-4 (1970).
- Patterson, G. R., "A Learning Theory Approach to the Treatment of the School Phobic Child," in L. P. Ullmann and L. Krasner (Eds.) Case Studies in Behavior Modification, New York, Holt (1965).
- Pinkston, E. M., N. M. Reese, J. M. LeBlanc, and D. M. Baer, "Independent Control of a Preschool Child's Aggressions and Peer Interactions by Contingent Teacher Attention," JABA 6, 115-124 (1973).
- Repucci, N. D., and J. T. Saunders, "Social Psychology of Behavior Modification: Problems of Implementation in Natural Settings," American Psychologist 29 (1974).
- Reynolds, G. S., A Primer of Operant Conditioning, Glenview, Illinois, Scott, Foresman (1968).
- Ringer, V. M. J., "The Use of a 'Token Helper' in the Management of Classroom Behavior Problems and in Teacher Training," JABA 6, 691-677 (1973).
- Sajway, T., S. Twadosz, and M. Burke, "Side Effects of Extinction Procedures in a Remedial Preschool," JABA 5, 163-175 (1972).
- Sandargas, R. A., "Setting Criterion Rates of Teacher Praise. The Effects of Video Tape Feedback in a Behavior Analysis Follow Through Classroom," in G. Semb (Ed.) Behavior Analysis and Education, Lawrence: University of Kansas, 253-261 (1972).
- Sidman, M., Tactics of Scientific Research, New York, Basic Books (1960).
- Skinner, B. F., The Technology of Teaching, New York, Appleton-Century-Crafts (1968).
- Solomon, R. W., and R. G. Wahler, "Peer Reinforcement Control of Classroom Problem Behavior," JABA 6, 49-56 (1973).
- Staats, A. W., Learning, Language, and Cognition, New York, Holt (1968).
- Tharp, R. G., and R. J. Wetzel, Behavior Modification in the Natural Environment, New York, Academic Press (1969).
- Thomas, D. R., "Preliminary Findings on Self-Monitoring for Modifying Teacher Behaviors," in E. Ramp and B. Hopkins (Eds.) A New Direction for Education: Behavior Analysis, Lawrence: University of Kansas 1, 102-114 (1971).

- Thomas, D. R., W. C. Becker, and M. Armstrong, "Production and Elimination of Disruptive Classroom Behavior by Systematically Varying Teacher's Behavior," JABA 1, 35-45 (1968).
- Walker, H. M., and N. K. Buckley, "The Use of Positive Reinforcement in Conditioning Attending Behavior," JABA 1, 245-250 (1968).
- Walker, H. M., and N. K. Buckley, "Programming Generalization and Maintenance of Treatment Effects Across Time and Across Settings," JABA 5, 209-224 (1972).
- Wetzel, R. J., "The Effects of Research on the Practice of Social Change," Ontario Psychologist 7 (1), 85-94 (1975).
- Wetzel, R. J., and J. R. Patterson, "Technical Developments in Classroom Behavior Analysis," in B. C. Etzel, J. M. LeBlanc, and D. M. Baer (Eds.) New Developments in Behavioral Research: Theory, Methods, and Applications. In Honor of Sidney W. Bijou, Hinsdale, New Jersey, Lawrence Erlbaum Associates (in press).
- Willems, E. P., Behavioral Technology and Behavioral Ecology, JABA 7 151-166 (1974).
- Wodarski, J. S., R. L. Hamblin, D. R. Buckholdt, and D. E. Ferritor, "The Effects of Low Performance Group and Individual Contingencies on Cooperative Behaviors Exhibited by Fifth Graders," Psychological Record 22, 359-368 (1972).
- Wolf, M. M., "Reviewers Comments on Kazdin's Methodological and Assessment Considerations in Evaluating Reinforcement Programs," Journal of Applied Behavior Analysis 6, 517-531 (1973).
- Wolf, M. M., D. K. Giles, and R. V. Hall, "Experiments with Token Reinforcement in a Remedial Classroom," Behavior Research and Therapy 6, 51-64 (1968).
- Zimmerman, E. H., and J. Zimmerman, "The Alteration of Behavior in a Special Classroom Situation," Journal of Experimental Analysis of Behavior 5, 59-60 (1962).