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Parent influence on academic achievement: an idiographic study

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Parent influence on academic achievement:

An idiographic study

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CHAPTER I. INTRODUCTION

Sources of Variation in School Achievement

An inherent function of any formal educational endeavor is to influence the behavior of students. The nature of this influence may vary on a continuum from being very explicit, direct, and concrete (e.g., specific skill training) to being more implicit, indirect, and abstract (e.g., a program designed to broaden moral, ethical, and cultural perspectives) (Dewey, 1966). Traditionally, the primary source of this influencing process has been assumed by many to be the educational institution itself, particularly the classroom teacher. The assumption that the educational institution accounts for most of the observed variance in educational outcomes has a firm and logical, if not empirical, foundation. This assumption is partially exemplified in the plethora of literature and related intervention models devoted to improving educational institutions and their personnel (Alberto & Troutman, 1982; Anderson & Ball, 1978; Becker, 1971; Bergan, 1977; Ulrich, Stachnik & Mabry, 1974). An attempt to measure the degree of influence of schools on achievement was undertaken when the U.S. Office of Education commissioned a study entitled "Equality of Educational Opportunity," also called the Coleman Report (Coleman, Campbell, Hobson, McPurtland, Mood, Weinfeld & York, 1966). In general, the Coleman study investigated the effects of various factors on the academic achievement of some 645,000 children in grades 1, 3, 6, 9, and 12 in some 4,000 schools in all fifty states and the District of Columbia. In particular, the study was

concerned with identifying those factors that differentiated children on the basis of their academic achievement. Factors that were investigated comprised two general areas: school factors (e.g., number of textbooks, age of school buildings, average class size, teacher's education and background) and student background factors (e.g., parents' education, family size, reading material in the home, parental interest in education, and parental educational expectations).

Coleman et al. (1966) found that differences in school quality were not very closely related to differences in student achievement. Indeed, differences in student achievement from school to school seemed to be due more to differences in student parental family backgrounds than to differences in the quality of schools themselves. Coleman et al. (1966) concluded:

> Taking all these results together, one implication stands out above all: That schools bring little influence to bear on a child's achievement that is independent of his background and general social context; and that this very lack of an independent effect means that the inequalities imposed on children by their home, neighborhood, and peer environment are carried along to become the inequalities with which they confront adult life at the end of school. For equality of educational opportunity through the schools must imply a strong effect of schools that is independent of the child's immediate social environment, and that strong independent effect is not present in American schools (p. 325).

A reanalysis of the Coleman Report data was undertaken by Jencks (1969), who concluded that, while a number of important details were incorrect, along with some questionable statistical techniques, the main conclusions of the Coleman Report were correct. Indeed, Jencks indicated that the net effect of the report's errors was to underestimate the importance of family background and overestimate the importance of school

factors in effecting achievement.

The conclusion reached by the Coleman Report is not unique to the Coleman Report's data alone. On the contrary, the Coleman Report is the largest but by no means the only study of its sort. Burkhead, Fox and Holland (1967) used an econometric technique of input-output analysis to investigate the relationships between the allocation of resources and other school inputs to the output in terms of achievement in high schools of five large cities. They concluded that factors external to the school setting (i.e., ethnic status, parents' occupation, income class of the neighborhood) were the most important determinants of educational outcomes. Similar conclusions were reached in England in a study commissioned by the Central Advisory Council for Education (1967). The above literature is consistent with the widely-held notion that parents are the primary influencers in the educational achievement of their children, particularly during preadolescent years (Conant, 1972; Kauffman, 1977; Kroth, 1972; Schaefer, 1972).

In summary, there is a body of literature that suggests that much of the learning within a school environment can be accounted for by factors existing external to and independent of the school environment. This implies that problems associated with learning in the school context may originate externally of that context, and that interventions designed to remediate such problems should be designed, in part, to intervene on putative causal factors external to the school setting. Such an intervention strategy may avoid some of the problems common to internally focused intervention models managed by school counselors, school social

workers, and school psychologists. The problems associated with the internal intervention model include, but are not limited to, (a) lack of teacher commitment, (b) lack of teacher follow-through, (c) lack of appropriate resources, and (d) due process issues (Matthew, 1986).

One important difference between an internally-based intervention model and an externally-based intervention model is the nature of the change agent. In the case of in-school intervention models, there appears to be a number of potential change agents whose involvement in a case depends somewhat on the nature of the student problem and the relative degree of expertise needed to deal effectively with the student problem. For example, the classroom teacher is generally the first person to identify a student problem and use his/her own resources in attempting a solution. If (s)he is unable to solve the problem, another teacher may be consulted, or a referral may be made to the school nurse, the school counselor may be asked to intervene, or the problem may be referred to the school psychologist, school social worker, or another outside agency (Matthew, 1986). However, in an externally-based, home-oriented intervention model, the number of potential change agents enlisted from the school setting to service the student are limited, and the parent or guardian must assume the major intervention role.

Parents as Change Agents

The utilization of parents as therapeutic agents has not only a logical appeal, but has a foundation in legal and empirical doctrine as well (Martin, 1975). In the case of children who have been diagnosed as

handicapped, Public Law 94-142, the Education for All Handicapped Children Act of 1975, clearly mandates that parents have the right to participate in the development of educational interventions and services to be administered to their children.

In addition to legal trends, the use of parents as change agents has strong empirical support. Parents have been shown to be effective change agents with children exhibiting aggressive behaviors (Zielberger, Sampen & Sloane, 1968), excessive self-scratching (Allen & Harris, 1966), noncompliance (Wahler, 1969), and child weight loss (Aragona, Cassady & Drabman, 1975). In one of the first reports of parental use of behavior modification techniques, Williams (1959) detailed the relative simplicity and effectiveness of an extinction procedure used to eliminate tantrum behavior in an infant. In this procedure, the parents were instructed to ignore the tantruming that occurred once the infant was put to bed. The procedure resulted in the complete cessation of the tantrums. In an example of more complex involvement by parents, Wolf, Risley and Mees (1964) developed intervention procedures for a 5 year old autistic boy involving the boy's appropriate use of glasses and speech patterns. The boy's behaviors were brought under control in the structured environment of the clinic, and the parents were taught to continue the therapy procedures in the home environment, and did so successfully.

The success of any therapeutic undertaking depends to a considerable degree upon the skills of the change agent. From a logical standpoint, it would seem that parents with higher intelligence, more education, and higher socioeconomic status would be easier to train and be more

successful in the application of therapy procedures in the natural environment. However, the literature in this area is equivocal. Bernal, Williams, Miller and Reagor (1972) and Patterson (1965) found that parents who manifest pathology, and are in general uncooperative, are not likely to benefit from or use the information taught in certain kinds of parent training programs. Patterson, Cobb, and Ray (1972) also reported that parents who have less formal education and are of lower socioeconomic status are more difficult to train in the use of behavioral therapy techniques. However, Mira (1970) found no relationship between parental intellect, socioeconomic status, or formal education and ability to profit from training in the use of certain therapeutic techniques. The findings of Mira (1970) support the experiences of this writer, who has observed no correlation between parents' educational level, income level, or other socioeconomic indicators and the parents' likelihood of benefiting from an intervention training program.

Parent Training Programs

Parent training can be traced back as far as 160 years (Croake & Glover, 1977), and it appears that interest in this area has increased dramatically within the last 10 or 15 years, as evidenced by the plethora of commercial training programs developed within that time frame (Bernal & North, 1978). Although many of the available packaged programs seem to have a behavioral theoretical basis, other program types include Adlerian and interpersonal communications orientations.

Adlerian approach

The Adlerian approach to parent training has generally involved the teaching of basic Adlerian concepts, hoping to increase the parents' understanding of their children's behavior and teaching the parents to establish a cooperative rather than competitive family atmosphere (Dinkmeyer & McKay, 1976; Dreikurs, Gould & Corsini, 1974). One of the most notable programs within this camp is Systematic Training for Effective Parenting (STEP), authored by Dinkmeyer and McKay (1976), which is commercially produced and marketed. The program is highly structured, and involves a recommended nine sessions in which parents meet once a week for two hours. Parents are taught various Adlerian-based principles (e.g., the dynamics of a child's unique position within the family constellation, that a child's behavior is purposive and goal oriented, and that inappropriate behavior is an aberrant attempt to achieve a sense of belonging). STEP sessions involve listening to tapes of vignettes of child-rearing situations, and attempting to deal effectively with those situations using Adlerian concepts and strategies supplied by the authors. Between sessions, parents carry out assignments and read materials prescribed by the program (Dinkmeyer & McKay, 1976).

Although published efficacy studies on Adlerian parent training appear to be few, there is some research that suggests that Adlerian groups are successful in changing parent attitudes, child-rearing practices, and child behavior, as assessed by parent-completed checklists (Benett, 1975; Freeman, 1975; McDonough, 1976; Moore & Dean-Zubritsky, 1979). However, the existing literature on the validity of parent

reports of actual behavior call the above literature into question (Patterson, 1982). Croake and Burness (1976) found significant changes in parental attitude and reported child-rearing practices, yet found no actual behavior changes in the children.

Interpersonal communications approach

Within the interpersonal communications area, parent training consists mainly of teaching parents to communicate more effectively with their children, and involves an emphasis on training empathic responding or reflective listening (Carkhuff & Bierman, 1970; Gordon & Sands, 1976; Hetrick, 1979). Probably the most prevalent structured program of this type is called Parent Effectiveness Training (P.E.T.) (Gordon & Sands, 1976). P.E.T. training sessions generally are held in eight three-hour blocks, one week apart, and consist of readings, role playing, and homework exercises. Emphasis is on improving parent-child relationships by using strategies described by Gordon and Sands (1976) as active listening and the "no-lose" method for conflict resolution. In a critical review of the literature on P.E.T., Rinn and Markle (1977) concluded that:

> Overall, the research on P.E.T. has been limited in scope and inadequate in design. Of the studies reviewed none possessed the methodological rigor necessary for informed judgments regarding the effectiveness of the technique as a training strategy . . . the data available on P.E.T. for review do not support the assumption that Parent Effectiveness Training is effective. (p. 105)

Behavioral approach

The behavioral approach to parent training involves teaching parents how to effectively manage antecedent and consequent stimuli in order to

change some aspect of their child's behavior (O'Dell, 1974). This follows traditional operant conditioning doctrine as first articulated by Skinner (1938; 1953), and has evolved into a burgeoning field of literature more popularly known as behavior modification (Martin & Pear, 1978) or applied behavior analysis (Baer, Wolf & Risley, 1968; Journal of Applied Behavior Analysis, 1968). The behavioral approach is based upon a considerable amount of laboratory research (Schwartz, 1984; Skinner, 1938; Journal of the Experimental Analysis of Behavior, 1957), and has well-defined philosophical and theoretical underpinnings (Skinner, 1953; 1969; 1971; 1974; The Behavior Analyst, 1978). At the heart of the behavioral approach is the antecedent-behavior-consequence (A-B-C) model, which specifies that behavior (B) is a function of the consequences (C) of that behavior, and that environmental stimuli (A) correlated with those consequences come to predict those consequences, given the specified behavior (Luthans & Kreitner, 1975). Behavior change is accomplished by systematically altering the immediate consequences of the behavior (called contingency management), the environmental stimuli that differentially predict those consequences from said behavior (called stimulus control), or both (called behavioral engineering) (Homme, C'de Baca, & Cottingham, 1968).

Parents have been successfully trained to use behavioral methods to change a variety of problem behaviors exhibited by children, including school phobia (Tahmisian & McReynolds, 1971), aggressiveness (Patterson, 1974; Wiltz & Patterson, 1974), problematic mealtime behavior (Evans, 1977; McMahon & Forehand, 1978), and noncompliance (Hobbs, Forehand &

Murray, 1978). Bernal and North (1978) published a survey of 29 behavioral training manuals for parents, an indication of the extent of the popularity of the behavioral approach. In addition to manuals, multimedia packaged programs for use with parent groups have been developed (Clark-Hall, Collier, Lieker, Grinstead, Kearns, Robie, & Rotton, 1978; McDowell, 1976; Wagonseller, Burnett, Salzberg, & Burnett, 1976). One of the most sophisticated treatment packages has been developed by Patterson et al. at the University of Oregon (Patterson et al., 1972; Patterson & Reid, 1973; Patterson, Reid, Jones, & Conger, 1975). This program is designed for use by parents of aggressive children and contains components that are common to most behaviorally-oriented models (e.g., the specification of overt target behaviors, continued measurement of the behavior over time, manipulation of antecedent and consequent stimuli associated with the target behavior, and continual evaluation via frequent data collection).

These components--particularly overt behavior specification and continual measurement of the behavior--make the behavioral approach inherently research-oriented, from an inductive perspective (Hersen & Barlow, 1976; Johnston & Pennypacker, 1980), hence more amenable to evaluation. The efficacy of behavioral parent training is generally supported by the literature (Berkowitz & Graziano, 1972; Forehand & Atkeson, 1977; Johnson & Katz, 1973; O'Dell, 1974). O'Dell (1974) stated the belief of many behavioral parent trainers when he stated, "There does not appear to be any class of overt child behaviors that parents cannot be trained to modify" (p. 421).

The literature reviewed thus far suggests that much of what goes on in the school setting is largely a function of factors external to the school setting. Indeed, school achievement appears to depend to a greater degree on factors such as family background and home environment. This being the case, it logically follows that since the parents are the core of the family and home environment, parents may be able to function effectively as change agents for their children's school behavior. The literature reviewed above suggests that, in general, when given the proper training parents are capable of acting as effective change agents for a variety of child behavior problems. Three different theoretical approaches to parent training were reviewed: Adlerian, interpersonal communications, and behavioral. The literature reviewed suggests that the behavioral approach to parent training is the most common approach, and one of the most effective. Therefore, it would seem that in designing interventions for in-school behavior problems, the following factors should be considered: a) that a possible source of variation of the observed problem may be external to the school setting, b) that parents are at the core of the external environment, c) that parents are generally capable of functioning as effective change agents, and d) that generally parents have been successful in implementing behaviorally-oriented treatment programs.

Externally-Based Contingency Management Systems

Behavior modification programs have been used successfully in school settings to ameliorate behavior problems for over 20 years (O'Leary &

O'Leary, 1976; Kazdin, 1980; Sulzer-Azaroff & Mayer, 1977). Primarily, such behavior management programs have been developed by a behavioral consultant, such as a school psychologist, in consultation with the classroom teacher. Such a collaboration has met with a great deal of success, indicating that teachers themselves can function as behavior modifiers in the classroom (Bergan, 1977). Teachers have successfully used a number of behavioral techniques to decrease disruptive behaviors as well as improving academic behaviors over a wide range of classroom settings, subject areas, and age levels (O'Leary & O'Leary, 1976). Although highly effective, the use of behavior management techniques in the classroom has some disadvantages. To be successful, each procedure may require a great deal of time and effort on the part of the teacher and behavioral consultant (Fairchild, 1976; Schumaker, Hovell, & Sherman, 1977). More often than not, a teacher must change his/her own classroom management methods to change the behavior of one or a few students (Schumaker et al., 1977). Indeed, some teachers question the ethic of implementing a tailored program for such a small sample when others in the class receive no special treatment because their behavior is appropriate (Martin, 1975). Other teachers agree to implement recommended behavioral techniques, yet fail to follow through, or follow through so inconsistently that the procedures are ineffective (Matthew, 1986). Very often this is due to a lack of belief in the behavioral approach (Patterson, Cobb, & Ray, 1971), sometimes based on experiences with incompetent consultants who recommended procedures that were technically and/or conceptually unsound, and resulted in failure

(Matthew, 1986). Perhaps the greatest disadvantage of school-based behavior modification programs is the relative lack of availability of effective reinforcers and punishers (Ayllon, Garber, & Pisor, 1975; Matthew, 1986; Schumaker et al., 1977). Some school budgets may allow for the purchase of tangibles to be used as potential reinforcers for a cross section of children, but schools are at a disadvantage when it comes to the control of such potentially reinforcing activities as TV watching, staying up later at night, going places in the evening with friends, etc. (Bailey, Wolf, & Phillips, 1970). These kinds of activities are generally under parental control, and are often not made contingent upon school performance. Making these activities contingent upon appropriate school performance is the rationale underlying external or home-based contingency management plans.

Conceptual-theoretical foundation

The conceptual model underlying home-based contingency management plans follows the A-B-C behavioral paradigm. In this paradigm, "B" represents the behavior of interest, and "C" represents the consequences of the behavior. "A" is the stimulus setting which differentially predicts certain consequences ("C") when the behavior of interest ("B") is emitted (Whaley & Malott, 1971). In general, if the consequences of a behavior are desirable or of value to the behaver, the behaver is induced to respond similarly again, in a similar context ("A"). If this happens, the consequence of the behavior is termed "positive reinforcer" and the situation in which the behavior was reinforced is called a

"discriminative stimulus." The behavior can be said to be under both stimulus and consequent control, in that on future occasions, the behaver is likely to respond in a similar manner in similar situations as long as the behavior of interest is to some degree predictably reinforced (Schwartz, 1984; Skinner, 1953). The behavior of interest will also continue to be emitted in a given situation if the consequence of the behavior is the avoidance of, or cessation of contact with, an unpleasant event. If a behaver responds in order to avoid or escape an event valued as unpleasant or aversive by the behaver, that event is termed a negative reinforcer, and it is said that responding is also under both stimulus and consequent control. The difference in the latter situation is that the behaver is responding to avoid, or cease contact with, a consequent event that is aversive to the behaver. Both types of consequences effect the probability of a behavior in the same way--they increase it (Whaley & Malott, 1971). If a response occurs (B), and the immediate consequence (C) of the behavior is unpleasant or aversive, that behavior in the future will probably not be emitted as frequently in the same context (A). This aversive consequence (C) is termed a punisher. However, given the same context (A) in which the behavior (B) was punished (C), on future occasions the behaver may emit a qualitatively different response that serves to avoid the aversive situation predicted by (A). This new response is said to be "negatively reinforced." The response that no longer occurs, or occurs less frequently, is called the "punished" response (Whaley & Malott, 1971). For example, given a rather narrow, open doorway (A), the behaver may walk into the wall, rather than through

the doorway. The consequence of this may be a mild amount of pain, embarrassment, a feeling of not having control of oneself, etc. Upon approaching the next open doorway (A), the behaver is likely to make a qualitatively different response--that of walking through the doorway. The other response--walking into the wall--was punished by the mild pain, embarrassment, and bad feelings. The new response--walking through the doorway--is said to be a "negatively reinforced" response, since it serves to avoid contact with the wall. Indeed, the new response may be said to be under the control of both negative and positive reinforcement, in that successfully walking through the door produces a desirable result.

One of the variables affecting the potency of a given consequence is the time between the emission of the behavior and the consequence itself. This time period has been called a "reinforcement gradient." Generally, the shorter the time between a behavior and its consequences, the more pronounced the effect of the consequence. The longer the time period, the less confident one may be in attributing any observed response to the consequence in question. It is thought that the length of time affecting the potency of a given consequence is somewhat dependent upon the behaving organism's relative level of sophistication as determined by its place on the phylogenic ladder (Schwartz, 1984; Skinner, 1969). The implication is that the simpler the organism, the more immediate the consequences must be in order to affect the organism's responses. In line with this logic is the observation that human behavior may be effected by consequences more temporally dissociated from a given

response. Even within the human species, behavioral sensitivity to consequences varies as a function of individual development, in that the more developmentally mature the individual, the more sensitive the individual to consequences further removed in time. Behavioral consequences for young children must be more immediate than those for adults (Skinner, 1969).

The home-based contingency management model follows the conceptual model outlined above in the following way: "B" represents the behavior of interest occurring in the school setting ("A"). The immediate consequences of these behaviors ("C") occur in the school setting, and of course vary for each child. As mentioned above, the consequences available to school personnel are few compared to those available to parents. A desirable situation may be to bring the child's behavior under control of the consequences that exist outside the school setting. This would be in line with the conceptual model outlined above, the primary difference being an extension of the reinforcement gradient. There would be a considerable gap in time, comparatively speaking, between the occurrence of a target behavior, in school, and its contrived consequence, out of school. Bridging this gap with some type of communication to parents may serve two functions: (1) the communication provides information to the parent as to what consequences will be applied, if any; and (2) the communication, especially if it is in written form, may act as a conditioned reinforcer or punisher to the extent its delivery to the parent results in reinforcing or punishing consequences (Brackbill & Kappy, 1962; Sluyter & Hawkins, 1972). A

conditioned reinforcer is one which acquires its reinforcing effectiveness by being paired with another reinforcer (Whaley & Malott, 1971). Such a communication system already exists in most schools through the use of quarterly report cards. Report cards utilize various criteria for representing the great quantities of behavior that a child has shown during grading periods. For some students, this type of feedback, in addition to other factors, seems to be sufficient motivation for the maintenance of adequate school performance. But for many students, the reinforcement gradient is much too long and the feedback much too delayed to support optimum classroom performance (Edlund, 1969; Karraker, 1972; Sluyter & Hawkins, 1972). Programs that involve home-based consequation of school behavior are based on the premise that the feedback concept inherent in standard report card systems can be of more benefit to teachers, student and parents than it now is.

These programs also have the potential for effectively addressing the issues mentioned above: a) external, out-of-school causes of in-school behavior; b) problems associated with in-school interventions; c) legal trends effecting the necessity of parental involvement; and d) the effectiveness of parents as change-agents.

The general purpose of this study was to examine the effects of various school-home communication and home-based contingency management plans on the academic performance of an Iowa junior high student population, using an idiographic research methodology. The study incorporated three separate experiments. Experiment I, conducted using a junior high math class, was designed to address the following questions:

1. What happens to math assignment performance (dependent variable) when performance reports are mailed to parents at the end of the week by the teacher (independent variable)?
2. What happens to math assignment performance (dependent variable) when performance reports are mailed to parents by the teacher each day an assignment is due (independent variable)?
3. What is the effect on math assignment performance (dependent variable) when a teacher-recommended home-based contingency management intervention is mailed to the parents (independent variable)?
4. What is the effect on math assignment performance (dependent variable) when a psychologist-recommended home-based contingency management intervention is mailed to parents (independent variable)?

Experiment II, conducted using three junior high math students, was designed to address the following questions:

1. What is the effect on math assignment performance (dependent variable) of students for whom a home-based contingency management plan (independent variable) is specifically designed?
2. What is the effect on students' performance in other subject areas (English, social studies, science) when performance in math is specifically targeted for intervention?

Experiment III, conducted using three junior high students, was designed to address the following questions:

1. What is the effect on the academic performance of each student

in math (dependent variable) and science (dependent variable) when home-based contingencies are applied to performance in both subjects simultaneously (independent variable)?

2. What is the effect on the academic performance of each student in math (dependent variable), science (dependent variable), and social studies (dependent variable) when home-based contingencies are applied to performance in all three subject areas simultaneously (independent variable)?

Research methodology

The research design used in this study is commonly referred to as "single-subject" research (Barlow, Hayes, & Nelson, 1984; Hersen & Barlow, 1976). Single-subject designs have been well-legitimized philosophically (Johnston & Pennypacker, 1980; Sidman, 1960), and empirically (Journal of the Experimental Analysis of Behavior, 1957), and have been used extensively in applied research (Bailey & Bostow, 1979; Barlow, Hayes, & Nelson, 1984; Journal of Applied Behavior Analysis, 1968). Characteristics of single-subject research include: a) an observable dependent variable; b) small number of subjects; c) data collected continuously over a specified period of time; d) an emphasis on clinical, rather than statistical, significance, or visual inspection of rather than a statistical analysis of the data; and e) demonstration of internal validity via the repeated introduction, withdrawal, and reintroduction of the independent variable(s), using the subject as his/her own control. External validity in single-subject research is

viewed as an empirical issue, rather than an actuarial one, as in group research. That is, the external validity of a procedure increases to the extent that it can be replicated across subjects, therapists, and treatment settings, as compared to traditional group designs, where external validity is logically inferred (Hersen & Barlow, 1976). In considering the external validity issue, Hersen and Barlow (1976) write:

> It is our contention that the single case A-B-A design "approaches" rather than equals the nonfactorial group design with no-treatment controls only because the number of clients is considerably less in a single case design (N=1) than in a group design, where eight, ten or more clients are not uncommon. It is our further contention that in terms of external validity or generality of findings, a series of single case designs in similar clients in which the original experiment is directly replicated three or four times can far surpass the experimental group/no treatment control group design. (p. 58)

There are two basic idiographic design models: the A-B-A design and the multiple baseline design.

The A-B-A design is the most simple design, and consists of baseline measurement of the dependent variable (A), introduction of the independent variable (B), and withdrawal of the independent variable (A). According to Hersen and Barlow (1976):

> If after baseline measurement (A) the application of a treatment (B) leads to improvement and conversely results in deterioration after it is withdrawn (A), one can conclude with a high degree of certainty that the treatment variable is the agent responsible for observed changes in the target behavior. Unless the natural history of the behavior under study were to follow identical fluctuations in trends, it is <u>most improbable</u> (italics theirs) that observed changes are due to any influence (e.g., some correlated or uncontrolled variable) other than the treatment variable that is systematically changed. (p. 176)

A multiple baseline design is essentially a series of A-B designs, in which the introduction of the independent variable is staggered across a

series of baselines. The baselines may be multiple behaviors of a single subject (for example, academic performance in three different subject areas), similar behaviors across multiple subjects (for example, math performance for three different students), or one target behavior for one subject across different environmental settings (e.g., in-seat behavior for a student in three different classes) (Bailey & Bostow, 1979). Experimental control is demonstrated "when a change in rate appears after its application while the rate of concurrent (untreated) behaviors remains relatively constant" (Hersen & Barlow, 1976).

CHAPTER II. REVIEW OF LITERATURE

The literature on home-based contingency management systems began to appear in the mid to late '60s (Cantrell, Cantrell, Huddleston & Woolridge, 1969; McKenzie, Clark, Wolf, Kothera & Benson, 1968), and expanded considerably in the 1970s (Atkeson & Forehand, 1979). This writer was able to find only three studies published thus far in the 1980s (Harris, 1983; Taylor, Cornwell, & Riley, 1984; Witt, Hannafin, & Martens, 1983).

One of the first home-based management systems reported in the literature was developed by Edlund (1969) to control the classroom conduct and work completion of elementary school students. Each child in the study had a checklist on which was itemized certain areas to be checked if a preset criterion was met. For students having work completion problems, the checklist had itemized each subject area (e.g., reading, arithmetic, and spelling). Each day the teacher would place a check mark or a zero by each subject area indicating whether the student did or did not complete the work criterion for that subject area. For conduct problems, the checklist was broken down into time periods which varied in length for each child. At the end of each time period, the teacher would place a check mark or a zero by each time period, indicating whether or not the student met the conduct criteria for that time period. For students with both work completion and conduct problems, a checklist was used incorporating both academic and conduct components, enabling the teacher to indicate, via a check mark or a zero,

whether or not criteria were met for each area. Criteria for both work completion and conduct were determined for each child on an individual basis. Target children would take the checklists home daily and parents would allow or withhold certain privileges contingent on the number of check marks on their child's checklist. Prior to implementation of the program, a series of parent-teacher conferences were held for the purpose of explaining the checklist, advising parents on selection of rewards, and teaching the parents when and how to adjust the reward system. Edlund reported that the procedure was successful. However, no data were presented regarding the specifics of the subject selection, baseline data, or treatment effects.

Subsequent research in the area has investigated such parameters as the extent of parent training necessary (Ayllon, Garber & Pisor, 1975; Lahey, Gendrich, Gendrich, Schnelle, Gant & McNees, 1977; Karraker, 1972), types of home-school communication that are effective (Hawkins, Sluyter & Smith, 1972; Bailey et al., 1970; Karraker, 1972; Lahey et al., 1977; Schumaker et al., 1977), and the nature of externally delivered consequences (Bailey et al., 1970; Hawkins et al., 1972; Karraker, 1972; Kroth, Whelan & Stables, 1970; Sluyter & Hawkins, 1972; Schumaker et al., 1977).

In the area of parent training, home-school contingency systems have been successful without extensive training and professional involvement. Karraker (1972) divided parents into three groups, each of which received a different training mode: 1) a letter, 2) a 15-minute conference, or 3) two one-half hour conferences. The children of all three groups of

parents improved their math performance to 90% correct, indicating no difference according to training mode. In general, this literature suggests that minimal parent training is necessary in developing successful home-based programs.

In studies related to the nature of the home-school communication, teacher reports to parents have ranged from general to specific. Some teacher reports indicated only whether the child was "good" (Ayllon et al., 1975), a "yes" or "no" (Bailey et al., 1970), a "satisfactory"-"unsatisfactory" (Matthew, 1986), or smiling/frowning faces (Karraker, 1972). Other studies have specified more detailed communication systems, in which specific behaviors are itemized on the report form (Hawkins et al., 1972; Schumaker et al., 1977). In general, both kinds of reporting formats have been successful. This writer found no research in which the type of reporting system was varied and used as an independent variable.

A considerable amount of the research literature has been concerned with the nature of home-based consequences. This literature has theoretical as well as practical significance, in that according to radical and methodological behavioral doctrine, behavior is a function of its consequences (Skinner, 1953). The implication is that a thorough understanding of the nature of behavioral consequents is necessary in bringing behavior under control. This literature will therefore be reviewed in some detail.

Using five predelinquent boys as subjects, Bailey et al. (1970) investigated the differential effects of indiscriminate reports, discriminate reports and reports without home-based consequences on rule

violations and study behavior, using an A-B-C-D-C design. The dependent measures were assessed using 10 second interval recording. A rule violation (e.g., tilting desk, out-of-seat, looking out window, making noises) was denoted in any 10 second interval it was observed, and study behavior (being on-task) was scored as occurring if it persisted throughout any 10 second interval. During baseline (Phase A), the study behavior of the group occurred less than 35 percent of the intervals scored, and rule violations for the group were observed to occur more than 60 percent of the time. During Phase B, the boys were required by their house parents to bring home a report card on which their math teacher could check "yes" or "no" for "obeyed the classroom rules" and "studied the whole period." The boys were told that if they received all yeses, they would receive points with which to buy certain privileges (TV, snacks, go outdoors, etc.), and that if they received even one "no", they would lose all privileges. During this phase, the boys were given all yeses, irrespective of their performances, and earned points. During Phase C, a boy had to have no more than 10 percent of the intervals marked as rule violations to earn a "yes" for that category, and had to have at least 90 percent of the intervals marked as studying to earn a "yes" for that category. Privileges were allowed or withheld each day, contingent on the cards presented to the houseparents. During Phase D, the boys were told that they did not have to earn all yeses to receive privileges, but still had to get their cards marked. During this phase, the boys were in effect receiving feedback, but the type of feedback and privileges earned were independent. Phase D was followed by a return to

Phase C.

During the initial part of Phase B, rule violations dropped and study behavior increased, but these changes did not maintain. By the end of the phase, study behavior fell to less than 30 percent and rule violations rose more than 25 percent. During Phase C, study behavior climbed to 95 percent, and rule violations occurred in less than 5 percent of the intervals. During Phase D, study behavior fell to 25 percent, and rule violations climbed to 46 percent. A return to Phase C conditions produced an increase in study behavior to over 90 percent, and a decrease in rule violations to 2 percent.

The results of this study strongly suggest that 1) indiscriminate feedback does not change behavior, 2) that non-contingent access to reinforcers (privileges) fails to change behavior, 3) that discriminate feedback alone will not maintain behavior change over time, and 4) that discriminate feedback plus home-based consequences have a significant effect on in-school behavior.

Sluyter and Hawkins (1972) examined the effects of delayed parental reinforcement on the classroom behavior of three elementary school students. With one student, a sixth grade girl, the experimenters utilized an A-B-C design in comparing the effects of teacher feedback (B) and parental reinforcement (C) on the student's relative class standing in arithmetic. Arithmetic scores were kept by the classroom teacher as part of normal classroom procedure. During baseline phase (A), an average of 67 percent of students scored higher than the target student. The feedback phase (B), which began after 20 days of baseline data

gathering, consisted of the teacher handing a note to the student when the student's behavior was "adequate." Adequate was not defined for the student, but meant that no more than 80 percent of the class scored higher in math that day. During the reinforcement phase (C), the student took the notes home to her parents, who reinforced her with stuffed animals for accumulating a pre-specified number of notes. This system was worked out with the experimenter prior to the start of the reinforcement phase. Results indicate that the student's class standing was relatively unchanged during phase B (feedback), yet changed dramatically during phase C (reinforcement), when a mean of only 25 percent of the class scored higher than the target student.

A similar procedure was utilized for a fifth grade boy to improve his class standing in both spelling and arithmetic. Again, an A-B-C design was used in which both feedback alone (phase B) and reinforcement (phase C) were used successively. The feedback phase consisted of the teacher handing a note to the student, which indicated if he "did well" in either subject. The student then returned the note to the teacher. In the reinforcement phase, the student took the notes home where an accumulation of a certain pre-set number of notes would earn certain rewards, such as bicycle parts and a knife. During baseline, which was collected by the teacher as a part of her normal routine, the boy's spelling scores were below a mean of 91 percent of the students in the class, and his arithmetic scores were below a mean of 73 percent of the students. During the feedback phase, there was no improvement in either spelling or math. In fact, his performance worsened. During the

reinforcement phase, a mean of 74 percent of the class scored higher in spelling, and a mean of 55 percent scored higher in math. A Mann Whitney U Test indicated both changes to be statistically significant.

With another student, a fourth grade boy, the experimenter used an A-B-C-D design in examining the differential effects of feedback to the student (phase B), feedback to the parents (phase C), and feedback to parents, plus reinforcement (phase D) on the percent of time the student was inattentive and talked out of turn. Data were taken by direct observation and measurement of both target responses, using 10-second partial interval recording. During the student-feedback phase, the student was given a note indicating that he had "done well," when inattentiveness occurred in 60 percent or fewer of the 10-second intervals of the observation period. The note was given after school. During phase C, the student took the notes home to his parent. For the reinforcement condition, phase D, the notes were taken home as in phase C, but were reinforced with bedtime extension, and the opportunity to earn things such as a model car and baseball glove upon accumulating a certain number of notes. Baseline data (phase A) indicated that the student was inattentive during a mean of 61 percent of measured intervals, and talked out of turn during a mean of 26 percent of the intervals. During the student feedback phase (B), the occurrence of inattentiveness was approximately the same (62%), but talking out of turn decreased to 21 percent. The authors also report a decrease in the variability of the data during this phase, although the decrease was not quantified. Phase C, the parent-feedback condition, resulted in a

decrease to 58 percent of recorded intervals for inattention, and a drop to 18 percent of recorded intervals for talking out of turn. The rate of inattention decreased significantly (Mann-Whitney U-Test: $P < .02$, $U = 17.5$, $N_1 = 12$, $N_2 = 10$, two-tailed) during the reinforcement phase, and talking out of turn decreased to a mean of 4 percent ($P < .002$, $U = 6.5$, $N_1 = 12$, $N_2 = 10$, two-tailed). The results of the Sluyter and Hawkins study suggest that (1) the use of reinforcement at home for desired behavior in school is an effective means of increasing that behavior, that (2) the time delay between desired behavior occurring in school and its reinforcing consequences at home does not render the reinforcement ineffective, and that (3) feedback alone, whether to the child or parent, may not be as effective as feedback plus reinforcement in modifying in-school behavior.

In a similar study, Schumaker et al. (1977), using a daily report card system, examined the effects of parental praise, the effects of parent-controlled privilege, and the effects of their combination on school grades, classwork, and conduct. In Experiment I, a multiple-baseline design was used to examine the combined effectiveness of praise and privileges on classroom conduct, classwork, and grades on three male seventh grade students. All three students were required to take home daily reports which indicated their progress in following classroom rules (conduct), completing their classwork, and grades earned on assignments and tests. On the report form, the teacher checked "yes" or "no" in each of ten conduct areas, indicating whether or not the student had met the compliance criterion, awarded the student points for meeting classwork

completion standards, and recorded any grades earned on recent tests. Each student took the report home each day, and points earned could be traded for certain privileges (e.g., TV time, staying up later in the evening, and snacks). Experimenters taught the parents basic rules used in exchanging points for privileges. The number of points necessary to purchase privileges was negotiated by each student with his parent. Each boy's progress was compared to baseline data taken by teachers prior to implementation of the note-home system, and the boys' grades were compared to the grades of a small sample of boys having similar characteristics. Although the authors omitted numerical data describing baseline and treatment conditions for conduct and classwork, visual inspection of the graphic data indicated substantial improvement in both areas across all three subjects. The grades of all three subjects improved when compared to both their pre-treatment conditions and grade growth of the comparison group.

In Experiment II, the necessity of using contingent privileges, rather than praise alone, was investigated using two seventh-grade boys as subjects. The procedures followed were identical to those used in Experiment I. With one boy (Ron), an A_1-B_1-A_2-B_2 design was employed to compare the effects of baseline-report card plus praise-baseline-report card plus praise conditions, respectively, on the percentage of rules followed and the percentage of classwork points earned. With the other boy (Fred), an A_1-B_1-C-B_2 design was used to compare the relative effects of baseline-report card and praise-report card, praise and privileges-report card and praise on the percentage of rules followed and percent of

classwork points earned. Results indicated that with Ron, both rules followed and classwork points earned increased in the praise alone condition, but more increase was noted in the first treatment condition (B_1). Although specific data were not given for this subject, examination of presented graphic data revealed less improvement in the second (B_2) treatment conditions, yet both were higher than either baseline condition.

Both numerical data and graphic data were given for the procedure used with Fred. During baseline (A), Fred followed an average of 59% of the rules and earned an average of 39% of the classwork points available. In the report card-praise condition (B), Fred failed to bring his report card home, and his teachers verbally reported no change in his performance. When the report card, praise, and privilege condition (BC) began, Fred followed an average of 93 percent of the rules and earned an average of 64 percent of the classwork points available. When the praise alone condition (B) was re-instituted following a second baseline (A_2) condition, Fred followed 80% of the rules and earned 44 percent of classwork points available. The results suggest that although praise alone may be sufficient to improve certain aspects of school behavior, these improvements may not endure over time, and may not be as dramatic as when contingent privileges are an integral part of the treatment package.

The literature indicates that home-based contingency management plans have been used successfully with primary grade (Ayllon et al., 1975; Karraker, 1972) as well as secondary (Heaton, Safer, Allen,

Spinnato & Prumo, 1976; Schumaker et al., 1977) populations, and both regular (Strober & Bellack, 1975) and special education (Kroth et al., 1970) settings. This writer could find no studies conducted on Iowa populations.

The literature reviewed above suggests the following: 1) that the amount of training needed by parents to successfully implement home-based management systems is minimal; 2) that the type of communication needed between school and home may be in very simple form; 3) that simple feedback to the student and parent is not sufficient in most cases to maintain desired behavior in school--privileges must be made differentially contingent upon school behavior; 4) that home-based systems have been effective with both primary and secondary student populations, as well as with regular and special education populations; and 5) that there has been little, if any, published research in this area using Iowa populations.

CHAPTER III. PROCEDURES

Experiment I

Method

Subjects The subjects in Experiment I consisted of the total number of students (N=12) in a seventh grade General Math class in a school in Northwest Iowa. None of the students was receiving special education services due to intellectual impairment or having a learning disability in math.

Baseline one The dependent variable was the percentage of assignment math problems worked correctly. Math assignments were given by the teacher approximately four days per week. On the day homework was due, students exchanged papers in class and scored each other's papers. The teacher collected the papers and recorded in her gradebook the percent correct for each student. Failure to hand in a paper was scored as a zero, unless the student was absent from class. In the latter case, papers were accepted late and scored by the teacher. Baseline data for each student were collected from the teacher's gradebook, beginning four weeks prior to the start of the first intervention. Throughout the duration of Experiment I, each student's performance was represented as the "mean percent correct" for each week. This was calculated by adding the total number of points earned on assignments for the week, and dividing by the total possible for the week. The number of assignments per week ranged from two to five.

Intervention During the first intervention phase (Tx1), a report of each student's performance was mailed to his/her parents by the experimenter on Friday for three weeks. The report indicated the percent of assigned math problems worked correctly for the previous week, as well as an indication of how many assignments had not been turned in or had been turned in but not completed, and a comparison to the student's performance the week before (see Appendix A). Students were told in advance by the teacher that reports of their progress would be mailed home.

During the second intervention phase (Tx2), performance reports were sent home to parents with each student on a daily basis, over a two-and-a-half-week period. Each child was provided a file folder containing report forms that were specifically addressed to the child's parent, and were predated. The folders were kept on a shelf in the classroom. At the close of each class period, each student obtained a report form from his/her folder and entered the correct data (see Appendix B). If there was no assignment, or if a student failed to hand in an assignment, the teacher was asked to initial items 1 and 2, respectively. This was a manageable task for the teacher, given that there were only twelve students in the class. Students were instructed by the teacher to take the reports home to their parents, obtain a parent's signature at the bottom of the form, and return it to their folder the following school day. The teacher was asked to arbitrarily check 2-4 different students' reports each day to make sure the data the students entered on the report form accurately reflected their performance that day. The teacher had

already established the practice of arbitrarily checking papers for accurate scoring to control for cheating and/or errors in calculating the correct percentage, which was to be done by the student scorer. Prior to beginning the study, the teacher had indicated that cheating in class or mis-scoring papers was not a problem with this particular class. During the course of this and subsequent phases, there were no contingencies set up to insure that the reports got home to parents.

For the next phase (Tx3), each student in the class was arbitrarily assigned to one of two groups. This was done by going down the class list and assigning the first and every other student to Group I, and the others to Group II. Each group was then arbitrarily assigned to a treatment condition, "Teacher" (Group I) or "Psychologist" (Group II). The parents of children in Group I received a letter from the math teacher (see Appendix C) suggesting that parents allow and withhold certain privileges at home, contingent upon the child's performance in math each day. The parents of children in Group II received a letter with the same content, except that it was signed by the school psychologist (this experimenter), and was written on stationery from the psychologist's office. During this treatment phase (eight school days), progress reports were to be taken home daily.

Baseline two During the second baseline (BL2), all systematic communication to parents regarding math performance was discontinued.

Reliability The classroom teacher randomly checked selected students' papers, following grading by other students, to control for mis-scoring and/or cheating. Reliability was also taken by the experimenter

arbitrarily choosing a day each week for checking 4-6 students' scored papers against an answer key. These procedures adequately controlled for mis-scoring and cheating by the student scorers, but did not control for cheating (or unauthorized "help") by the students when doing their assignments, since these were done outside of class as well as in class.

Design The design used in Experiment I was a single-subject A-B-BC-BCD-A (or BL1-Tx1-Tx2-Tx3-BL2) design, with replication across twelve subjects (Hersen & Barlow, 1976). Each subject in the class was used as his/her own control across conditions, as were the class and two Groups (Tx3), as single units. Data were analyzed individually and in the aggregate.

Experiment II

Method

Subjects The subjects in Experiment II consisted of three junior high math students--Mark, Shawn and Joan (pseudonyms)--attending school in Northwest Iowa. The students were selected on the basis of the following criteria: (a) each was performing below average ("C") on graded math assignments; (b) each had intelligence in the average range, as measured by the Cognitive Abilities Test (CAT); (c) none had received or were receiving special education assistance in the math area under a learning disability classification; and (d) all were identified by the teacher as underachievers.

Baseline The dependent variable was the percent of assigned math homework problems worked correctly. Math homework was assigned by the

teacher from three to five times per week. At the beginning of each class, students exchanged papers and graded each other on the basis of correct answers given by the teacher. Scores were recorded on the paper, as the percent correct, the papers were handed in and the scores were recorded by the teacher in her gradebook at a later time. A zero score was recorded for any student failing to turn in any homework, unless that person was absent from class. The classroom teacher had been collecting such data since the beginning of the school year.

Prior to the end of baseline, parents of the subjects were contacted by the school psychologist (phone), informed of their child's poor progress, and were asked to meet with the teacher and the school psychologist to discuss an intervention. At the meeting, parents were shown the baseline data for their child, and were asked if they would be willing to make home privileges contingent upon their child's performance in math, as evidenced by daily reports their child would bring home. A sample report was shown to the parents (see Appendix D). Upon receiving the parents' verbal support and commitment for involvement, they were asked about the activities their child usually engaged in after school and in the evening. An attempt was made to identify at least three potential reinforcers for each child, such as TV watching, extended bedtime, allowance, playing outside after school, or talking on the telephone, etc. A subsequent meeting was scheduled with the parents to go over a written program prepared by this writer in the interim. The written program for each subject was identical except for the consequences specified for "satisfactory" and "unsatisfactory" reports,

as outlined in parts 1 and 2 of the program (see Appendix E). It was pointed out to the parents that it was their responsibility to explain to their son/daughter the consequences inherent in the program, and the behavior producing these consequences. A date for implementation was then targeted.

Intervention Intervention was begun on a Thursday for Mark, and on the following Monday for Shawn and Joan. During intervention (Tx), each child was given a report by the teacher to take home to the child's parent (see Appendix D), indicating whether his/her performance was "satisfactory" or "unsatisfactory". For the purpose of this experiment, "satisfactory" meant that the subject reached criterion, which was set at 75 percent (C level) or higher, depending upon teacher opinion and the student's baseline history. Satisfactory was also circled if an assignment was not made or graded, if class was not held, or if some other situation arose that prevented an accurate evaluation of student performance. "Unsatisfactory" was circled if the percent of problems worked correctly was below criterion. This would be true if an assignment was not turned in, or was turned in late, both of which resulted in zero grades, with some exceptions. Late papers were accepted by the teacher only if a student was absent from school or class for a "legitimate" reason (an "excused" absence). This was an established policy for the class in general.

Parents were instructed to withhold privileges if their child failed to bring home a report. The independent variable for each child was similar, in that preferred activities at home were made contingent upon a

"satisfactory" report. An "unsatisfactory" report resulted in the loss of those privileges. To find out how the home-based program for math affected other academic subject areas, baseline data were collected on assignment accuracy ("percent correct") for those areas during math intervention.

Reliability To insure data reliability, the teacher had an established policy of spot-checking papers after they were scored by student scorers and handed in. This was done to control for mis-scoring, intentional or otherwise, by student scorers. Reliability was also controlled for by the experimenter checking the target students' papers at least once per week on arbitrarily chosen days. Target student answers, as scored by a student scorer, were compared to the correct answers. Reliability was calculated by dividing the number of agreements (items scored correctly) by the number of agreements plus disagreements (items scored incorrectly), and multiplying by 100 to yield a percentage.

Design The design used can be characterized as a multiple baseline design across students, using the same behavior (math performance) as the dependent measure (Bailey & Bostow, 1979).

Experiment III

Method

Subjects The subjects in Experiment III consisted of three junior high students attending school in Northwest Iowa. The students were selected on the basis of the following criteria: (a) each was performing below average ("C") on graded assignments in the subject areas

of math, science and social studies; (b) each had intelligence in the average range, as measured by the Cognitive Abilities Test (CAT); (c) none had received or were receiving special education assistance; (d) all were identified by their teachers as underachievers; and (e) according to their teachers, all had enough of a knowledge base in the target classes to be able to "catch-up", with effort.

Baseline There were three different dependent variables for each student, making up three separate baselines. The dependent measures were: (a) percent of assigned math problems worked correctly, (b) percent of science assignment completed correctly, and (c) the percent of assigned social studies work completed correctly. Teachers of each subject area routinely assigned homework from three to five times per week. Students were generally given time toward the end of the class period to begin working on assignments, the balance of which was to be completed on the students' own time prior to the next class period. In each subject area, a zero score was recorded for any student failing to turn in homework assignments, unless they had an "excused" absence from class or had some special arrangement with the teacher. The students in Experiment III were the same students in Experiment II, where math was already being intervened upon. Prior to intervention upon subsequent subject areas (science and social studies), the parents were called by the experimenter to discuss performance in the subject areas, discuss possible changes in the reinforcers used at home, and decide upon a starting date for the addition of another class to the program. Teachers were also contacted to elicit their approval and discuss their concerns.

Intervention Intervention was continued on math from Experiment II. For Experiment III, the contingencies in effect for math were also in effect for another subject area for each student: social studies (Mark and Shawn) or science (Joan). Now each student had to demonstrate adequate performance in two subject areas, and were accountable to parents for both by an expanded version of the original note home, which included the added subject area. The same subject area was not added simultaneously for each student. Two students--Mark and Shawn--were started in social studies, while Joan was started in science. The decision regarding which subject areas were added to a particular student's program was made primarily on the basis of a student's need to improve in that area, and secondarily on the basis of good experimental design logic. English was not chosen as a target area due to the experimenter's concerns regarding the reliability of any obtained data base. The criterion for "satisfactory" being circled in an added subject area was at least 75 percent ("average") for each student. This criterion was set on the basis of teacher recommendation. Following intervention on two subject areas, the third subject area was added for two of the three target students, Mark and Shawn. Due to poor performance in both science and math following the addition of science to Joan's program, social studies was not added; science and math progress continued to be intervened on. For Mark and Shawn, the home-based contingencies in effect for math and social studies were expanded to include science. Science was added to the note being taken home by the two students, and parental and teacher support were solicited by the

experimenter, as before. Examples of notes representing addition of subsequent subject areas can be found in Appendix F. Parents were asked to explain the changing contingencies to their children.

Reliability Reliability was taken by having the experimenter check the target students' papers, in each class during baseline and intervention, comparing it to the teacher's answer key, and comparing the percent correct obtained to the percent recorded in the teacher's gradebook. Reliability was calculated by dividing the number of agreements (with the teacher) by the number of agreements plus disagreements, and multiplying by 100 to yield a percentage.

Design The design used for Experiment III can be characterized as a multiple baseline design across behaviors, using three different behaviors (performance in math, science, and social studies) within the same subject, as dependent measures (Bailey & Bostow, 1979).

Follow-up surveys

Two surveys were mailed to the parents of the 12 students in Experiment I. The first survey, mailed about three weeks following the end of the baseline 2 (BL2), attempted to assess the parents' value of the reports, preference for daily or weekly reports, how reliably the daily reports were brought home, and whether or not parents thought the reports provided enough information (see Appendix G, page 1). The second survey, mailed a month after the first survey, attempted to assess the parents' attitudes towards, and understanding of, the recommended intervention (Tx3) they received by letter (from either the teacher or

school psychologist), how much the parent complied with the recommendation, and again, how reliably (percent of time) their child brought home reports (see Appendix G, page 2).

CHAPTER IV. RESULTS AND DISCUSSION

Methodological Rationale

The methodology for evaluating idiographic research data has been an area of controversy (Baer, 1977; Johnston & Pennypacker, 1980; Kazdin, 1976; Michael, 1974), centering around the statistical analysis vs. visual inspection issue (Edgington, 1967; Jones, Weinrott & Vaught, 1975; Kratochwill & Levin, 1980; Parsonson & Baer, 1978; Wampold & Worsham, 1986).

The use of traditional statistical tests (F-test, t-test) in analyzing time-series data has been criticized, primarily because properties inherent in such data may violate assumptions underlying the tests, particularly the assumption of independence (Box & Jenkins, 1970; Jones, Vaught & Weinrott, 1978). Independence exists when the correlations among pairs of observations within a population of observations are "0". Lack of independence, or "autocorrelation" among observations in time-series data, is thought to inflate the Type I error rate, leading one to reject a true null hypothesis (Toothaker, Banz, Noble, Camp & Davis, 1983). The existence of autocorrelation has been debunked by some (Huitema, 1985). Others have taken equivocal positions (R. F. Strahan, Dept. of Psychology, Iowa State University, Ames, personal communication, July 7, 1988; Suen, 1987; Suen & Ary, 1987). Other statistical methods--called time-series analyses--have been developed that ostensibly control for autocorrelated data (Box & Jenkins, 1970). The major drawback with the use of time-series methods is the

number of observations required, ranging from 50 (Glass, Willson & Gottman, 1975) to 100 (Box & Jenkins, 1970). Many applied research settings, by their very nature (schools, clinics, etc.), make the collection of such data impractical.

The visual inspection of graphic data has been the most common method of analysis, as evidenced in part by wide usage in both the experimental (Journal of the Experimental Analysis of Behavior, 1957) and applied (Journal of Applied Behavior Analysis, 1968) operant literature. Critics of visual analysis contend that it is difficult to make accurate visual discriminations in graphic data, potentially leading one to draw erroneous conclusions (De Prospero & Cohen, 1979; Gottman & Glass, 1978; Wampold & Furlong, 1981). Parsonson and Baer (1978) contend that visual inspection is a conservative approach to decision making, yielding potential benefits. They write:

> In the visual analysis of graphed data, differences between baseline and experimental conditions have to be clearly evident and reliable for a convincing demonstration of stable change to be claimed. . . . In order to produce a visible change in the data, an effect would probably have to be more powerful than that required to produce a statistically significant change. . . . The use of the less sensitive visual data analysis in behavior analysis also means that the probability of a Type II error could be higher than is the case in studies employing statistical analysis. This is because small effects do not show up as readily. . . . The less sensitive measurement technique has been advantageous in the development of a functional analysis of behavior, in that it has a built-in bias against the selection of weak and unstable variables. (p. 112-113)

They conclude:

> Regardless of any other statistical procedures that are brought into play, visual analysis of graphic data must remain the primary source on which on-going [operant] research decisions are based. It represents the most rapid, reactive, and economical data analysis procedure, capable of being used and understood by persons with

> differing levels of technical skill in a wide variety of applied and research settings. (p. 162)

The aforementioned literature leads this writer to conclude the following: a) that traditional statistical procedures (F-test, t-test) may be inappropriate for use with idiographic data; b) that time-series analyses may be too impractical for many applied research settings; c) that time-series analyses used in basic research may be of considerable heuristic value to the applied researcher; and d) that for the applied researcher interested in real-world applications, the conservative visual analysis approach may be of most benefit.

Experiment I

Results

The experimental design used in Experiment I may be termed an A-B-BC-BCD-A design (Hersen & Barlow, 1976). A problem inherent in such designs is the interpretation of data observed in the treatment phases, especially phases BC and BCD. In a standard A-B-A design, the effects of treatment B may be compared to two adjacent, nontreatment phases, A, allowing a cleaner interpretation of data. In Experiment I, however, the B phase (Tx1) is adjacent to only one nontreatment phase, BC (Tx2) is adjacent to two treatment phases, and BCD (Tx3) is adjacent to a treatment and nontreatment phase. Any data change noted in phases BC (Tx2) or BCD (Tx3) may be a function of the preceding phase, and additive in nature. Different effects may also be observed if the independent variables, though still being adjacent, were presented in another order, for example Tx2 before Tx1. Although phase BCD (Tx3) is adjacent to a

nontreatment condition (BL2), withdrawal of treatment permits no conclusions to be drawn regarding the unique effects of the treatment introduced in phase BCD (Tx3), since it follows another treatment phase. Phase B (Tx1), following a nontreatment condition, may be easier to interpret, yet is still subject to historical and maturational threats to internal validity (Campbell & Stanley, 1966). Indeed, any steady trend across phases in such a design may be due to order effects, sequence effects (additivity), historical factors, maturational factors, or any combination thereof.

Data were analyzed and graphed for the class as a unit, for each group (I and II) and for each of the 12 students in the class.

A repeated-measures ANOVA was used to analyze the variability of the percent correct among the experimental phases for the class as a unit: Baseline one (BL1), notes-home weekly (Tx1), notes-home daily (Tx2), recommended intervention (Tx3), and baseline two (BL2). The results of that analysis are summarized in Table 1, and depicted in Figure 1.

Table 1. Analysis of variance of percent correct, by treatment

Sources of variation	df	Mean squares	F-value
Treatment	4	238.15	1.2987
Error	44	183.36	

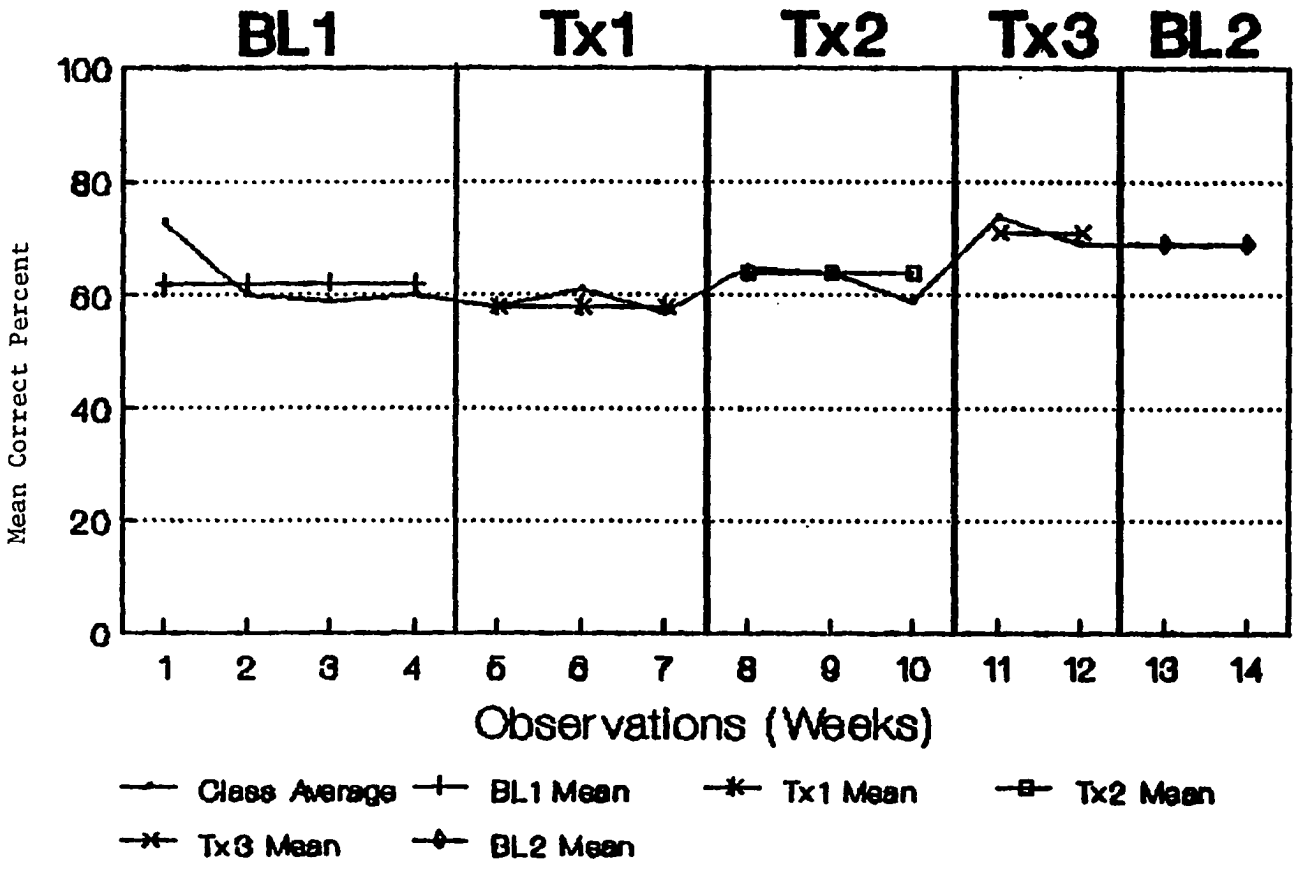

Figure 1. Class math performance as a function of baseline (BL1), weekly notes home (Tx1), daily notes home (Tx2), recommended intervention (Tx3), and baseline conditions (BL2)

Using a .05 level of significance as a criterion, the analysis suggests that there were no significant differences among the phases [(F (4, 44) = 1.30, p < .2853)]. Inspection of the graphed data (Figure 1) tends to support the statistical analysis. There appears to be stable performance from baseline one (BL1) to notes-home weekly (Tx1), with a gradual trend upward during notes-home daily (Tx2) and recommended intervention (Tx3), leveling off during the last baseline (BL2).

In examining the effects of the teacher-recommended intervention (Group 1) and psychologist-recommended intervention (Group 2) during Tx3, the performance of the 2 groups is presented in Table 2 and Figure 6, Appendix H.

Table 2. Means and standard deviations of Groups 1 and 2, during notes-home daily (Tx2), recommended intervention (Tx3), and baseline (BL2) conditions

	Tx2		Tx3		BL2	
Group	Mean	SD	Mean	SD	Mean	SD
1	60.00	6.68	68.00	4.24	66.00	--
2	67.66	2.88	70.33	4.04	79.00	--

These data show increases from Tx2 to Tx3 for both groups, with Group 1 gaining the most percentage points, and decreasing in variability from Tx2. Neither group decreased appreciably in the absence of any intervention during BL2, and Group 2 actually increased during BL2. Examination of Figure 6 reveals a gradual trend upward in these data for both groups, beginning about week 2 for Group 1 and week 5 for Group 2.

Group 2 appears to have been the stronger of the two throughout most of the study.

The repeated-measures ANOVA performed on the aggregate class data and summarized in Table 1 indicated that there were no significant differences among the means, using an alpha of .05 as criterion. One of the drawbacks of nomothetic research is the obfuscation of treatment effects on individuals within the group. This is partially exemplified in an analysis of individual performances within this general math class, summarized in Table 3 and Figures 7-18, Appendix H. An examination of individual performances reveals, for the most part, a considerable degree of variability and few clear-cut trends. On a case-by-case basis, the results may be summarized as follows:

Student 1: Performance appears to follow class average during baseline one (BL1), gets worse during the first part of Tx1, then follows the class average until week 12.

Student 2: Performance follows class average until week 4, when it falls below class average. A noted improvement coincides with the implementation of the notes-home weekly (Tx1) condition, with further improvement noted with the implementation of notes-home daily (Tx2). Performance falls to class average during week 10, and continues to approximate class performance.

Student 3: Follows class average during BL1, with a noticeable decrease during the first week of Tx1, a rebound during week 6, and fairly stable performance after that.

Student 4: This student handed in no work during the first three

Table 3. Means and standard deviations of math averages, by student and treatment condition

Student #	Baseline (BL1)		Weekly note (Tx1)		Daily note (Tx2)		Letter (Tx3)		Baseline (BL2)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD[a]
1	68.75	4.19	49.00	10.14	66.67	12.09	54.50	14.84	33.00	0.00
2	64.00	13.54	65.00	2.64	76.00	14.17	76.00	1.41	69.00	0.00
3	66.75	3.86	47.33	36.11	67.66	18.17	71.50	20.50	76.00	0.00
4	11.75	23.50	47.33	9.71	16.33	8.38	53.00	4.24	66.00	0.00
5	39.25	30.50	52.33	33.30	41.33	18.58	72.50	0.70	81.00	0.00
6	59.25	25.26	70.66	18.23	80.00	8.54	83.00	12.72	84.00	0.00
7	76.75	7.93	65.33	13.61	78.33	5.50	76.00	16.97	49.00	0.00
8	61.50	24.36	63.66	7.76	76.00	11.53	72.00	11.31	70.00	0.00
9	87.00	7.78	68.33	10.21	91.33	4.04	89.00	7.07	80.00	0.00
10	67.25	14.50	51.00	22.33	38.33	32.74	38.50	27.57	46.00	0.00
11	79.00	6.58	70.00	7.93	70.33	5.68	71.50	6.36	70.00	0.00
12	68.75	5.12	53.66	32.65	52.66	45.78	82.50	24.75	100.00	0.00

[a]Data points for BL2 (weeks 13 and 14) are both the averages of five daily data points across those two weeks.

weeks of baseline, then improved the week prior to the start of Tx1. Performance trends downward through week 10, with a marked increase during Tx3 that lasted into the second baseline (BL2).

Student 5: Performance marked by a high degree of variability. An immediate but short-lived improvement is noted with the implementation of the note-home weekly (Tx1) condition. Another improvement is correlated with the teacher-recommended intervention (Tx3) condition, that continues into baseline two (BL2).

Student 6: This student consistently outperforms the class, with ten data points above the class average, and there appears to be a gradual trend upward throughout treatment conditions. Noted improvements

are correlated with the implementation of the notes-home weekly (Tx1) and notes-home daily (Tx2) conditions.

Student 7: Consistently above the class average until week 12. Slight trend upward from week 5 to week 11.

Student 8: Closely follows class trend, with the exception of weeks 2, 3, and 10.

Student 9: No discernible overall trend, yet consistently above the class average. A noted decrease in performance is correlated with the onset of the note-home weekly (Tx1) condition. Performance begins to trend upward prior to the onset of the note-home daily condition, and remains considerably higher than the class average during that condition.

Student 10: Considerable variability, yet data appear to trend downward across treatment conditions.

Student 11: Stable responding, gradual trend downward from BL1 until closely approximating class average.

Student 12: Performance is generally above the class average, with weeks 6 and 10 notable exceptions. A notable increase in performance is correlated with the onset of the psychologist-recommended intervention (Tx3) condition.

Follow-up surveys

Three parents responded to the first survey (see Appendix G, page 1). On a scale of one to five (1 = no value, 3 = average, 5 = very valuable), two parents rated the reports as "average", one parent as very valuable. All three parents indicated that the daily reports were more

valuable than the weekly report, that their child "reliably" brought daily reports home, and that the reports provided enough information. One parent commented that a "letter grade for the day would have been helpful"; another parent commented that she thought her daughter worked a "little more intensely". Three parents responded to the second survey (see Appendix G, page 2), two of whom had responded to the first survey. All three parents indicated that they did not ignore the suggested intervention, that they did not believe it was not the parents' job to motivate kids, and that the suggested intervention was not too general and was understood. Two parents indicated that they followed the suggested intervention 75 percent of the time, one parent 50 percent of the time. Each of the three parents indicated that their child brought home reports 100, 75 and 50 percent of the time, respectively. One parent commented, "Thanks for this idea! I needed to be reminded of my responsibility and how important that is." Another parent commented, "I thought it was a good idea to keep parents informed. When parents and teachers work together, it should help the students." The third parent respondent made no comment. The two parents who responded to the first survey, and indicated that their child brought home reports "reliably", indicated on the second survey that their child brought home reports 100 and 75 percent of the time, respectively.

Discussion

An examination of the graphed class and group data (Figure 1 and Figure 6, Appendix H) suggests a general trend, beginning about week 7.

Given the data--little or no "clinically" significant improvement, as a group--attempts at teasing out contributions to the data may be superfluous. In retrospect, collection of more baseline data on both ends (BL1, BL2) of the procedure may help in determining the nature of the slight trend noted. Five daily percentages (observations) were used to calculate the data points graphed for weeks 13 and 14. This probably should have been extended for another three weeks to help determine the data trend.

In considering the differential treatment of the two groups in Tx3, slight upturns are seen in both groups, again appearing to follow a general trend line. Neither group appeared to change radically as a function of the letter the parents received, independent of the trend.

Examination of the individual data is also inconclusive. This experimenter sees no data that suggest unequivocal treatment effects, if the criteria for such effects are 1) immediate change in level of responding, 2) change in response trend, and/or 3) change in variability (Bailey & Bostow, 1979). Appropriate statistical analyses of these data may in fact illuminate ("significant") differences in level, trend, or variability across phases, but any such findings would be of secondary importance to the paucity of clinical significance noted.

Improvements in Experiment I may include the following:

(1) Introduction of baseline phases between Tx1 and Tx2, and Tx2 and Tx3.

(2) A control to insure that parents in fact receive the reports that are supposed to be taken home during Tx2 and Tx3. This

was an underlying assumption of those two treatment phases, which may have been violated to a greater degree.

(3) A control to insure that the information entered on the report by the student (and spot-checked by the teacher) is accurate.

Experiment II

Results

The results of Experiment II are summarized in Table 4, in Figure 2, and in Figures 19-23, Appendix I. Figure 2 depicts mean weekly data for all three subjects, Mark, Shawn, and Joan. The vertical line drawn between week 8.3 and 8.4 indicates beginning of treatment for Mark (TxM). The vertical line drawn prior to week 9 indicates the beginning of treatment for Shawn and Joan (TxS&J), which Mark's treatment overlaps. Figure 19 depicts the weekly performance during baseline (BL) and treatment conditions for Mark (TxM), Shawn (TxS), and Joan (TxJ). Figures 21-23 depict individual math performance across baseline (BL) and treatment (Tx) conditions, compared to the class trend. The graphed data point for each week is the percent correct of all math problems graded that week, independent of the number of math assignments for the week; therefore, data compiled in Table 4 are based on weekly data. Intervention for Mark began on Thursday of week 8; intervention for Shawn and Joan began on Monday of week 9. Mark and Shawn were in the same math class, Joan was in another class.

Mark improved from a baseline (BL) mean of 43.90 to a treatment (Tx) mean of 83.58, with BL-Tx decrease in variability (standard deviation)

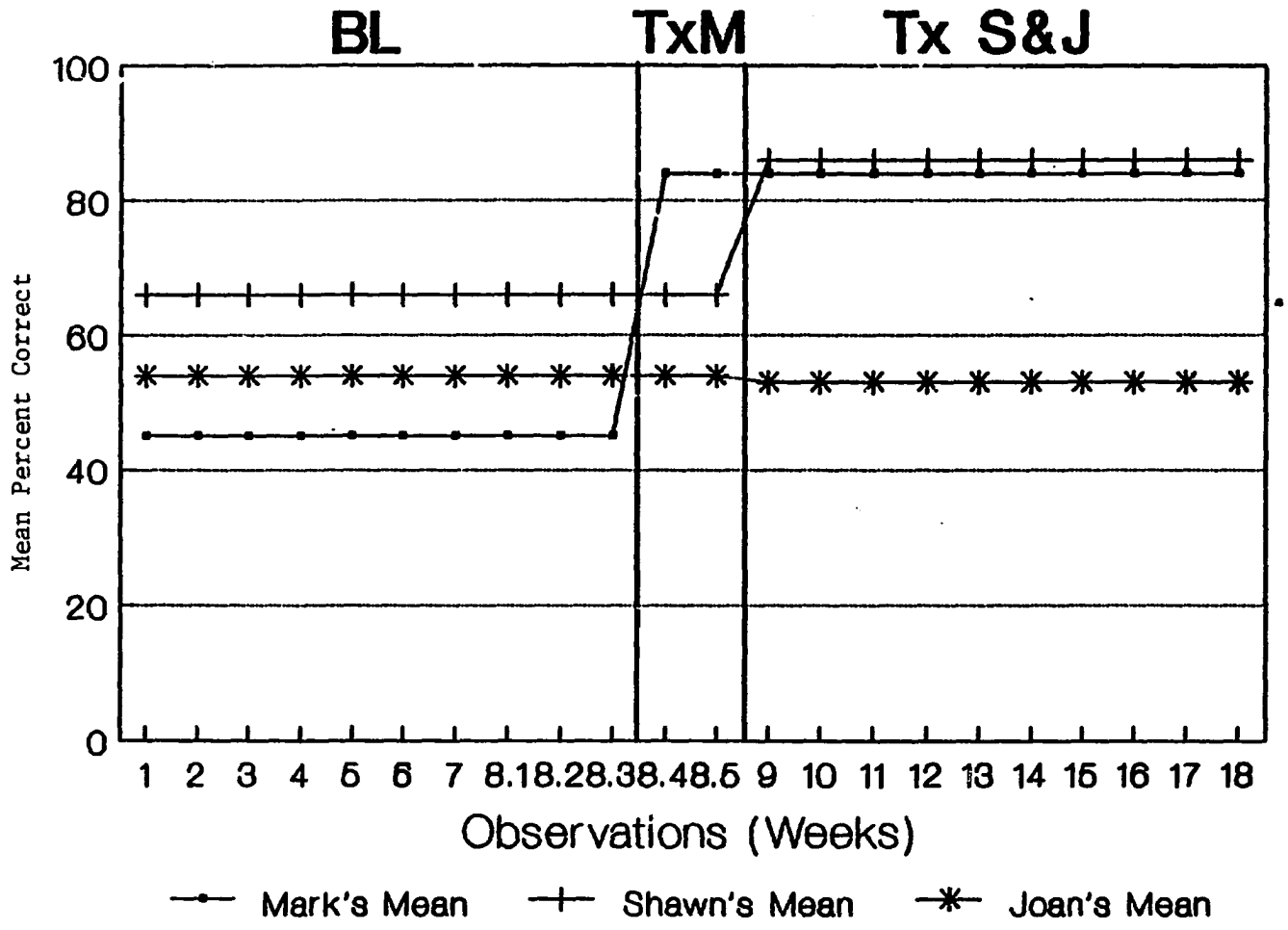

Figure 2. Mean math performance as a function of baseline (BL) and home-based management conditions cumulatively applied to Mark (TxM) and Shawn and Joan (TxS&J)

Table 4. Means and standard deviations of math performance by condition and student

Condition	Baseline (BL)		Treatment (Tx)	
	Mean	Standard deviation	Mean	Standard deviation
Mark	43.90	32.98	83.58	14.03
Shawn	66.22	21.98	86.10	17.54
Joan	53.57	19.68	52.87	40.74

from 32.98 to 14.03. An examination of his graphed performance (Figure 20, Appendix I) reveals a pronounced downward trend during BL, ending during week 8 with three daily zero scores just prior to intervention. Since intervention was begun during week 8 (Thursday) rather than at the beginning, each day of week 8 is expressed as a separate data point to more clearly highlight the change from BL to Tx conditions. Upon implementation of Tx, Mark's performance improved immediately (the next day), with one below average data point observed throughout the remainder of Tx. In addition to changes in level (mean) and variability (SD), there is also a marked change in trend from BL to Tx, the latter more in line with the overall class trend. Parenthetically, the percent of assignments not turned in went from 26 during BL to zero during Tx, and his grade for daily work went from an "F" during BL to a "B" during Tx. His grade for the term, including test scores and daily work, was a "C+".

Shawn improved from a BL mean of 66.22 to a Tx mean of 83.58, with a decrease in variability from a standard deviation of 21.98 (BL) to 17.54 (Tx). An examination of Shawn's graphed data (Figure 21, Appendix I)

indicates a downward trend in performance during BL, ending with a 30 percent weekly average during week 8, just prior to intervention. Tx went into effect on Monday of week 9, with an immediate improvement in performance noted (89 percent correct). Along with an increase in mean performance and decrease in variability during Tx, Shawn's trend appears to more closely approximate the class trend. During BL, Shawn failed to turn in seven (21 percent) of her assignments, while during Tx she failed to turn in one (3 percent) assignment. Her grade on daily work during BL was a "D", which rose to an "A-" by the end of Tx. Her grade at the end of the term, which reflected both daily work and test scores, was a "C".

Joan's mean performance, by and large, did not change from BL to Tx, yet variability increased over the same period (see Table 4). Her graphed performance (see Figure 22, Appendix I) appears to trend downward during BL, with a slight upturn during week 8, just prior to intervention. Joan's average for week 9 was 99 percent, which tapered to a low of zero percent during weeks 12 and 13. No assignments were turned in during those two weeks. There appears to be an absence of a clear-cut trend during Tx. Joan failed to turn in 12 (36 percent) assignments during BL, and 13 (39 percent) during Tx. Joan's daily work grade during BL was a "D", which did not change at the end of Tx. Her grade for the term, which included both daily work and test scores, was a "D-".

Reliability

Reliability during BL and Tx was 100 percent, meaning that the target subjects' papers, as scored by student scorers and reviewed by

this experimenter, agreed with a scoring key. Spot checks by the classroom teacher, a normal classroom procedure, yielded the same results. This procedure controlled only for errors in student scoring, not for cheating on the part of the target students. Since students were allowed to work their assignments out of class, there were no controls for getting answers to the problems from other sources, such as parents or students.

Discussion

The data reviewed above suggest that there may exist a functional relationship between the independent variable (home-based contingency management program) and dependent variable (percent of math problems worked correctly) for two of the target subjects, Shawn and Mark. The design used in this experiment, a multiple-baseline design across persons, may demonstrate treatment effectiveness ". . . when a change in rate appears after its application while the rate of concurrent (untreated) behaviors remained relatively constant. A basic assumption is that the target behaviors are independent from one another" (Hersen & Barlow, 1976, p. 226). Inference of a treatment effect for Mark and Shawn may be made from the following:

(1) An increase in level, from BL to Tx.

(2) An immediate, rather than delayed, increase.

(3) An increase in Mark's performance prior to an increase in Shawn's performance, when both are in the same class.

(4) A decrease in variability from BL to Tx.

(5) Lack of similar changes in the class trend line.

A major threat to the internal validity of this experiment is cheating, which was not controlled for. Test performance was combined with daily work, resulting in term grades of "C+" and "C" for Mark and Shawn, respectively. Since the grades for their daily work were "B" and "A-", respectively, it can be hypothesized that test performance would have to be considerably lower in order to drag the daily work grade down (assuming equal weighting), such that the overall average for both was in the "C" range. If actual learning of math took place as a function of diligent homework application, one could logically expect some generalization of those skills to a test situation over similar material (Stokes & Baer, 1977). Cheating, or otherwise not acquiring those skills, may manifest itself in poor test performance. Therefore, cheating remains a plausible alternative explanation for the data observed during Tx. For Joan, lack of a treatment effect is self-evident when considering the procedure in its entirety. Yet, the immediate improvement in performance noted upon Tx implementation cannot be discounted. This improvement, though trending downward, remained above BL levels until week 12, when another academic subject (science) was added to Joan's program (see Experiment III). Beginning with week 12, the home-based contingencies in effect for math performance were in effect for both math and science. Due to poor performance in both areas during week 14, science was dropped from the program effective at the beginning of week 15. Math improved during week 15, but dropped again during weeks 16 and 17.

The intervention employed during Tx had two major components for

each student--the note-home component and the contingency program provided by the parent, and the latter was somewhat different for each student. Which part of the total treatment package accounted for most of the variance observed during Tx for Mark and Shawn is indeterminate. Anecdotally, comments made to this experimenter by Shawn suggest that the monetary component of her program was particularly reinforcing. On the other hand, comments made by Mark's parents, as well as a generalization effect to a nontargeted subject area (see Experiment III), suggest that the notes going home may have been sufficient to generate the data in Mark's Tx phase.

In evaluating the overall effectiveness of the procedure carried out in Experiment II, one must consider whether or not a functional relationship between the dependent and independent variables was demonstrated, threats to internal validity notwithstanding. It is the opinion of this experimenter that such effects were demonstrated for Mark and Shawn, less so for Joan, although a case could be made for her. When Joan's Tx involved a contingent relationship only for math (not the addition of science), her math performance was above the BL mean on 4 out of 7 data points. In retrospect, this experimenter should not have intervened in science in addition to math, given the downward trend in her data at the time.

Experiment III

Results

Experiment III was essentially a continuation and expansion of Experiment II. Experiment III evolved from a multiple-baseline design across persons to a multiple-baseline design across academic subject areas, within each student, using a cumulative (as compared to moving) treatment (Bailey & Bostow, 1979). The treatment (home-based contingency management) for math in Experiment II was applied to successive baselines in social studies and science (Mark and Shawn) and science (Joan) in Experiment III, in addition to continuing with math. Data were collected on the "percent correct" of daily assignments in English, for comparison purposes. The results are summarized in Tables 5-7 and in Figures 3-5. Both tabled and figured data are based upon weekly data, which in turn are based on daily percentages. Therefore, the variability represented in both tabled data (standard deviations) and figured data (trend lines) is compressed. Figures depicting the mean erformance of each student (i.e., Figures 5, 6, and 7 for Mark, Shawn, and Joan, respectively) are in the body of the text. The figures in Appendix J are grouped by student; i.e., Figures 23-27 (Mark), Figures 28-32 (Shawn), and Figures 34-37 (Joan). The second figure for each student (i.e., Figures 23, 28, 33 in Appendix J) depicts graphed weekly data for all three targeted subject areas. The vertical phase lines in the body of the graph indicate points at which treatment was added for the targeted subject areas. For example, Figure 21 (Mark) indicates that treatment for math (TxM) was begun on Thursday of week 8 (8.4), treatment for social studies

(TxSS) was begun at the beginning of week 11, with math continuing, and treatment for science (TxSC) was begun at the beginning of week 14, with math (TxM) and social studies (TxSS) continuing. The last four figures for each student depict performance in each separate subject area, with the vertical phase line indicating point of intervention, and includes a trend line for the class average.

Mark's performance is summarized in Table 5, and depicted in Figure 3 and in Figures 23-27, Appendix J. As Experiment II indicated, Mark's

Table 5. Means and standard deviations of Mark's academic performance, by condition and subject

Condition	Baseline (BL)		Treatment (Tx)[a]	
	Mean	Standard deviation	Mean	Standard deviation
Math	43.90	32.98	83.58	14.03
Social studies	45.40	23.78	77.85	27.00
Science	48.23	23.31	90.20	7.05
English	72.85	23.60	39.83	33.92

[a]No treatment was applied to English. Data displayed indicate performance during treatment for other subject areas, beginning week 9, ending week 18.

performance in math improved from baseline (BL) to treatment (Tx) conditions. During the time math was intervened on exclusively, during weeks 9-10, his performance in social studies trended downward, ending baseline (BL) at week 10 (see Figure 25). During the same period, performance in science improved somewhat (see Figure 26), and performance

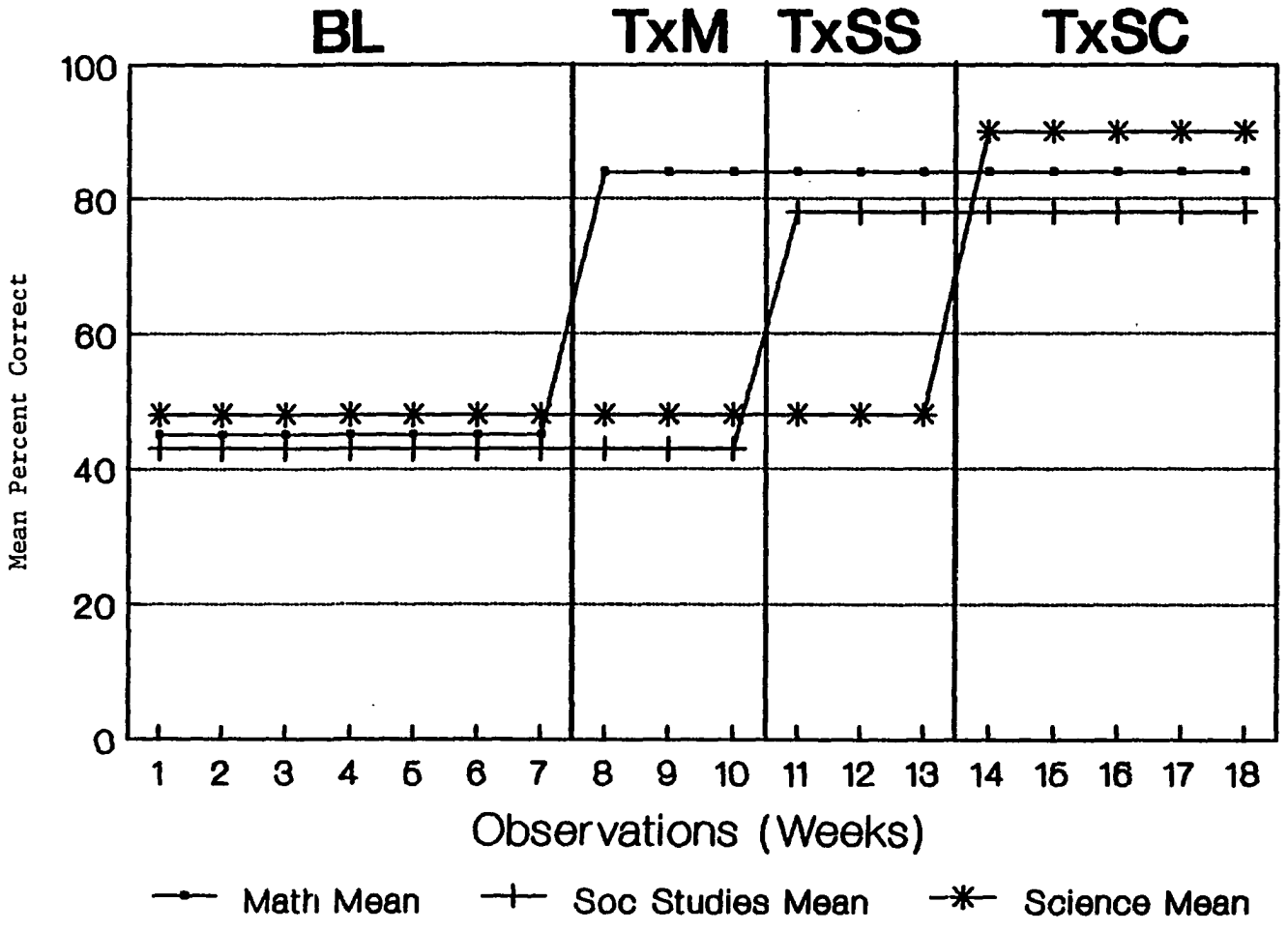

Figure 3. Mark's mean academic performance as a function of baseline (BL) and home-based management, cumulatively applied to math (TxM), social studies (TxSS) and science (TxSC)

in English hit bottom (see Figure 27), following a trend that had begun after week 6. Beginning with week 11, social studies was added to Mark's home-based contingency management program. Mark's BL mean was 45.40, with a standard deviation of 23.78. During Tx, his mean performance increased to 77.85, while his standard deviation increased slightly to 27.00. Mark's first week of social studies treatment (week 11) was his lowest data point (24 percent correct) for the phase. Four of six Tx data points were above the class average. During BL Mark failed to complete 15 (34 percent) assignments. This number fell to four (13 percent) during Tx. During the period that math and social studies were intervened upon exclusively (weeks 11-13), Mark's performance in science followed the class trend, and his performance in English began an upturn. Science was added to the program at the beginning of week 14, which meant that the consequences at home were now contingent upon performance in math, social studies and science. Mark's BL performance in science included a mean of 48.23 and a standard deviation of 23.31. During Tx, his mean improved to 90.20, with a substantial decrease in standard deviation to 7.05. Mark's last data point prior to science treatment (TxSC) was 51 percent, which jumped to 93 percent the first week of TxSC, and remained above the 80 percent level during that phase. During BL, which for science was weeks 1-13, Mark failed to hand in 39 percent of his daily assignments. During TxSC, all assignments were handed in. The effect on other subjects of adding science to the program was negligible. English, the untreated subject area (see Figure 27), continued to trend upwards. Data for English reveal a mean of 72.85 and a standard

deviation of 23.60 during the first eight weeks, when no subjects were intervened upon. From weeks 9-18, when the other subjects were cumulatively intervened upon, English dropped to a mean of 39.83, and a SD of 33.92. However, examination of the trend line (Figure 27) suggests an upturn in trend during treatment of targeted subject areas, beginning week 12. During BL (weeks 1-7) for Mark, he failed to turn in one (5 percent) assignment. During Tx for the targeted subjects (weeks 8-12), he failed to turn in six (38 percent) assignments. An examination of the raw data indicates that five of the six assignments were not handed in during weeks 8-10, which coincides with the onset of treatment for math.

Shawn's performance is summarized in Table 6 and depicted in Figure 4, and in Figures 28-32, Appendix J. Experiment II showed that Shawn's

Table 6. Means and standard deviations of Shawn's academic performance, by condition and subject

Condition	Baseline (BL)		Treatment (Tx)[a]	
	Mean	Standard deviation	Mean	Standard deviation
Math	66.22	21.98	86.10	17.54
Social studies	51.70	32.80	75.00	21.95
Science	61.92	20.89	72.75	12.97
English	60.28	23.59	54.50	19.94

[a]No treatment was applied to English. Data displayed indicate performance during treatment for other subject areas, beginning week 9, ending week 18.

math performance improved from BL to Tx conditions. While math was being intervened upon alone, social studies continued a trend downward,

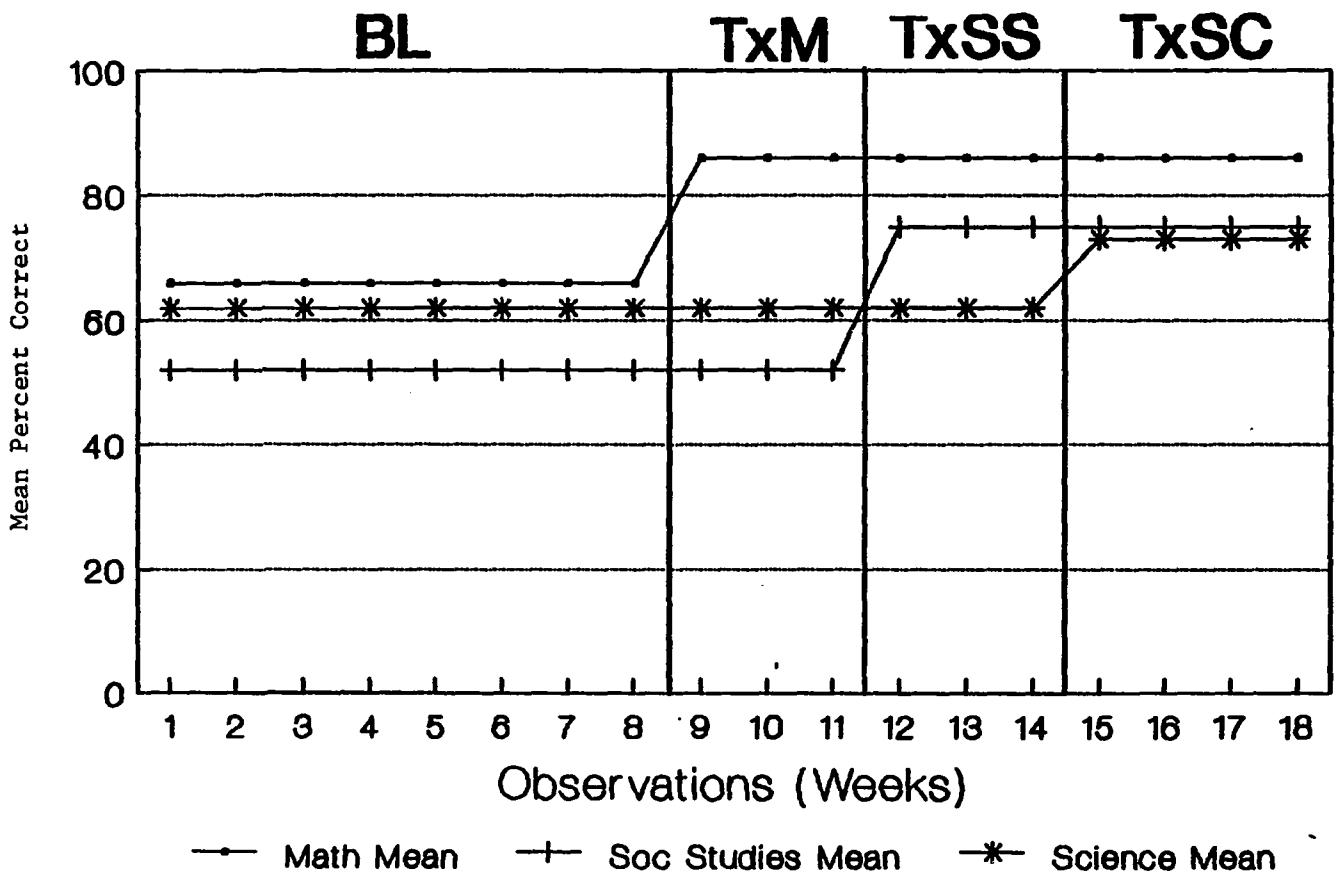

Figure 4. Shawn's mean academic performance as a function of baseline (BL) and home-based management, cumulatively applied to math (TxM), social studies (TxSS) and science (TxSC)

rebounding just prior to treatment, which began week 11. Science remained stable during math Tx, and English performance dropped during week 10. The BL mean for social studies (weeks 1-10) was 51.70, with a SD of 32.80, which improved to a mean of 75.00 and a SD of 21.95 during Tx. Shawn's BL trend line displays considerable variance, which decreases considerably during Tx (see Figure 30). During the period that math and social studies were treated exclusively (weeks 11-14), math remained stable, science trended downward, and English (Figure 32) remained variable. During social studies BL (weeks 7-10), Shawn failed to hand in 15 (34 percent) assignments. This dropped to one (3 percent) during TxSS (weeks 11-17). Science was added to the total program, beginning week 15. Shawn's BL mean (weeks 1-14) was 61.92, with a standard deviation of 20.89. During TxSC, her mean performance rose to 72.75, with a decrease in SD to 12.97. Shawn's trend line (see Figure 31), although showing less variability during Tx, is not really extensive enough to make a direct comparison to BL. Shawn failed to hand in six (21 percent) assignments during BL, and handed them all in during Tx. A downturn in the data for math and social studies (week 17) is apparent during TxSC, yet is far enough removed from TxSC onset (2 weeks) that a "ratio strain" effect (Whaley & Malott, 1971) is questionable. Due to the variability inherent in Shawn's English data (see Figure 32), it is difficult to determine the effect, if any, that the addition of science had on her English performance. Shawn's mean performance in English prior to any intervention (weeks 1-8) was 60.28, which decreased slightly to 54.50 for the period that the object subjects were being treated

(weeks 9-18). Shawn failed to hand in three assignments (13 percent) during BL, one assignment (9 percent) during Tx.

Joan's performance is summarized in Table 7, and displayed in Figure 5 and in Figures 33-37, Appendix J.

Table 7. Means and standard deviations of Joan's academic performance, by condition and subject

Condition	Baseline (BL)		Treatment (Tx)[a]	
	Mean	Standard deviation	Mean	Standard deviation
Math	53.57	19.68	52.87	40.74
Social studies	23.72	14.77	28.66	32.91
Science	61.14	8.11	33.88	25.50
English	20.83	23.01	45.50	38.02

[a]Neither social studies nor English was treated. Data displayed indicate performance during intervention period for math and science, beginning week 9, ending week 18.

Experiment II resulted in a brief increase in Joan's math performance, which began trending downward just prior to science intervention, which began week 12 (see Figure 33). During math Tx alone (weeks 9-11), science trended upward, social studies was trending downward, and English remained variable (see Figure 37). Science was added to Joan's program beginning with week 12. Joan's science BL mean was 23.72, with a SD of 14.77. During TxSC (weeks 12-18), Joan's mean was 28.66, with an increase in SD to 32.91. Joan's trend line during BL (see Figure 31) was upward, and continued rising into Tx (week 12) until

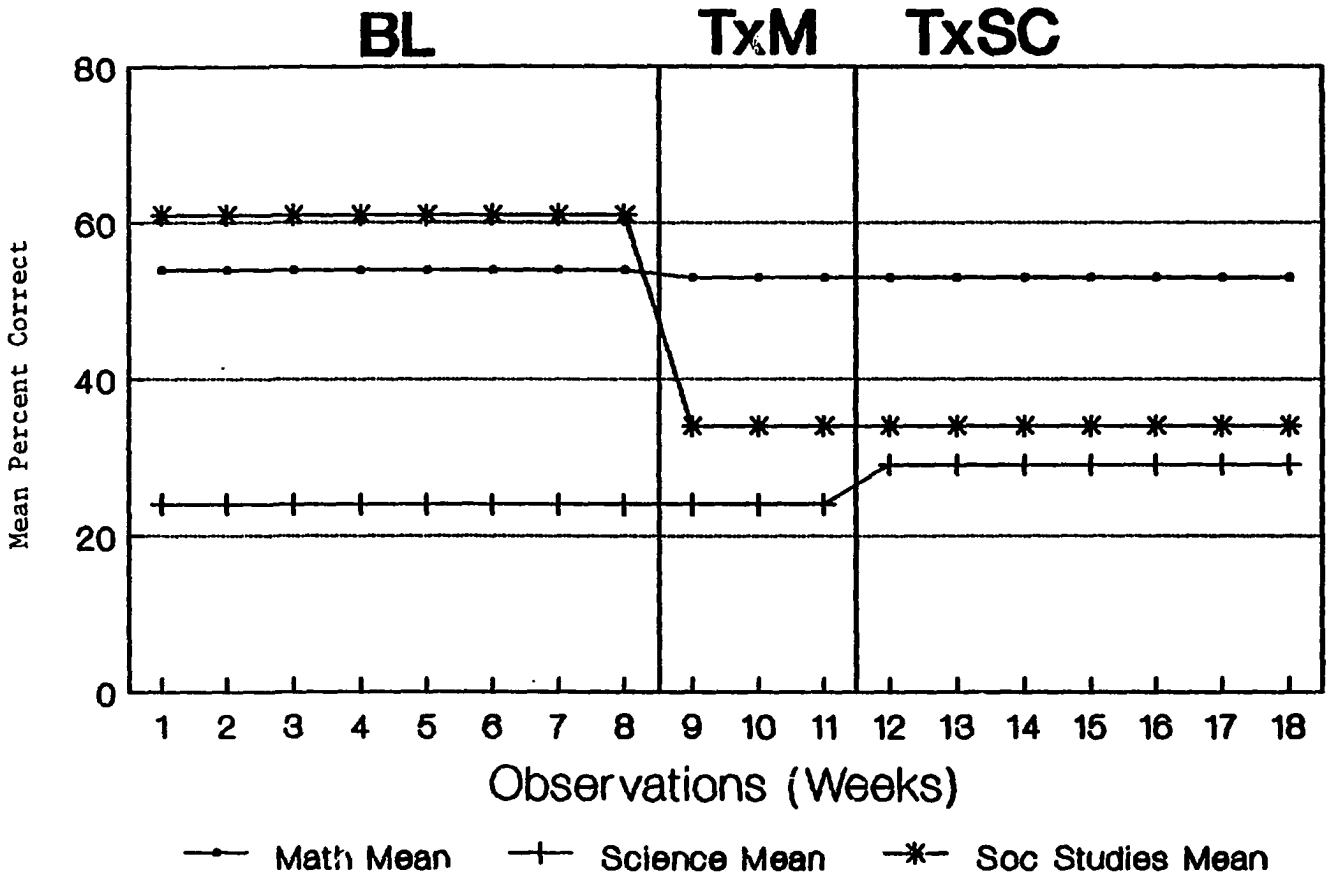

Figure 5. Joan's mean academic performance as a function of baseline (BL) and home-based management, cumulatively applied to math (TxM) and science (TxSC)

weeks 14 and 15, when Joan failed to turn in any work. During science BL, Joan failed to turn in 14 (46 percent) assignments, and during Tx, six (46 percent) assignments. The introduction of science appears to be correlated with a marked decrease in math performance (see Figure 33), an immediate but temporary improvement in social studies performance and a negligible effect on English performance. Joan's mean percent correct in English during BL (weeks 1-8) was 20.83, with a SD of 23.01. During Tx of other subjects (weeks 9-18), Joan's mean increased to 45.50, as did the SD, to 38.02. Although Joan's percent correct doubled from BL to Tx, one could hardly call that "clinically significant," since it is still in the failing range. Due to the negligible improvements noted in math and science during TxSC (see Figure 33), social studies was not added to the program, although data continued to be collected.

Reliability

Reliability was checked for social studies as it was in math (Experiment II), by the experimenter rechecking assignment papers that were scored by a student scorer, for each student, on a biweekly basis. No discrepancies were found. The science teacher, rather than her students, scored assignments; therefore, reliability was not taken in science. Nor was reliability taken in English, since it was not a targeted subject area. As was mentioned in Experiment II, the benefit of reliability checks was to control for mis-scoring--intentional or otherwise—by student scorers. It did not control for cheating on the part of the target students.

Discussion

While Experiment II attempted to investigate whether or not a functional relationship existed between the treatment and (same) dependent variable across persons, Experiment III attempted to investigate whether or not a functional relationship existed between the independent variable and three different dependent measures (response classes), within persons, in a cumulative fashion. Evidence for and against such a demonstration will be reviewed below.

In the case of Mark, evidence for treatment effects is as follows:

(1) An increase in performance level, from BL to Tx, for all three subject areas.

(2) A change in performance level that coincided with introduction of the independent variable.

(3) A decrease in variability from BL to Tx, in two subject areas.

(4) Replication of the effect across three different response classes (math, social studies, science), in staggered fashion.

(5) Absence of similar levels of change in class trend in targeted subject areas, across BL and Tx conditions.

(6) An increase in the percentage of assignments completed, from BL to Tx, in all three target subject areas.

Evidence questioning treatment effects is as follows:

(1) In science (Figure 26), the data appear to trend slightly upward during BL. Although Tx data are fairly high and stable, it is possible to view the Tx phase as a continuation of the trend evident during BL, independent of intervention.

Evidence for treatment effects with Shawn is as follows:

(1) An increase in performance level, from BL to Tx for all three subject areas.

(2) An increase in performance that coincided with the introduction of the independent variable.

(3) A decrease in variability from BL to Tx, in all three subject areas.

(4) Replication of the effect across three different response classes (math, social studies, science), in staggered fashion.

(5) Absence of similar increases in class trend in targeted subject areas, across BL and Tx conditions.

(6) An increase in the percentage of assignments completed, from BL to Tx, in all three targeted subjects.

Evidence questioning treatment effects is as follows:

(1) Social studies intervention (see Figure 30) was begun immediately after an upturn in the data, which occurred week 10. It is possible that the following data point (week 11) was a continuation of the trend upturn, and independent of any Tx effect.

(2) Although Shawn's science data reflected improvement (see Figure 31) from BL to Tx, the comparison is made on the basis of 14 data points (BL) to four data points (Tx). Considering the difference in number of observations, and considering the overall trend line from weeks 1-18, it is possible that the Tx data may in fact be a smaller sample of an overall (Tx) trend

that approximated the trend established during BL. More data points during Tx are needed for clarification.

In the case of Joan, evidence for treatment effects is as follows:

(1) During the time math was treated exclusively (weeks 9-11), performance improved considerably (mean = 81) over BL (mean = 53.57).

(2) In science, an improvement in mean performance was noted from BL to Tx conditions.

Evidence against treatment effects is as follows:

(1) Upon the addition of science to Joan's Tx, math performance plummeted. This suggests that either the initial Tx effect on math (weeks 9-11) was very weak, or math performance was independent of the Tx.

(2) Addition of science to the program resulted in increased variability (see Figure 35), and not a "clinically" significant improvement in performance. Joan was still performing in the "F" range on daily work, in general, during Tx.

Due to the trend in data during Tx for both math and science, social studies was not added. This experimenter induced that if the treatment could not produce clinically significant improvements in two subject areas simultaneously, it could not do so for three.

In the cases of Mark and Shawn, cheating outside of class remains a possible explanation for the observed treatment effects, more so in math and social studies than in science. Many daily grades in science were based on lab work, completed in class. However, that still did not

totally prevent students from exchanging information during labs.

As in Experiment II, the independent variables (treatment package) in Experiment III consisted of two major parts--the report home, and the contingencies in effect at home. In the case of Mark, the differential effects of either component are indeterminable. Although, anecdotally, after having had contact with his parents on several occasions, this experimenter surmises that they were fairly strict disciplinarians, and that the contingencies specified in the program may have been superfluous to the daily reports. In Shawn's case, it was fairly evident after conversations with her and her parents that the monetary component of the program was making a significant contribution to the treatment effect. Each time a subject area was added to her program, the monetary reinforcement increased by 25 cents. Lack of positive treatment effects with Joan may have been due in part to the home situation. Both parents were employed, one working a day shift, the other a night shift. There was evidence of marital problems, and behavior problems with an older sibling.

Improvements in Experiment III may include the following:

(1) The dependent measure--daily assignments--could be expanded to include test/quiz scores.

(2) Develop a systematic method to monitor parent compliance with program follow-through.

(3) Develop a quantitative profile of student's academic history (assignments turned in, for example) and develop a model to help determine likelihood of success of parent-managed program.

(4) Develop a profile of parents' child management practices (for example, loose vs. strict disciplinary philosophy) and develop model to coincide with C above.

CHAPTER V. GENERAL DISCUSSION

The purpose of this study was to contribute to the existing literature on the nature of parent influence on the academic achievement of children. This was attempted by performing three separate but related experiments, via an idiographic research methodology, designed to address questions related to the issue, as stated in Chapter I. These questions will now be addressed, experiment by experiment.

Experiment I

1. What happens to math assignment performance (dependent variable) when performance reports are mailed to parents at the end of the week by the teacher (independent variable)?

For the class in the aggregate (N=12), graphed data (see Figure 1) indicated that mean performance decreased when parents received weekly reports. Examination of individual performances reveals mixed results. Some students (i.e., students 2, 4, 5, 6) appeared to benefit somewhat, yet others (i.e., students 1, 3, 9, 10, 11) did not. There were no remarkable increases in performance that could be directly attributable to weekly notes home.

2. What happens to math assignment performance (dependent variable) when performance reports are taken home to parents by their child each day an assignment is due (independent variable)?

For the class in the aggregate, there appeared to be a slight improvement in performance when compared to weekly notes, but not so when compared to baseline conditions (see Figure 1). Examination of individual performances revealed mixed results. Some students (i.e., students 2, 7, 8 and 9) appeared to benefit; others (i.e., students 4,

10) exhibit either decreases in performance or no change. This suggests that for some students, math assignment performance may improve if parents are informed of their performance on a frequent basis; others may not.

3. What is the effect on math assignment performance (dependent variable) when a teacher-recommended home-based contingency management intervention is mailed to the parents (independent variable)?

For these students (Group 1, N=6), there appeared to be an improvement (see Figure 6) although, given the nature of the design, it is difficult to attribute the observed data to any one factor. The effect may be a function of a general overall pre-established trend, an additive effect from the previous condition, a unique treatment effect, or any combination thereof. Of the six students in Group 1, four improved during this condition (i.e., students 2, 3, 4 and 5).

4. What is the effect on math assignment performance (dependent variable) when a psychologist-recommended home-based contingency management intervention is mailed to parents (independent variable)?

For these students (Group 2, N=6), there was a slight improvement in performance, in general. However, examination of individual data indicated that only one student (i.e., student 12) improved significantly from the previous condition. Again, it is difficult, given the design, to attribute the improvement solely to the effect of the treatment.

Experiment II

1. What is the effect on math assignment performance (dependent variable) of students for whom a home-based contingency management plan (independent variable) is specifically designed?

Math assignment performance was (clinically) significantly improved for two of three students for which this procedure was implemented.

2. What is the effect on students' performance in other subject areas (English, social studies, science) when performance in math is specifically targeted for intervention?

For Mark, social studies performance decreased, science performance was mixed, and English performance plummeted. Shawn's social studies performance was zero percent during the first week of math intervention, then climbed to average levels just prior to social studies intervention. Science remained largely unchanged, as did English. Joan's science performance remained below the passing level, as did social studies and English Science continued a slight trend upward. It appears that Shawn may have diverted resources away from social studies, and Mark diverted resources away from both social studies and English, during math treatment.

Experiment III

1. What is the effect on the academic performance of each student in math (dependent variable) and science (dependent variable) when home-based contingencies are applied to performance in both subjects simultaneously (independent variable)?

This part of Experiment II was conducted with Joan, exclusively. When the independent variable was applied to math and science simultaneously, math performance immediately decreased from previous levels, and science temporarily increased. The overall effect was to increase the variability in both subject areas, and produce a small net improvement in science (see Figure 35), and a decrease in math (see

Figure 34).

2. What is the effect on the academic performance of each student in math (dependent variable), science (dependent variable), and social studies (dependent variable) when home-based contingencies are applied to performance in all three subject areas simultaneously (independent variable)?

This part of Experiment III was completed with Mark and Shawn. The data indicated that, with both students, the home-based contingencies had an overall positive impact on all three subject areas, when applied simultaneously. This suggests that, with some students, it may be possible to target more than one subject area for improvement using a home-based contingency management plan.

Implications

The results of the current study (Experiments I-III) imply the following:

(1) That feedback alone may not be as effective as feedback plus a systematic, home-based contingency management plan in improving academic performance. This is consistent with research by Bailey et al. (1970) and Sluyter and Hawkins (1972). The current study adds to the existing literature by comparing the frequency of feedback (weekly vs. daily) math performance (Experiment I). The results of this portion of the study are equivocal.

(2) That an intervention recommended by the school psychologist or classroom teacher, via a letter, may have a slight positive impact on some students. This varies somewhat with Karraker's research (1972), which showed an improvement in math (to 90 percent) for

children whose parents received a "letter" form of training, similar to that conducted in Tx3 of Experiment I. The discrepancy points out that, differences in subjects, settings and procedures notwithstanding, generalization in idiographic research is a tenuous undertaking. The most that can be said about the letter-recommended intervention in Experiment I is that it may be of questionable value for most of the students it was used with.

(3) That when parents are provided feedback about academic performance, as well as a systematic behavior management plan to use in conjunction with the feedback, clinically significant gains in achievement may be possible. These results are consistent with the findings of Bailey et al. (1970), Sluyter and Hawkins (1972), and Schumaker et al. (1977). The current study (Experiments II and III) extends the generality of the previous finding across behaviors, settings, students, teachers and parents, to a limited degree. The lack of positive results with Joan constrains the degree of generality.

(4) That the type of report sent home to parents need not be detailed or extensive. Positive results were obtained with Mark and Shawn (Experiments II and III) using a simple report form. This supports findings by Bailey et al. (1970), Karraker (1972) and Sluyter and Hawkins (1972), all of whom used relatively simple report forms in their research.

(5) That extensive parent training is not necessary for home-based procedures to be effective. In Experiments II and III, parents were

provided with a program to follow, but not otherwise trained in behavior management procedures. The results obtained with Mark and Shawn suggest that this was a sufficient procedure; the results obtained with Joan raise questions. The total time spent with each set of parents prior to intervention was approximately one-half hour, which is roughly similar to one of the training conditions in Karraker's study (1972), which was also successful.

(6) That home-based contingency management programs may be successful with secondary students, more specifically, seventh graders. This supports previous research by Heaton, Safer, Allen, Spinnato and Prumo (1976) and Schumaker et al. (1977).

(7) That home-based contingency management programs may be successful with Iowa students. The current study adds to the existing literature in that no previous research has been published using Iowa students. The current research supports previous, unpublished research conducted by the author, using students ranging in grades from pre-school to high school seniors.

Delimitations

Given the nature of the research methodology used in this study, the results obtained herein, successful or otherwise, may not be generalizable to other students, academic subjects, settings or procedures.

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APPENDIX A

TO: Mr. and Mrs. (parent)

FROM: Mrs. (teacher), (student)'s math teacher

RE: (student)'s performance in math this week

DATE: Friday,

1. (student) correctly worked _____ percent of all math problems assigned this week.
2. (student) failed to hand in _____ completed assignments this week.
3. (student)'s performance is (worse, about the same, better) than last week's performance.

TO: Mr. and Mrs. (parent)

FROM: Mrs. (teacher), (student)'s math teacher

RE: (student)'s performance in math this week

DATE: Friday,

1. (student) correctly worked _____ percent of all math problems assigned this week.
2. (student) failed to hand in _____ completed assignments this week.
3. (student)'s performance is (worse, about the same, better) than last week's performance.

APPENDIX B

DAILY REPORT

TO: Mrs.

FROM: Mrs. , Math teacher

RE: 's performance in math today

DATE: _____

1. There was no assignment graded today. _____
(teacher initials)

2. Your child correctly worked _____ out of _____ assigned problems that were corrected today.

3. Your child failed to hand in an assignment today. _____
(teacher initials)

Please sign, indicating that you have seen this report, and return to school with your child.

Parent Signature: _____

APPENDIX C

Dear Mr. and Mrs. ___(parents)___

It is sometimes difficult for teachers to motivate students to do their very best. Often this can be accomplished when parents are supportive of the teachers' efforts. The past few weeks I have been sending home reports of your son/daughter's progress, and think that he/she can improve his/her math grades if he/she improves his/her effort.

You could help a great deal by explaining to him/her that you think school is very important, and that in order to take part in certain privileges at home, s(he) must do well in school. I have seen considerable improvement in school performance in other students where the parents have made things like watching TV, staying up later at night, going out after school, etc. depend on good reports from school. I suggest that, when _____ brings home a report that shows improvement, that s(he) be allowed to do the things s(he) likes best that day. When a report shows poor performance, I suggest that s(he) not be able to do the things s(he) likes best (TV watching, talking on phone, etc.). These reports will continue for the next few weeks. Thank you very much for your support.

Sincerely,

_____

APPENDIX D

TO: Mrs.
FROM: Mrs. , 's math teacher
RE: 's progress in math today
DATE:

's progress in math today was (circled)*

Satisfactory Unsatisfactory

* Satisfactory means that all assigned work has been handed in on time and is at least percent correct. Satisfactory may also be circled if no class was held, no assignment was given, the teacher was unable to evaluate the work, or a substitute teacher was present. Unsatisfactory means that an assignment is late or less than percent accurate.

Please sign, indicating that you have seen this report and return it to the school with .

_____
Mrs.

APPENDIX E

TO:
FROM: Bill Matthew, School Psychologist
DATE:
RE:

The purpose of the following plan is to connect ____'s academic progress with the things ____ enjoys doing out of school, so that being allowed to do those things depends on doing well in school. Once ____ learns that privileges at home depend on good performance in school, good performance in school should increase. It is very important to be consistent in following the plan. Explain to ____ exactly what you expect of ___ and what the following conditions are:

1. If on any day ____ brings home a report with math circled "satisfactory", the following happens:
   a.
   b. (Privileges to be allowed itemized here)
   c.
   d.
2. If on any day ____ fails to bring home a report for any reason (losing it or forgetting it are not valid excuses), or brings home a report with math circled "unsatisfactory", the following happens that evening:
   a.
   b. (Privileges to be denied itemized here)
   c.
   d.
3. If on any Saturday ____ has no more than one zero on the calendar for the previous week,
   a. (Zeroes are put on the calendar each day an unsatisfactory
   b. report is brought home. Privileges allowed on Saturday
   c. are itemized here)
4. If on any Saturday ____ has more than one zero on the calendar for the previous week,
   a.
   b. (Privileges to be denied on Saturday itemized here)
   c.

<u>What can be expected initially</u>?

A. <u>She/He</u> may say <u>she/he</u> "lost" or "forgot" the report - follow through with #2 above.

B. <u>She/He</u> may bring home a report with unsatisfactory circled; follow through with #2 above.

Both A and B are common, and mean only that the system is being tested to see if the parent really means to follow through with the program.

C. When first following through with the negative consequences (#2 and #4 above), you can expect whining, crying, anger, excuses, bargaining or any other behavior that has worked in the past in getting ___ way or in getting ___ out of something. These are normal attempts to maintain the situation the way the child is used to.

Why this may not work:

A. The most common reason is that the parents do not follow through with the program or follow through with it inconsistently. Most often, a parent "gives in" to the child's behavior mentioned in "C" above. A parent often would rather give in than to have to listen to whining and crying or see their child unhappy. When parents do give in, the child learns that ___ behavior "works" in getting ___ way, and she/he also learns that the parents can be manipulated, regardless of what the parents say the child must do.

B. Lack of effective rewards and punishments: The child must value the rewards given, and must dislike losing certain privileges.

C. In order for rewards to be effective, they must not be available elsewhere or be given when the desired behavior does not occur.

D. Not rewarding immediately - the rewards (and the privileges withheld), must be given (and withheld) as soon as possible after the behaviors occur, and when promised - not in the distant future.

E. Not giving the system a chance to work - the program must be followed through with consistency for a period of time.

F. Lack of consistency from both parents: If it's a two-parent home, both parents must follow the program.

Who is responsible for maintaining this program?

The teachers and the parent, in a cooperative effort.

A. Teachers are responsible for making accurate evaluations of the student's progress, and for communicating to the child exactly what must be done in order to get "satisfactory" circled. The child must also be told precisely why an "unsatisfactory" is circled.

B. The parent is responsible for following through with the program, as outlined, in a consistent manner, and contacting teachers if questions arise.

C. If the program is not working, either the teacher or the parent should contact the psychologist to help trouble-shoot the program.

How long must this program be in effect?

If it's working, the program should be in effect for at least a couple of months. After that, the program could be modified such that notes only go home twice a week (Tuesday and Thursday, for example), or less frequently, depending on the child's performance.

APPENDIX F

TO: Mrs.
FROM: Mrs. , 's math teacher
RE: 's progress in math today
DATE:

's progress in math today was (circled)*

Satisfactory . Unsatisfactory

* Satisfactory means that all assigned work has been handed in on time and is at least percent correct. Satisfactory may also be circled if no class was held, no assignment was given, the teacher was unable to evaluate the work, or a substitute teacher was present. Unsatisfactory means that an assignment is late or less than percent accurate.

Please sign, indicating that you have seen this report and return it to the school with .

Mrs.

TO: Mr. and Mrs.
FROM: Mrs. (math) and Mrs. (social studies)
RE: 's performance in math and social studies today
DATE:

Subject	's performance today was (circled)*		
Math	satisfactory	unsatisfactory	no assignment
	Teacher signature: _____ (Mrs.)		
Social Studies	satisfactory	unsatisfactory	no assignment
	Teacher signature: _____ (Mrs.)		

* Satisfactory means that all assigned work has been handed in on time and is at least percent correct. Satisfactory may also be circled if no class was held, no assignment was given, the teacher was unable to evaluate the work, or a substitute teacher was present. Unsatisfactory means that an assignment is late or less than percent accurate.

Please sign, indicating that you have seen this report and return it to the school with .

_____
Mrs.

TO: Mr. and Mrs.
FROM: Mrs. (math), Mrs. (social studies) and Mrs. (science)
RE: 's performance in math, social studies and science today
DATE:

Subject	's performance today was (circled)*		
Math	satisfactory	unsatisfactory	no assignment
	Teacher signature: _____ (Mrs.)		
Social Studies	satisfactory	unsatisfactory	no assignment
	Teacher signature: _____ (Mrs.)		
Science	satisfactory	unsatisfactory	no assignment
	Teacher signature: _____ (Mrs.)		

* Satisfactory means that all assigned work has been handed in on time and is at least percent correct. Satisfactory may also be circled if no class was held, no assignment was given, the teacher was unable to evaluate the work, or a substitute teacher was present. Unsatisfactory means that an assignment is late or less than percent accurate.

Please sign, indicating that you have seen this report and return it to the school with .

_____
Mrs.

APPENDIX G

April 20, 1988

Dear Parent:

During February and March you received weekly, then daily reports about your child's performance in Mrs. Larson's math class. This was part of a study conducted by Mrs. Larson and myself. We would like feedback from you regarding the value of these reports. Would you please circle the most correct number beside each item below, and return this letter in the envelope provided, by April 29th? Your opinions are VERY important. Thank you for your help.

Sincerely,

Bill Matthew
School Psychologist

		of no value		average		very valuable
1.	In general, the reports were	1	2	3	4	5

2. The most valuable reports were 1 - weekly report 2 - daily reports

3. My child did not bring home daily reports reliably: 1 - true 2 - false

4. The report forms provided enough information: 1 - true 2 - false

5. Please make comments about the reports, (for example how often they should come home, what information they should have, etc.)

_____

_____

_____

_____

_____

_____

_____

_____

May 26, 1988

Dear Parent:

During the period that your child was bringing home daily math reports from school, you received a letter from either me or Mrs. Larson (math teacher) suggesting a method to improve your child's motivation to do math. A copy of that letter is enclosed.

I would appreciate it very much if you would answer the following questions about the suggestions that were made, and return this letter to me in the envelope provided. Your answers are very important. Please try to return this by next Friday (June 3rd). Thank you very much for your help; it's really appreciated!

Sincerely,

Bill Matthew
School Psychologist
Arrowhead AEA
501 Bank Street
Webster City, Iowa 50595
PHONE: 832-3791

Please circle the most accurate:

1. I thought the suggestions were garbage and ignored them. — True — False

2. It's not the parents' job to motivate kids--it's the teacher's job. — True — False

3. The suggestion was too general, I didn't understand it. — True — False

Percent of Time:

4. I followed the suggestion — all (100) — 75 — 50 (half) — 25 — 0 (none)

5. My child brought home reports — all (100) — 75 — 50 (half) — 25 — 0 (never)

Please comment: _____

_____

_____

_____

_____

APPENDIX H

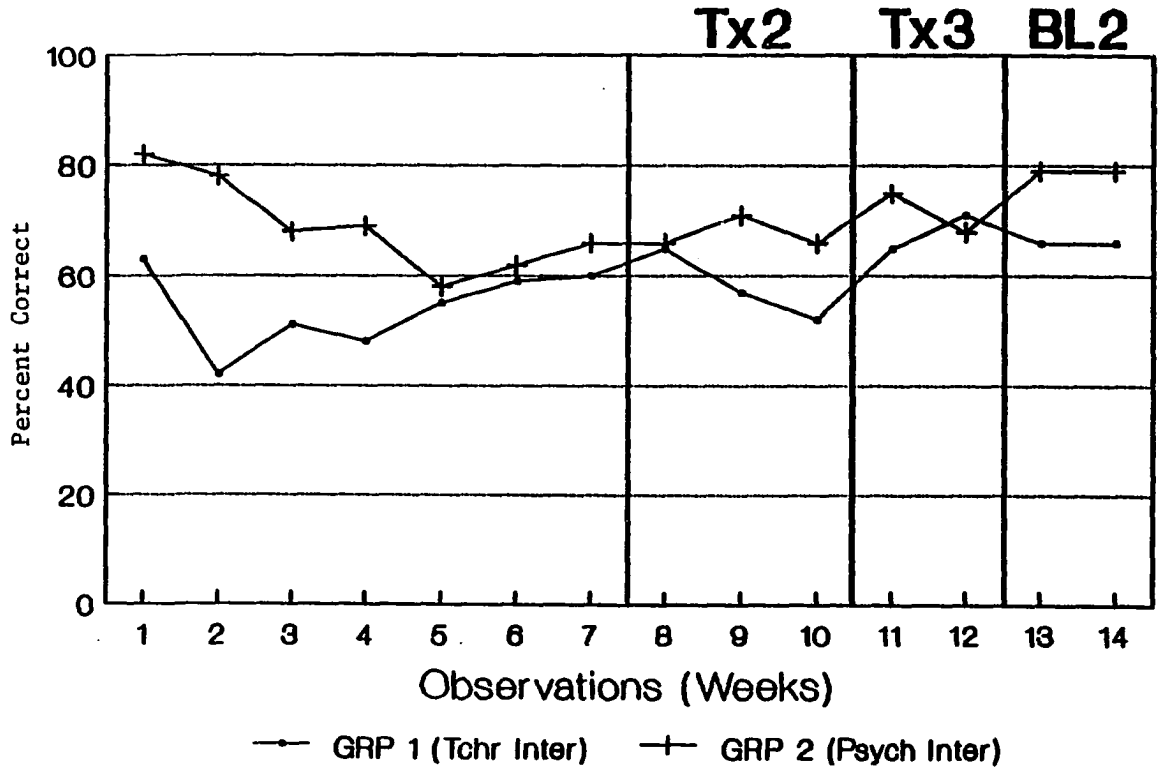

Figure 6. Math performance of Groups 1 and 2, as a function of daily notes home (Tx2), teacher- (Grp 1) or psychologist- (Grp 2) recommended intervention (Tx3), and baseline (BL2) conditions

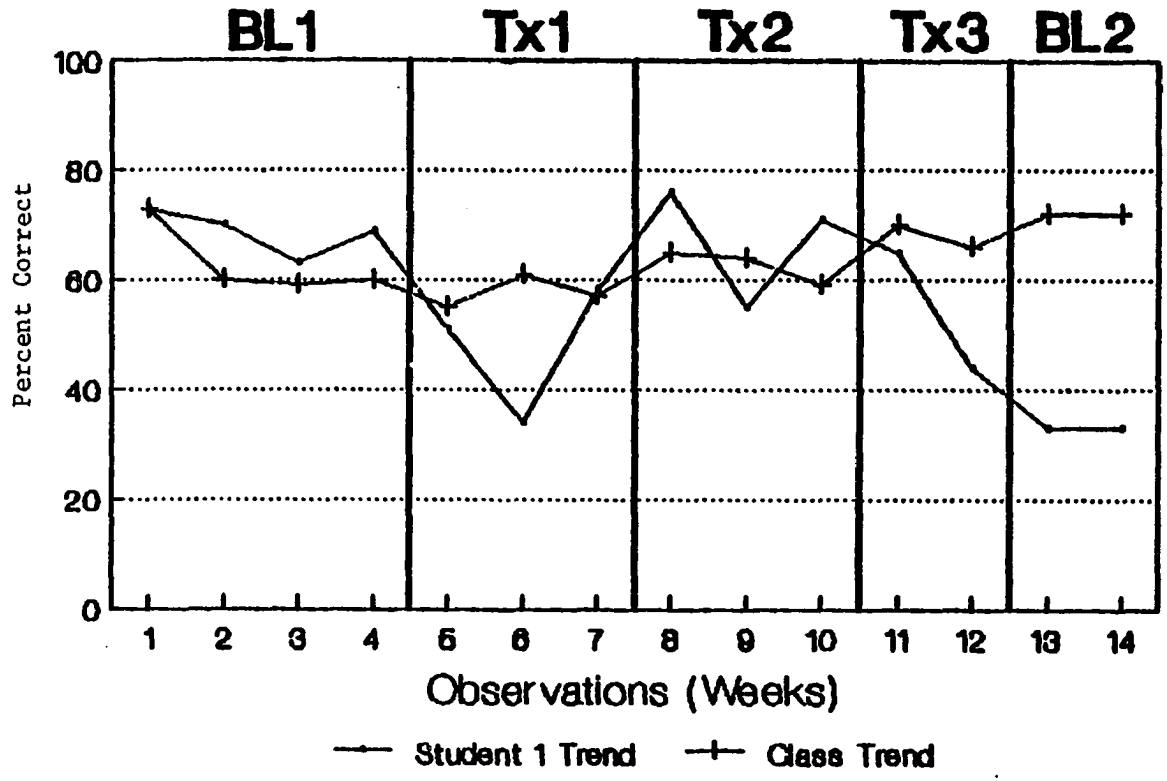

Figure 7. Comparison of Student 1 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

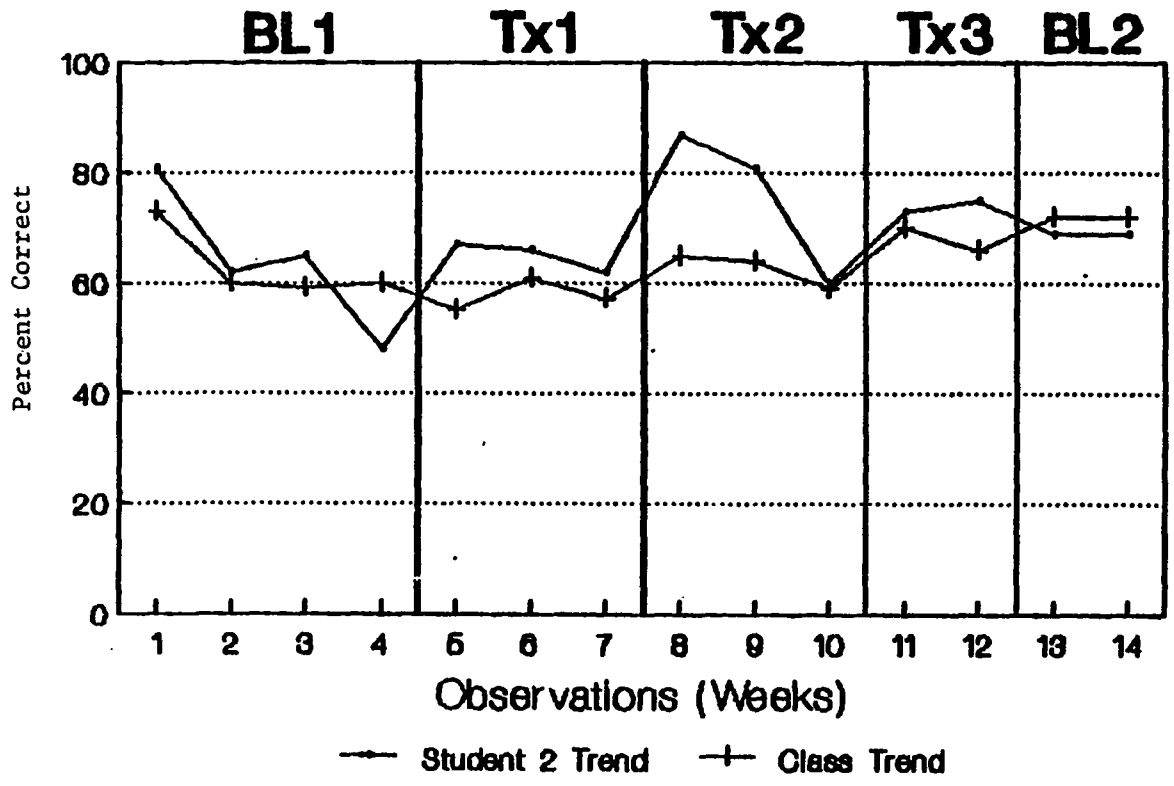

Figure 8. Comparison of Student 2 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

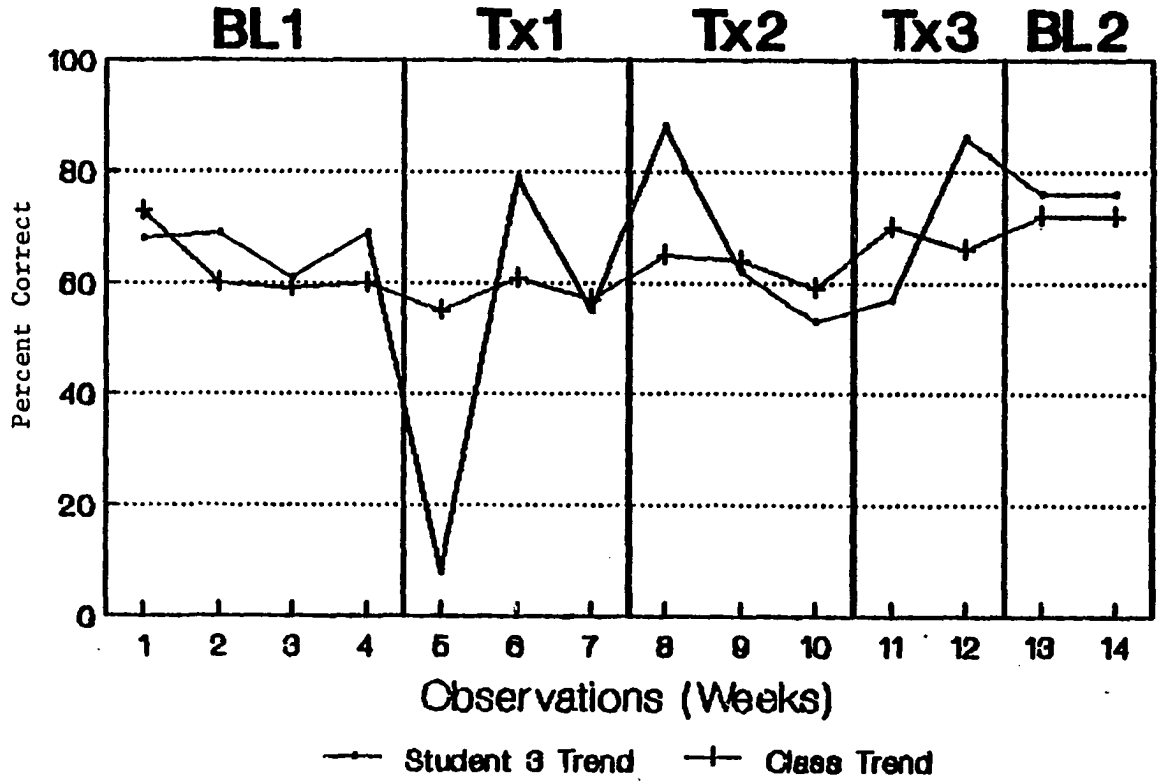

Figure 9. Comparison of Student 3 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

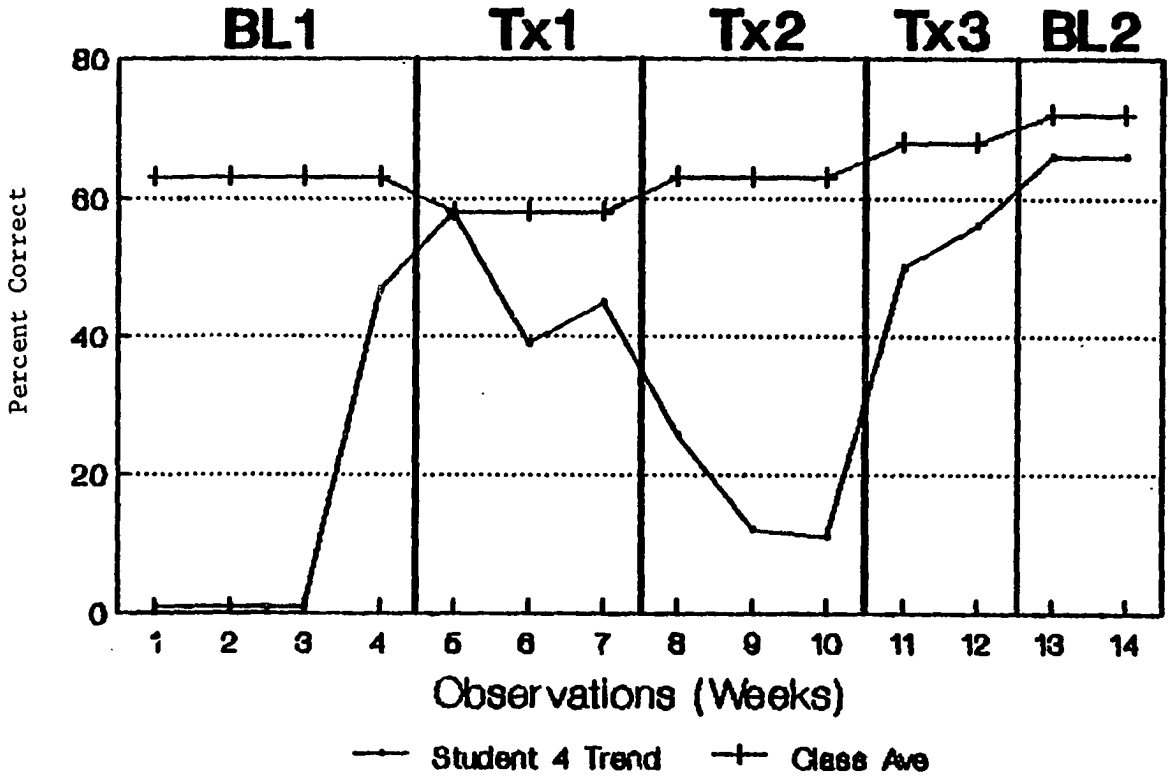

Figure 10. Comparison of Student 4 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

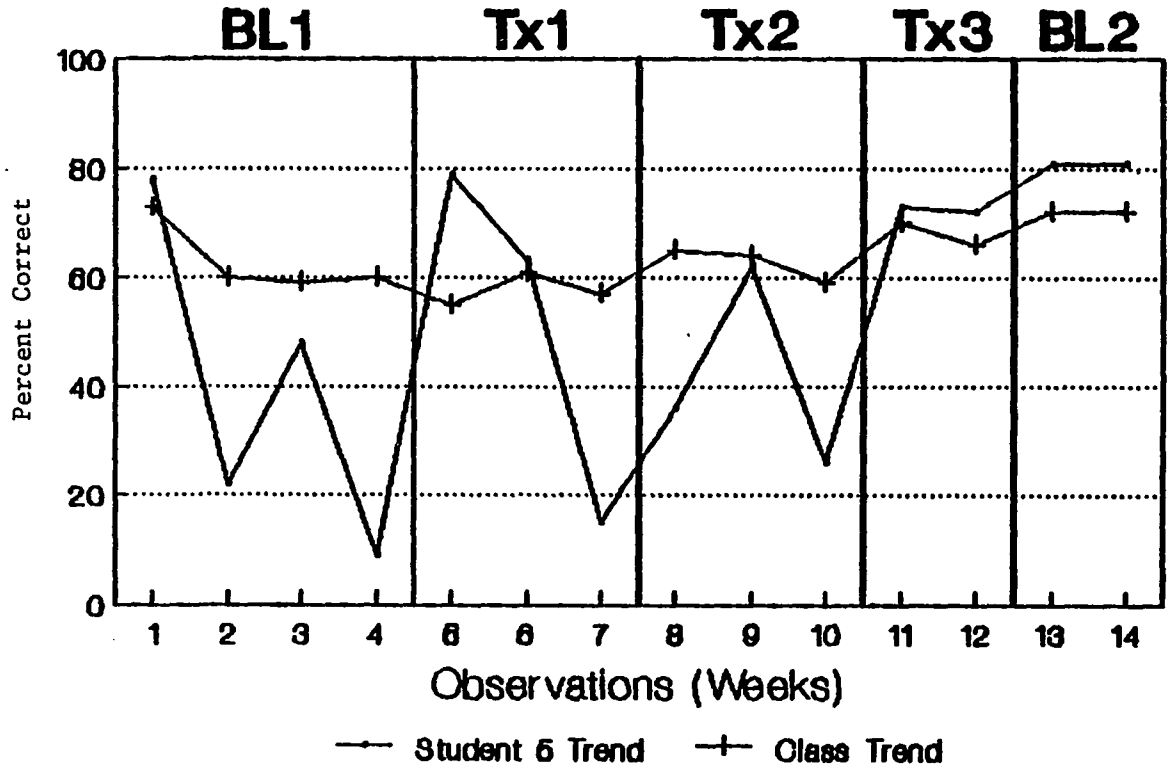

Figure 11. Comparison of Student 5 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

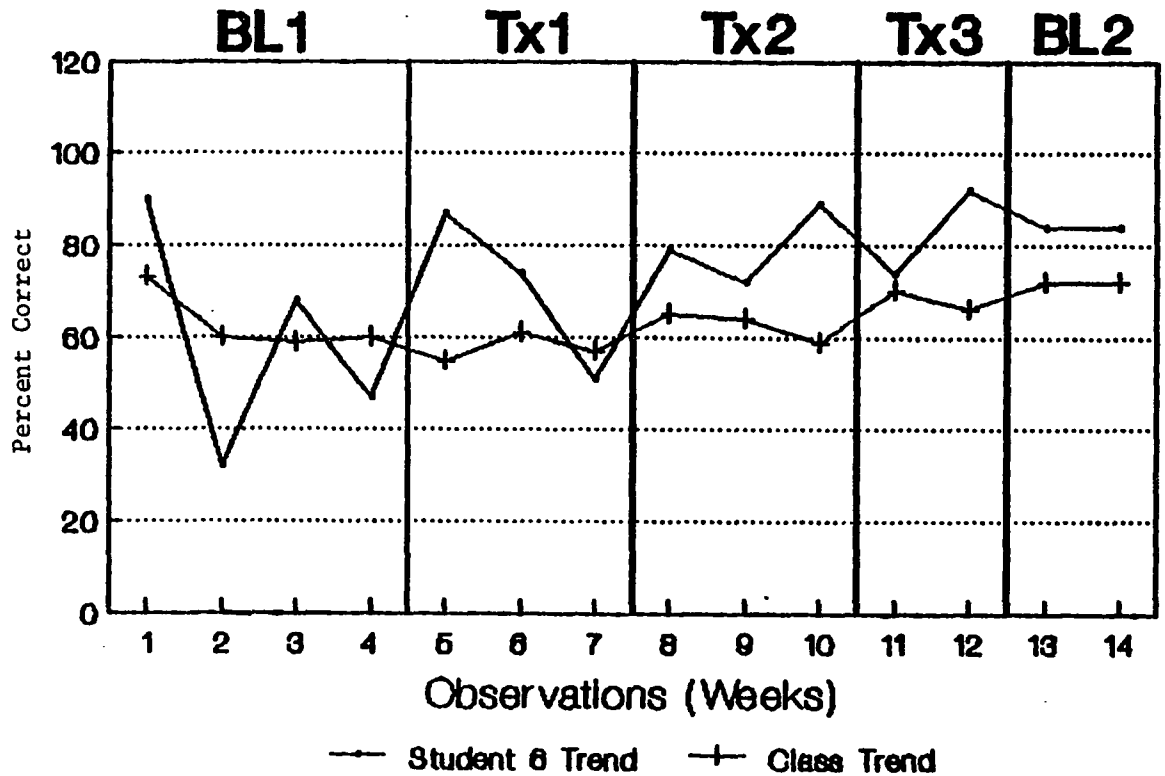

Figure 12. Comparison of Student 6 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and teacher-recommended intervention (Tx3) conditions

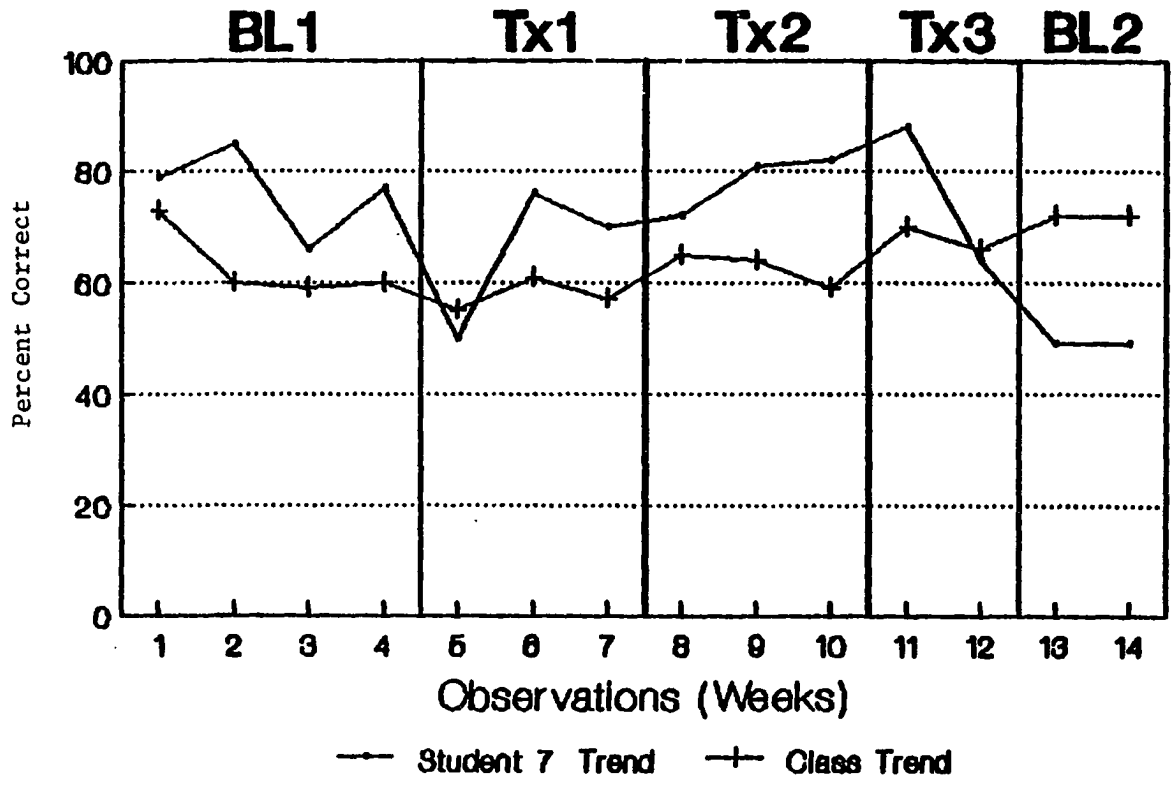

Figure 13. Comparison of Student 7 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

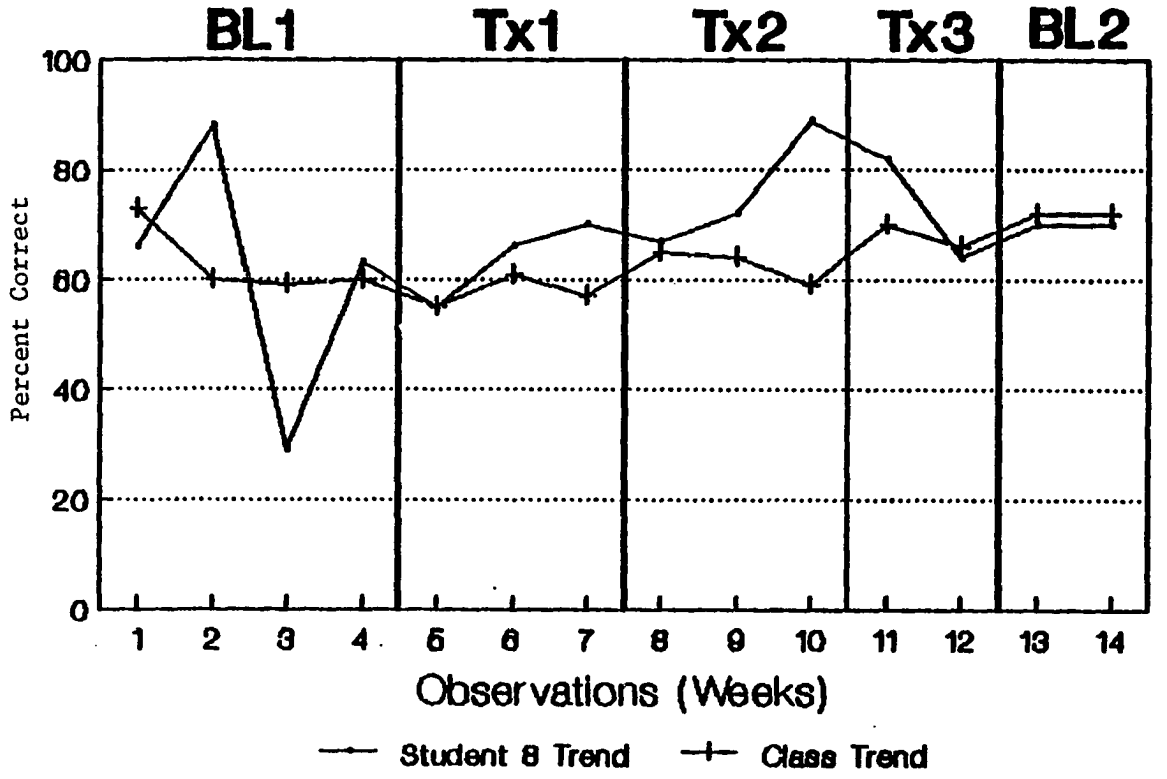

Figure 14. Comparison of Student 8 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

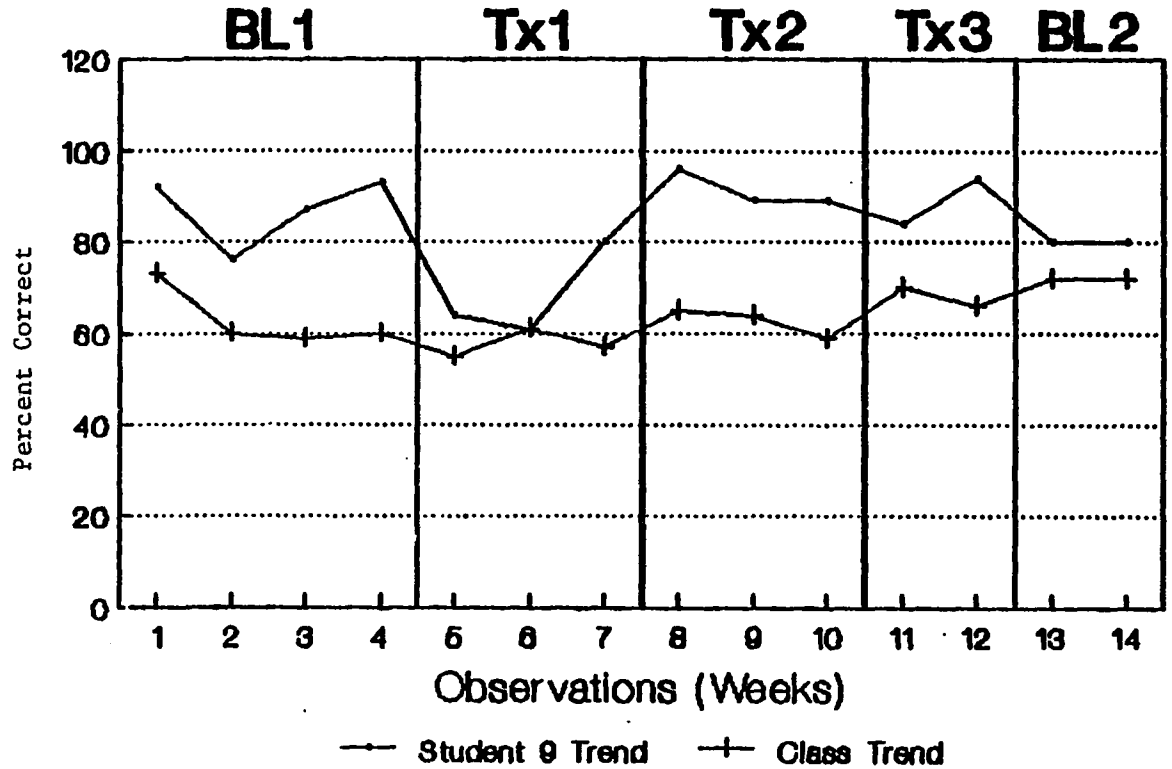

Figure 15. Comparison of Student 9 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

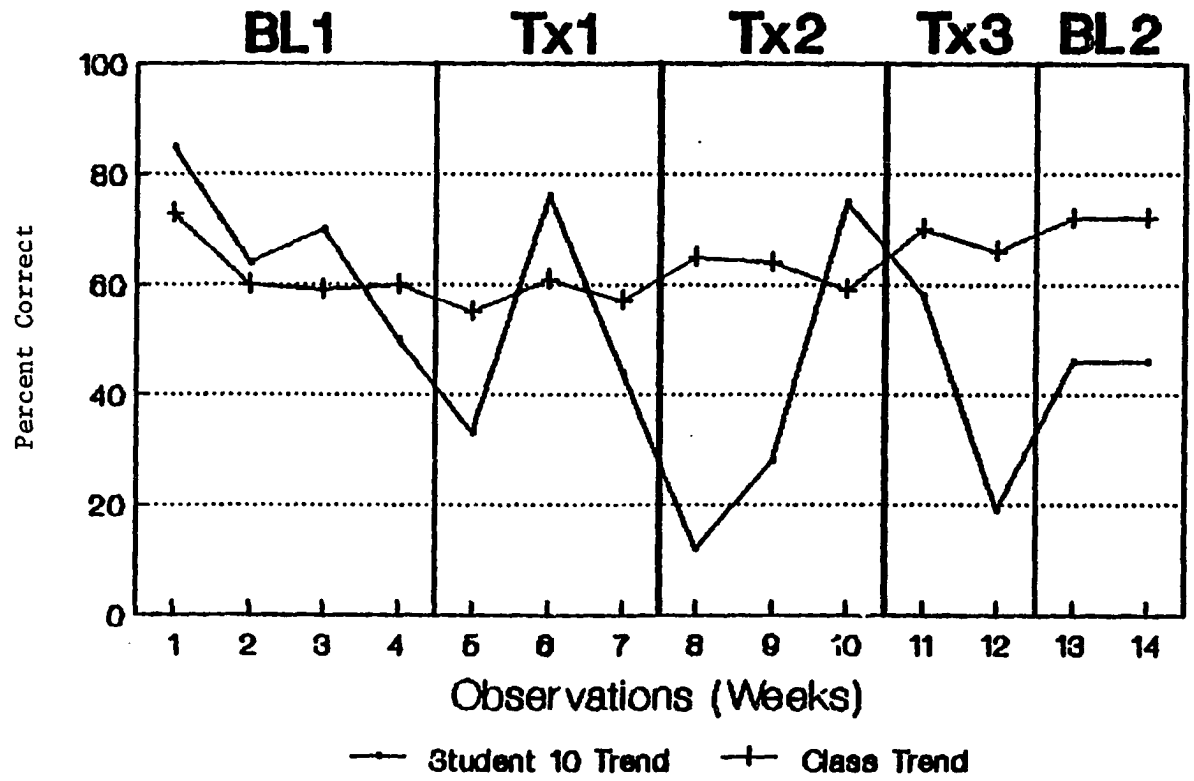

Figure 16. Comparison of Student 10 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

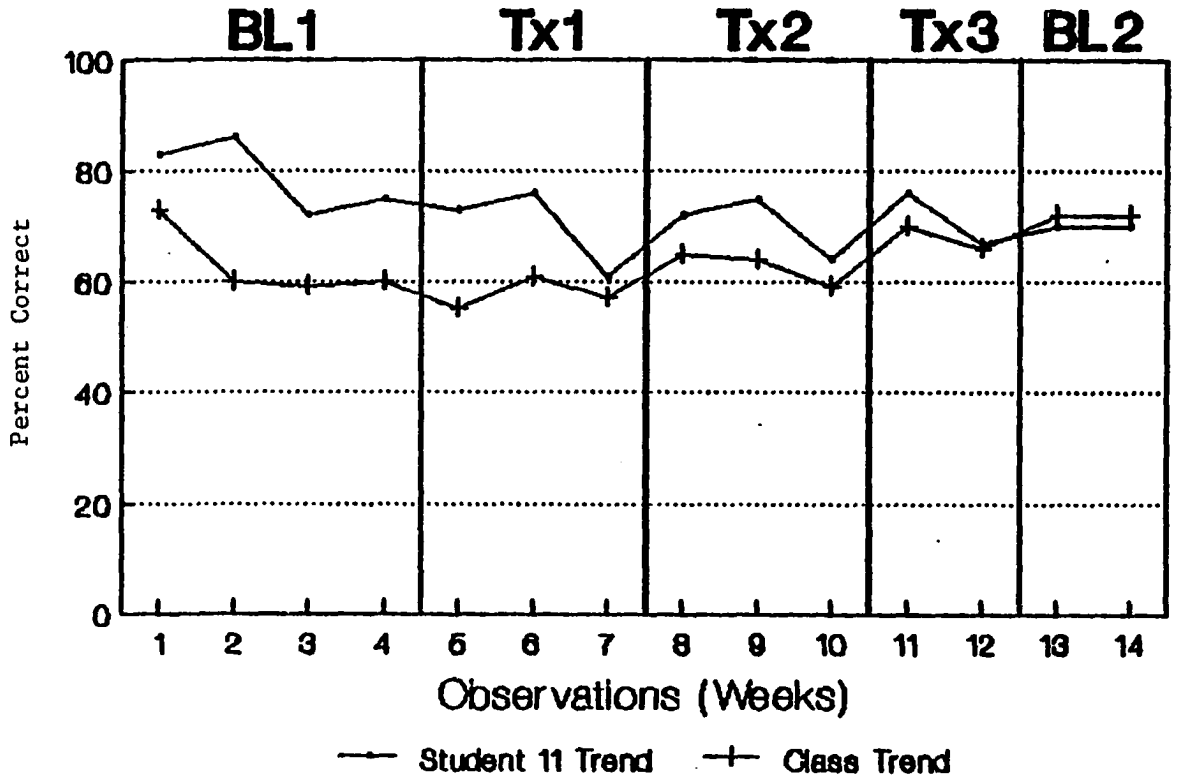

Figure 17. Comparison of Student 11 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

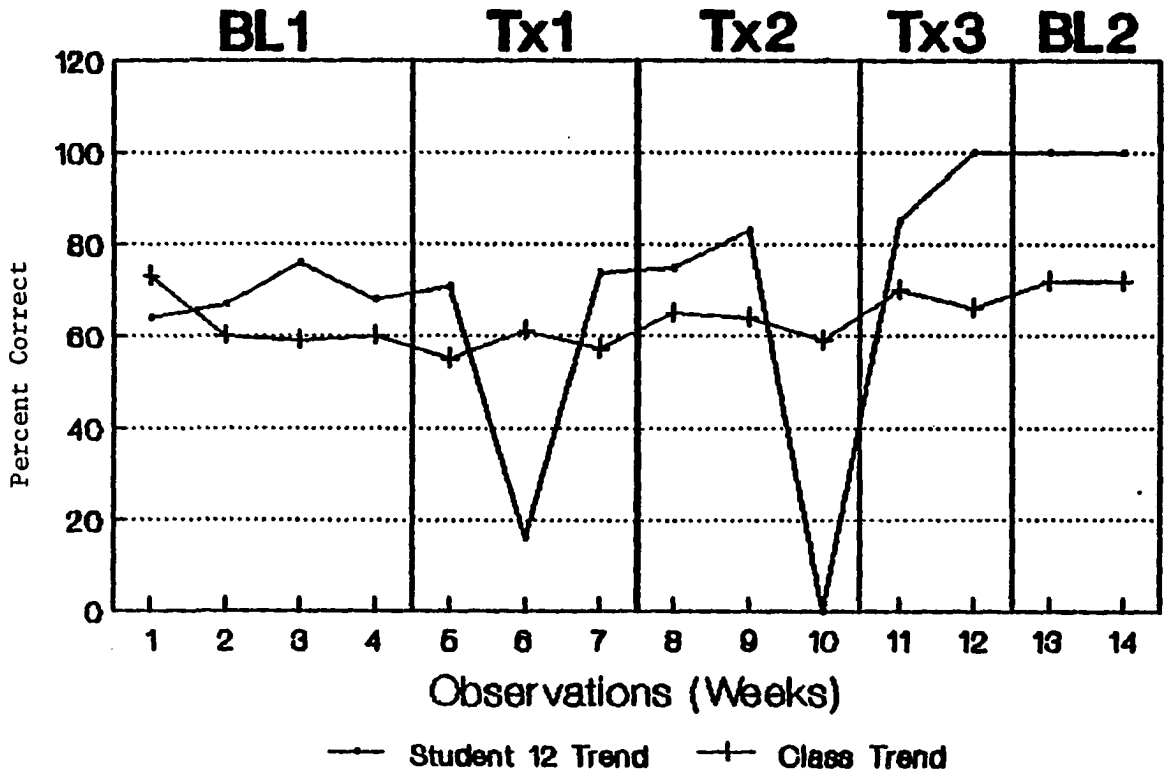

Figure 18. Comparison of Student 12 with class, as a function of baseline (BL1, BL2), notes-home weekly (Tx1), notes-home daily (Tx2), and psychologist-recommended intervention (Tx3) conditions

APPENDIX I

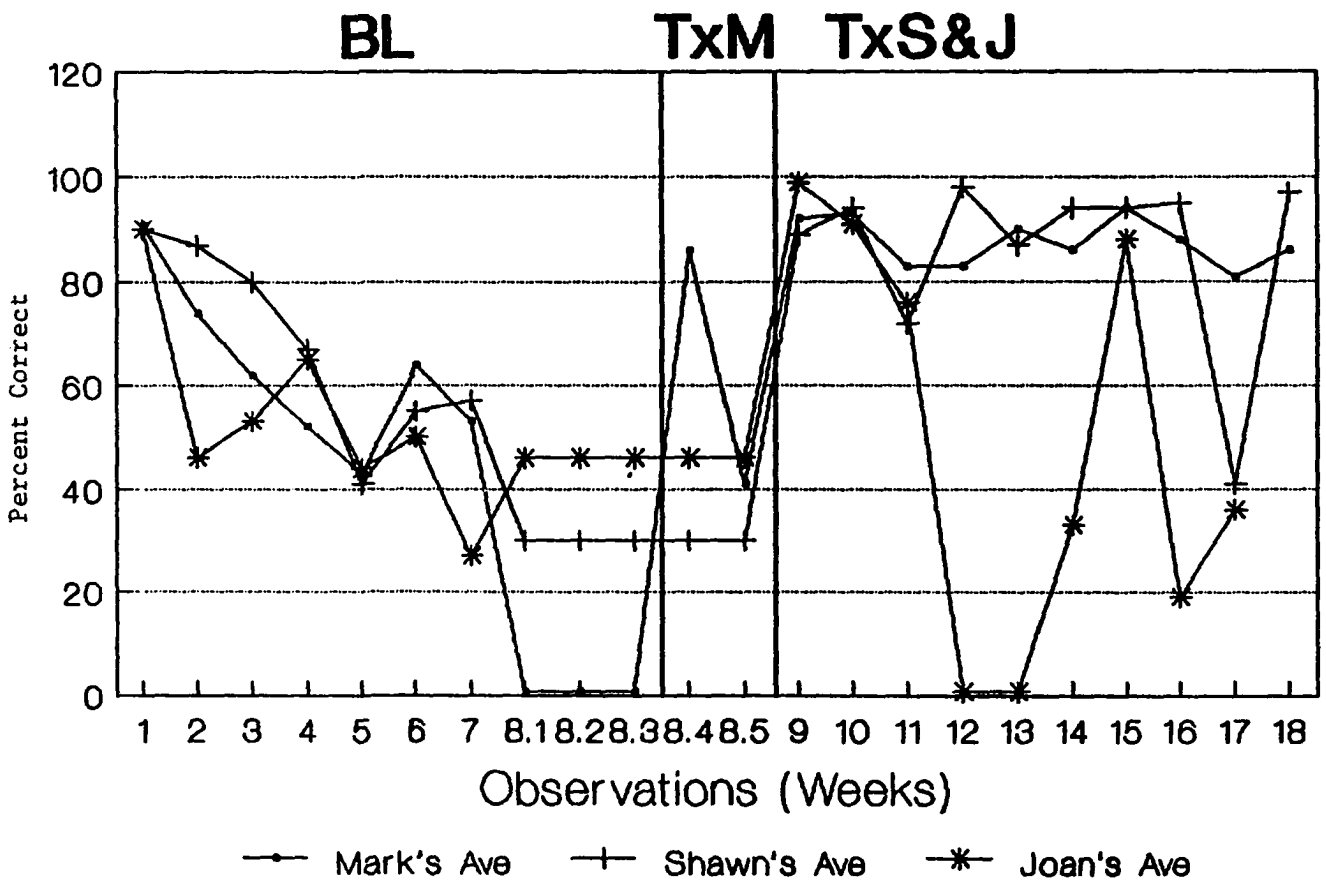

Figure 19. Math performance as a function of baseline (BL) and home-based contingency management conditions for 3 students. Intervention began week 8 for Mark (TxM), and week 9 for Shawn (TxS) and Joan (TxJ)

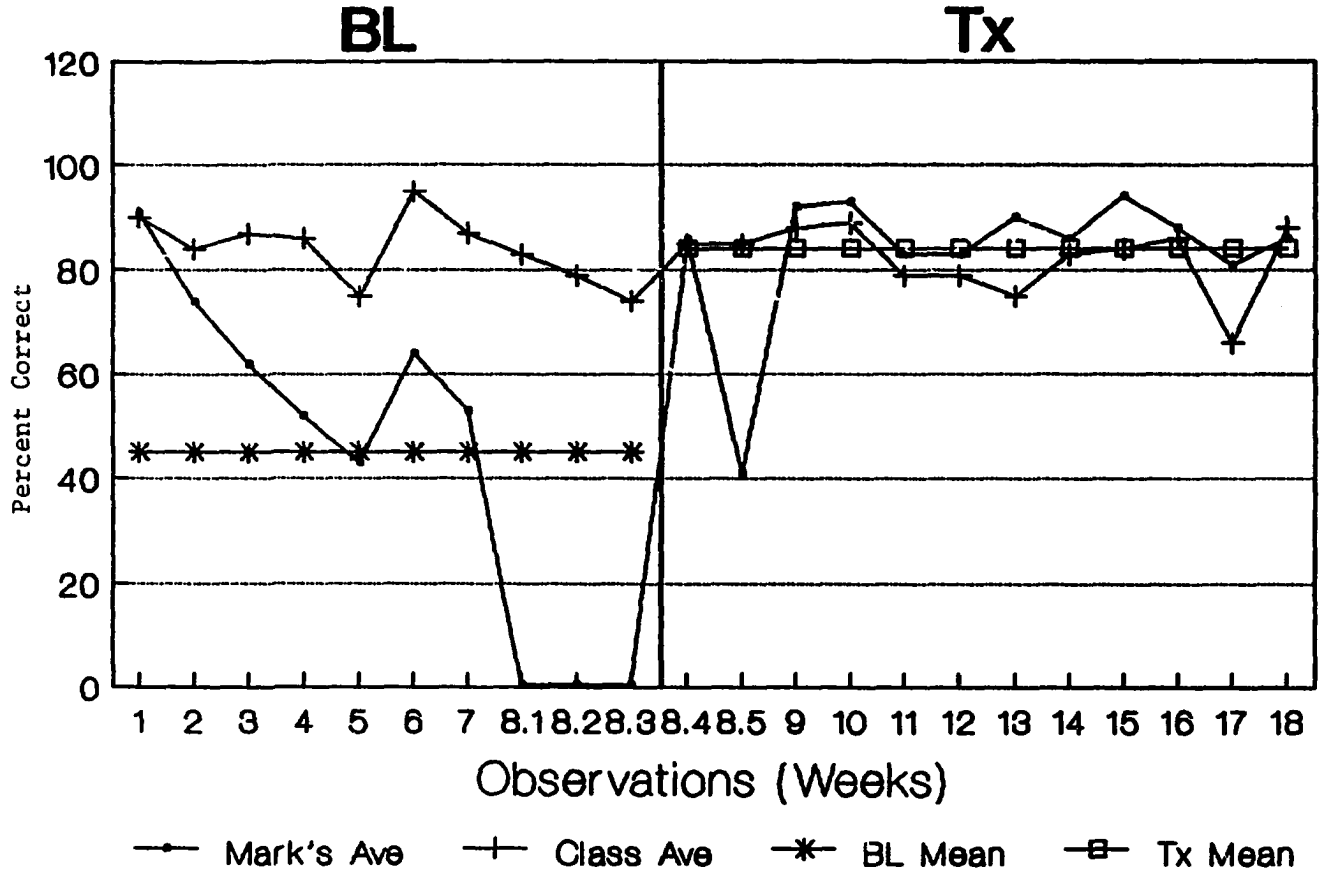

Figure 20. Mark's math performance as a function of baseline (BL) and home-based contingency management (Tx) conditions

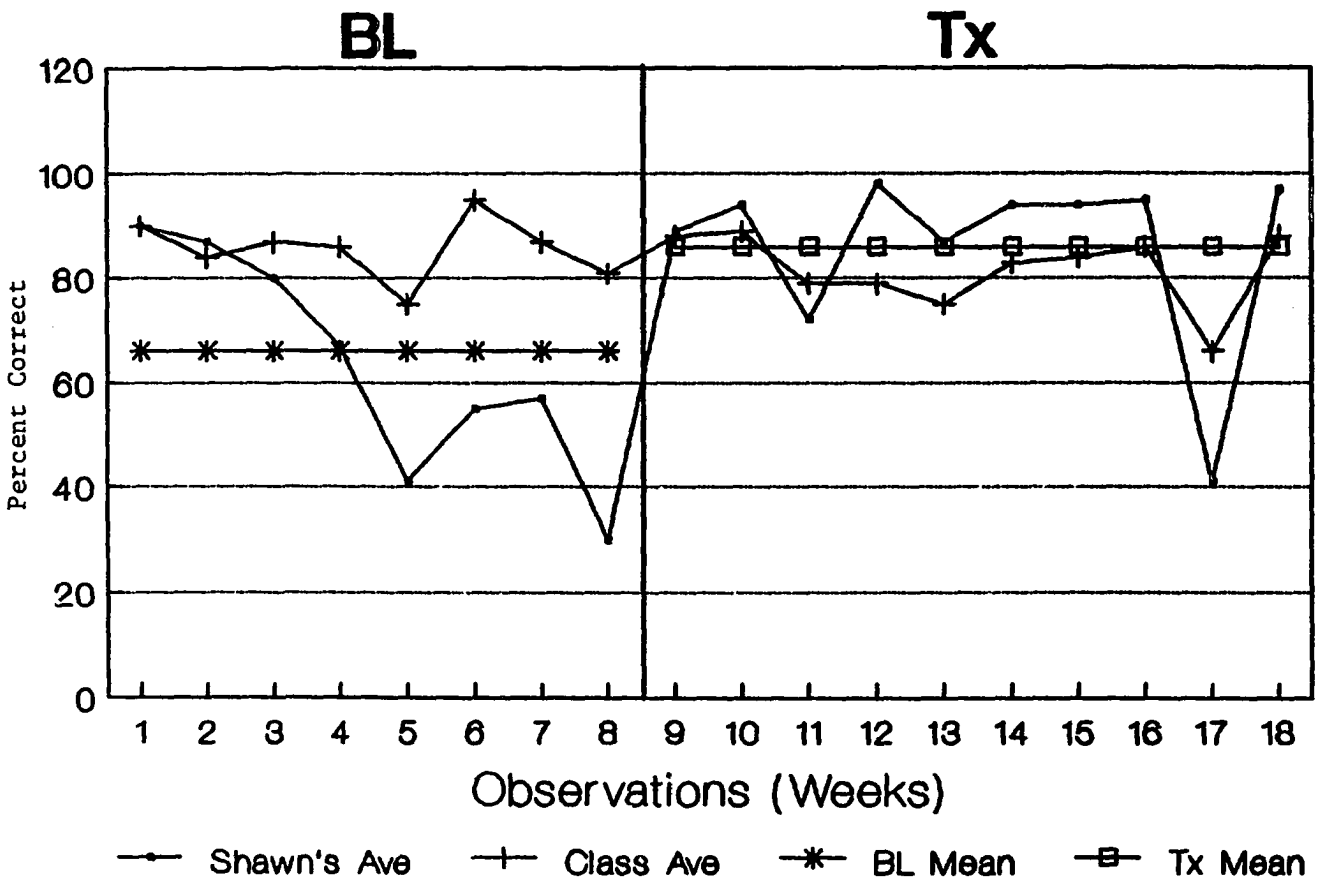

Figure 21. Shawn's math performance as a function of baseline (BL) and home-based contingency management (Tx) conditions

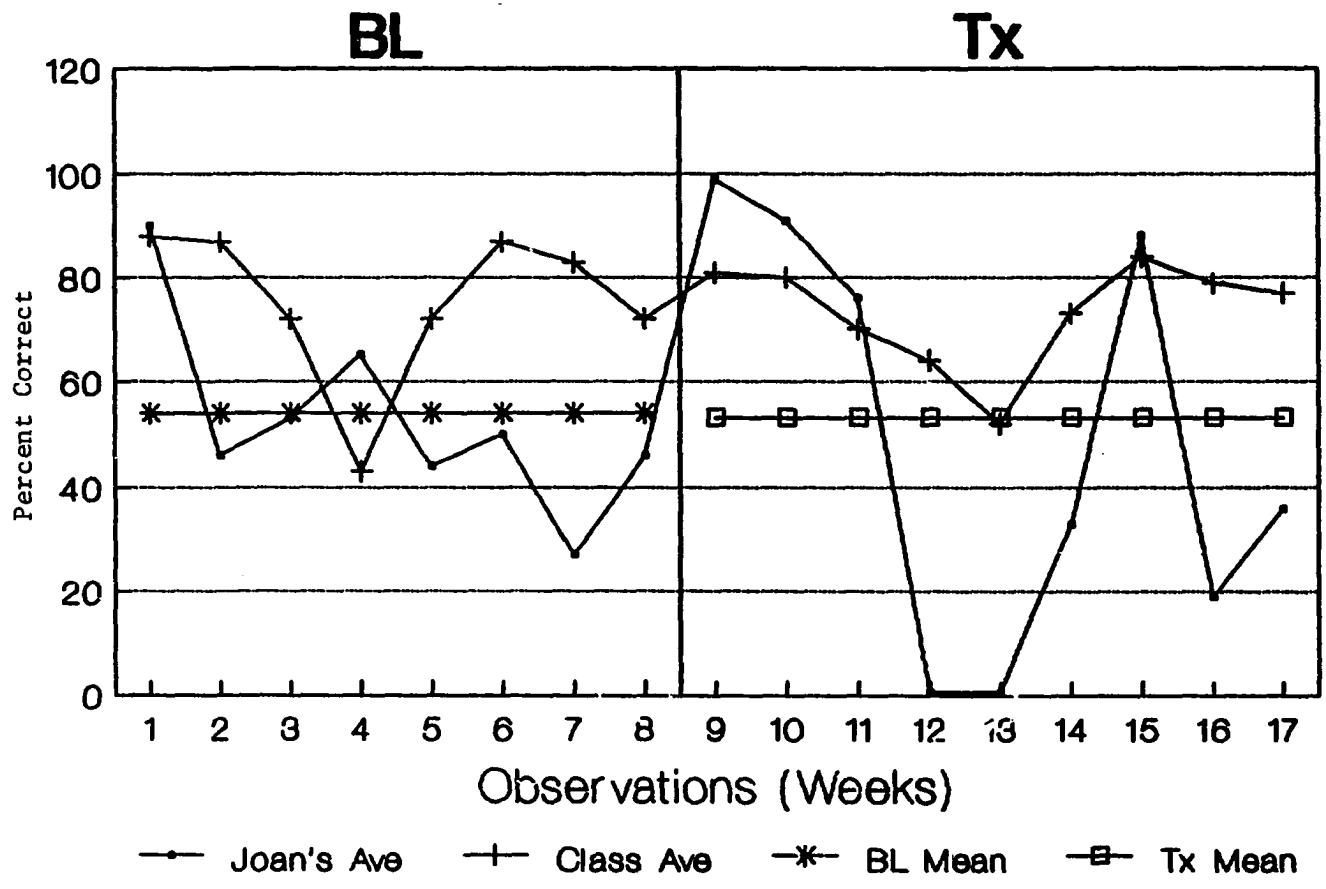

Figure 22. Joan's math performance as a function of baseline (BL) and home-based contingency management (Tx) conditions

APPENDIX J

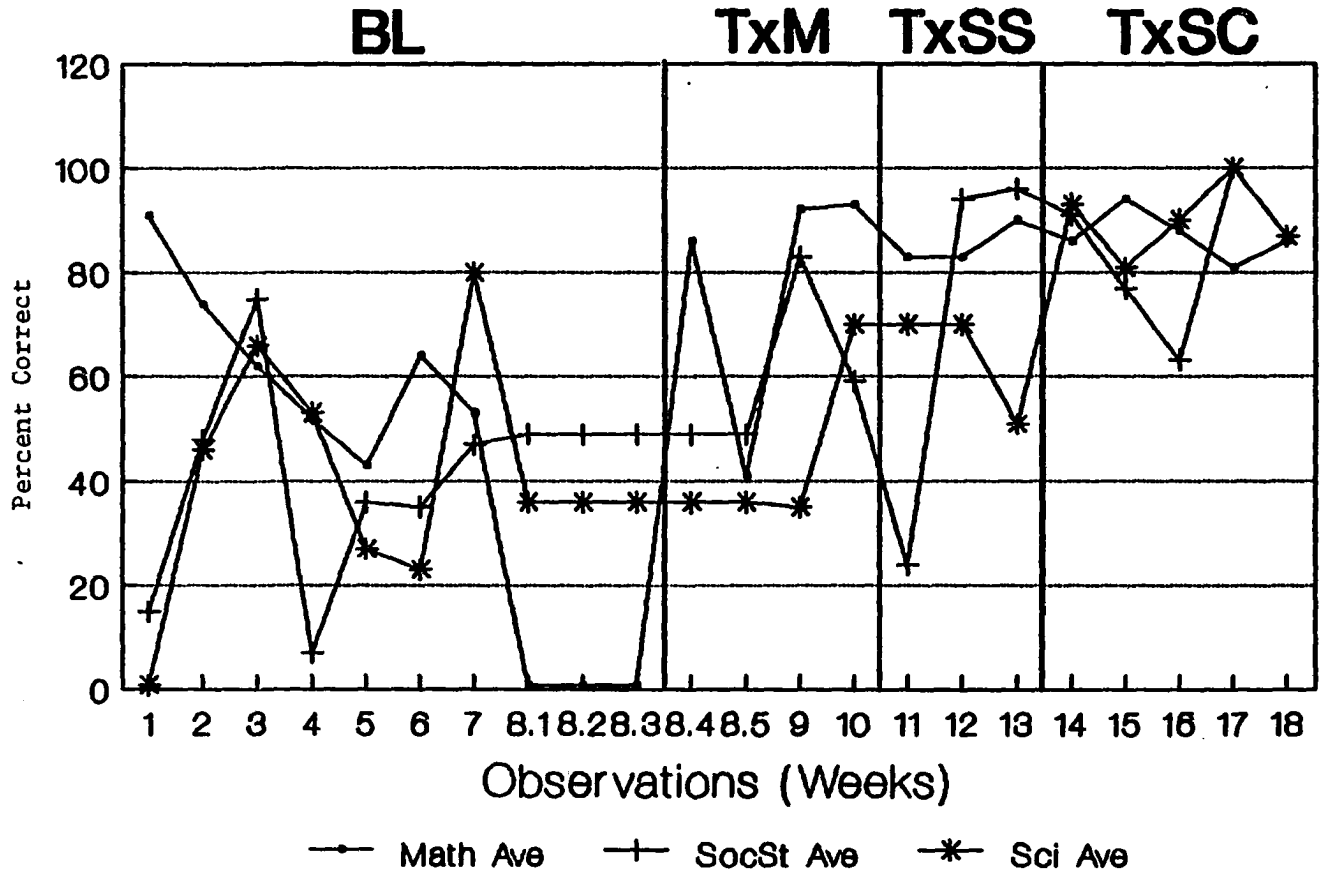

Figure 23. Mark's academic performance as a function of baseline (BL) and home-based management, cumulatively applied to math (TxM), social studies (TxSS), and science (TxSC)

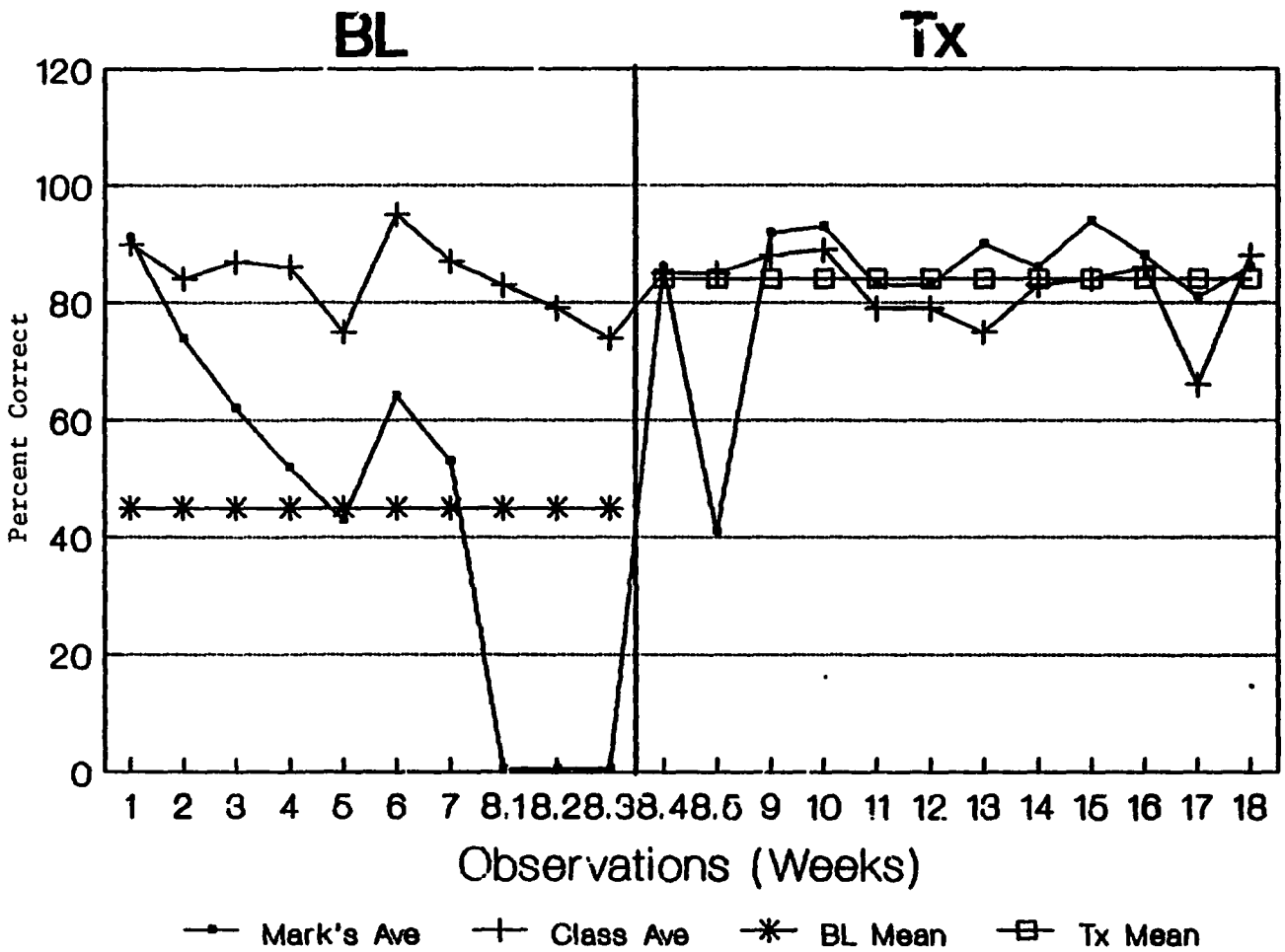

Figure 24. Mark's math performance as a function of baseline (BL) and home-based management (Tx) conditions

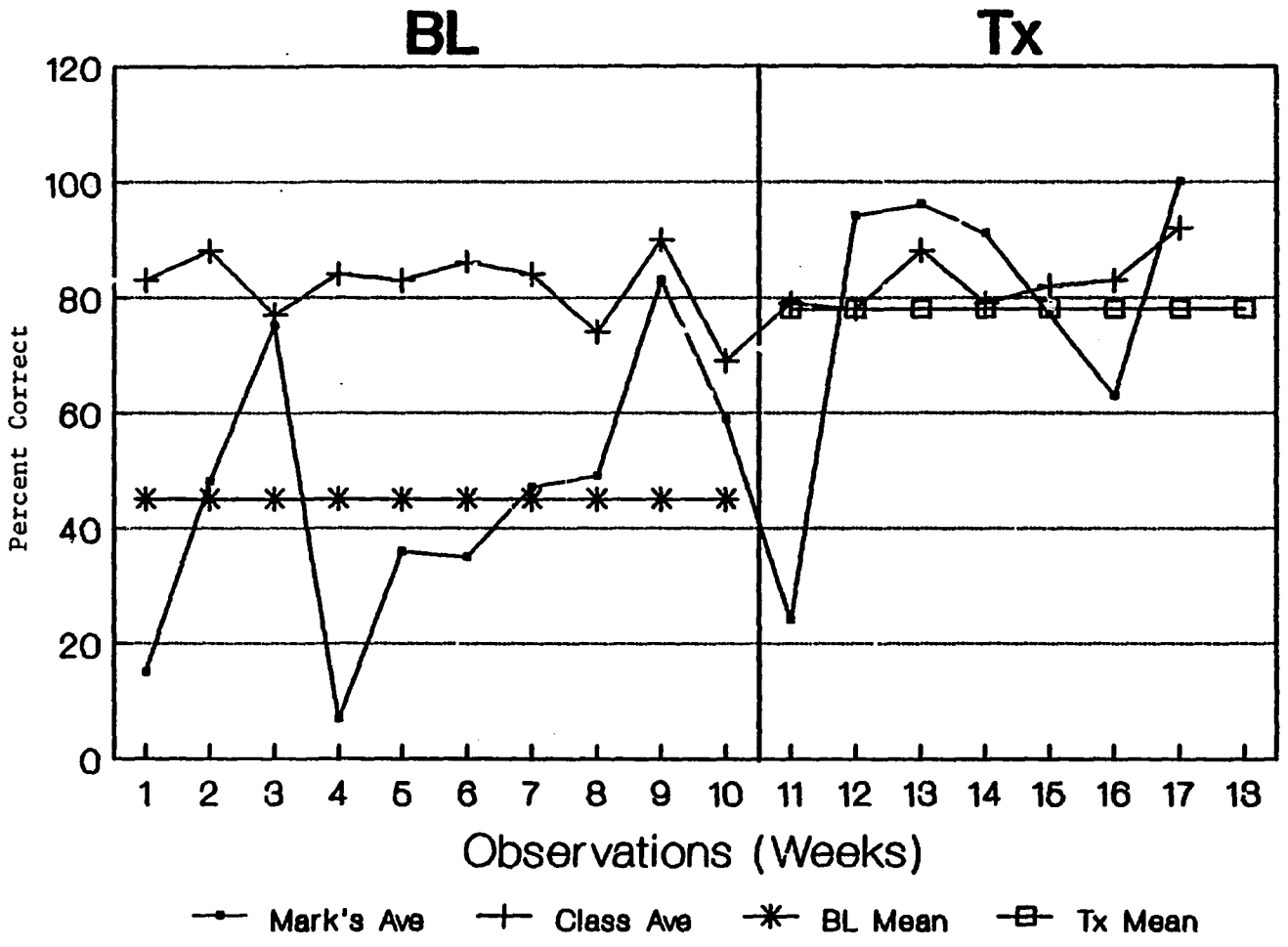

Figure 25. Mark's social studies performance as a function of baseline (BL) and home-based management (Tx) conditions

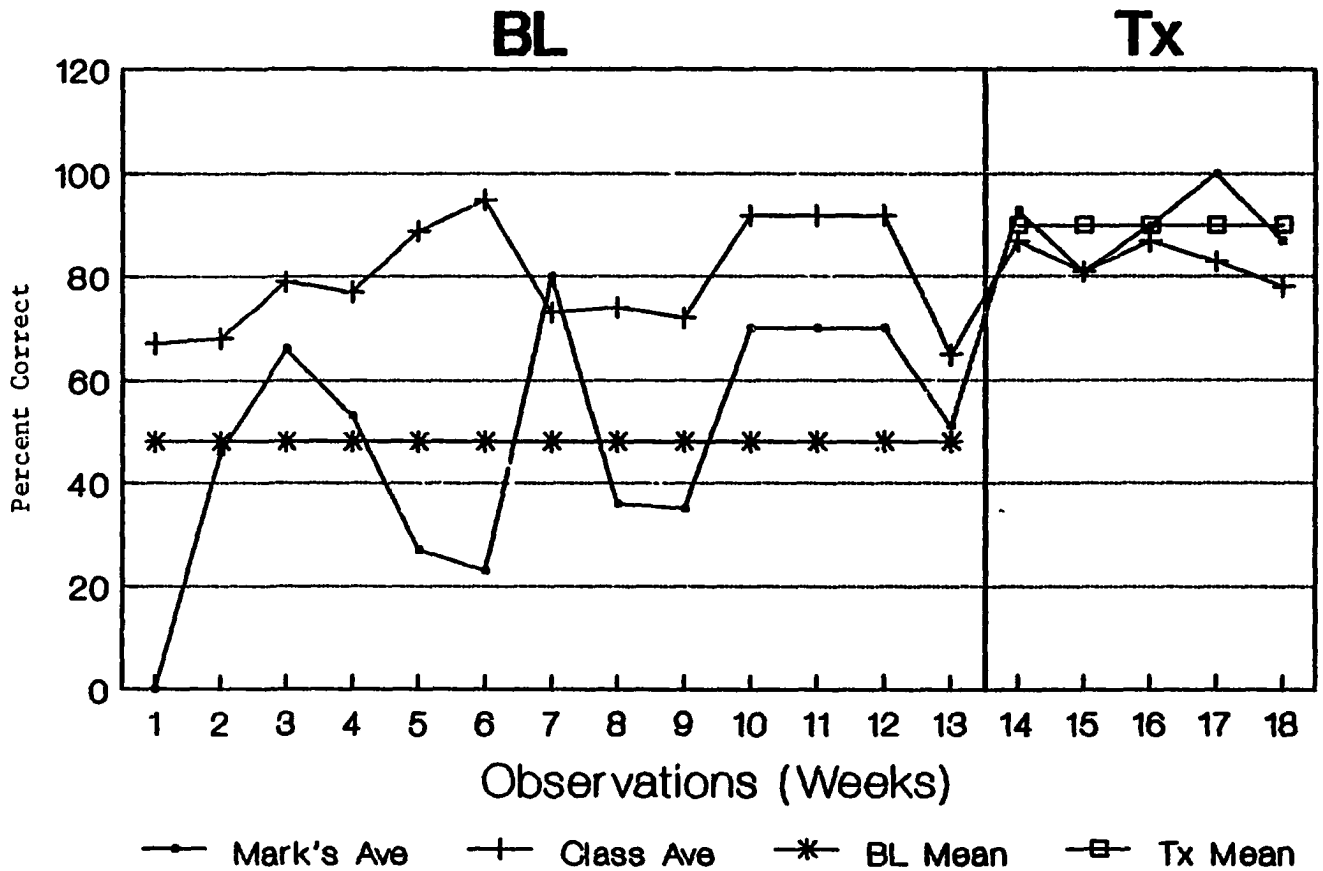

Figure 26. Mark's science performance as a function of baseline (BL) and home-based management (Tx) conditions

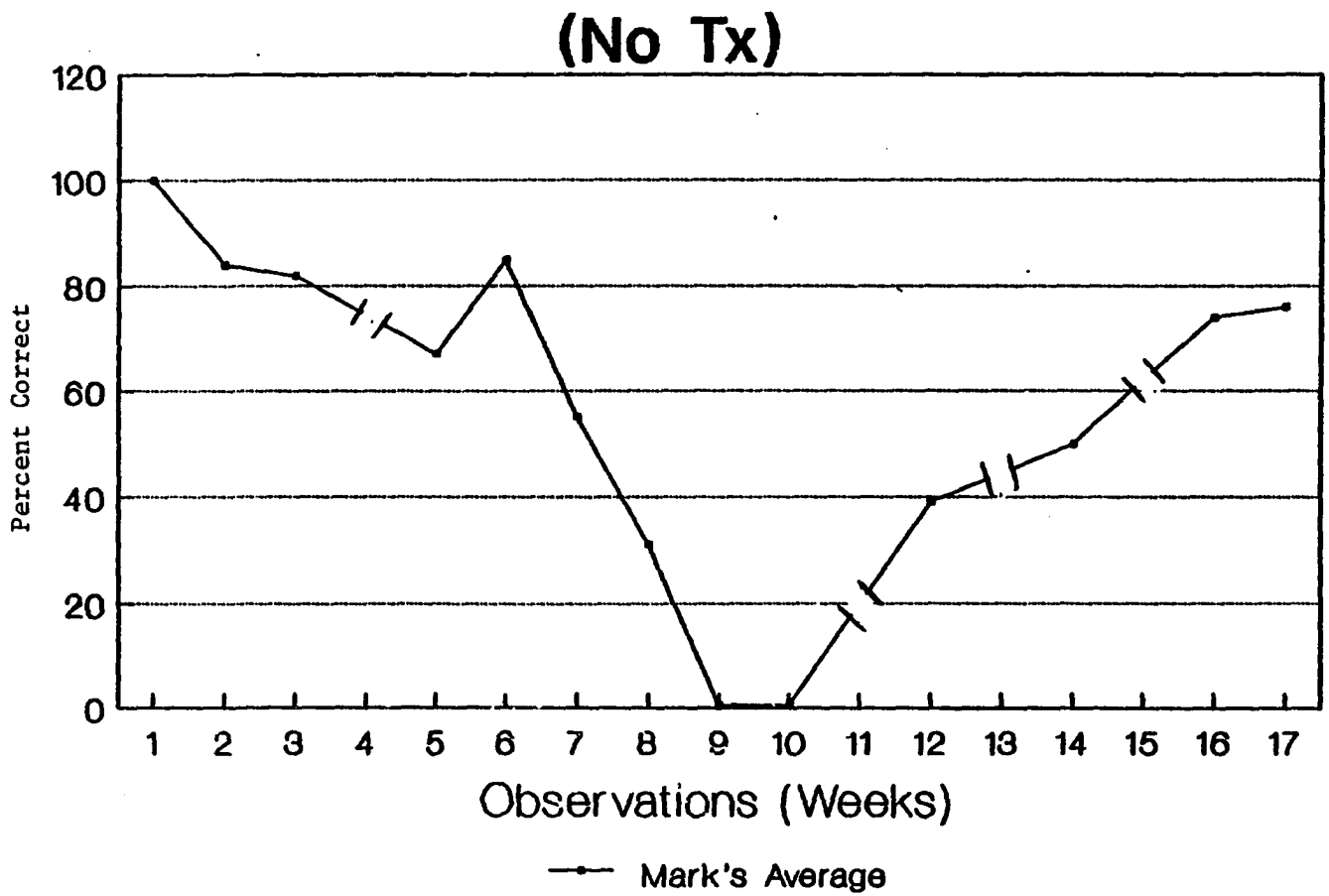

Figure 27. Mark's English performance during baseline (weeks 1-8) and treatment (weeks 9-17) conditions for targeted subject areas

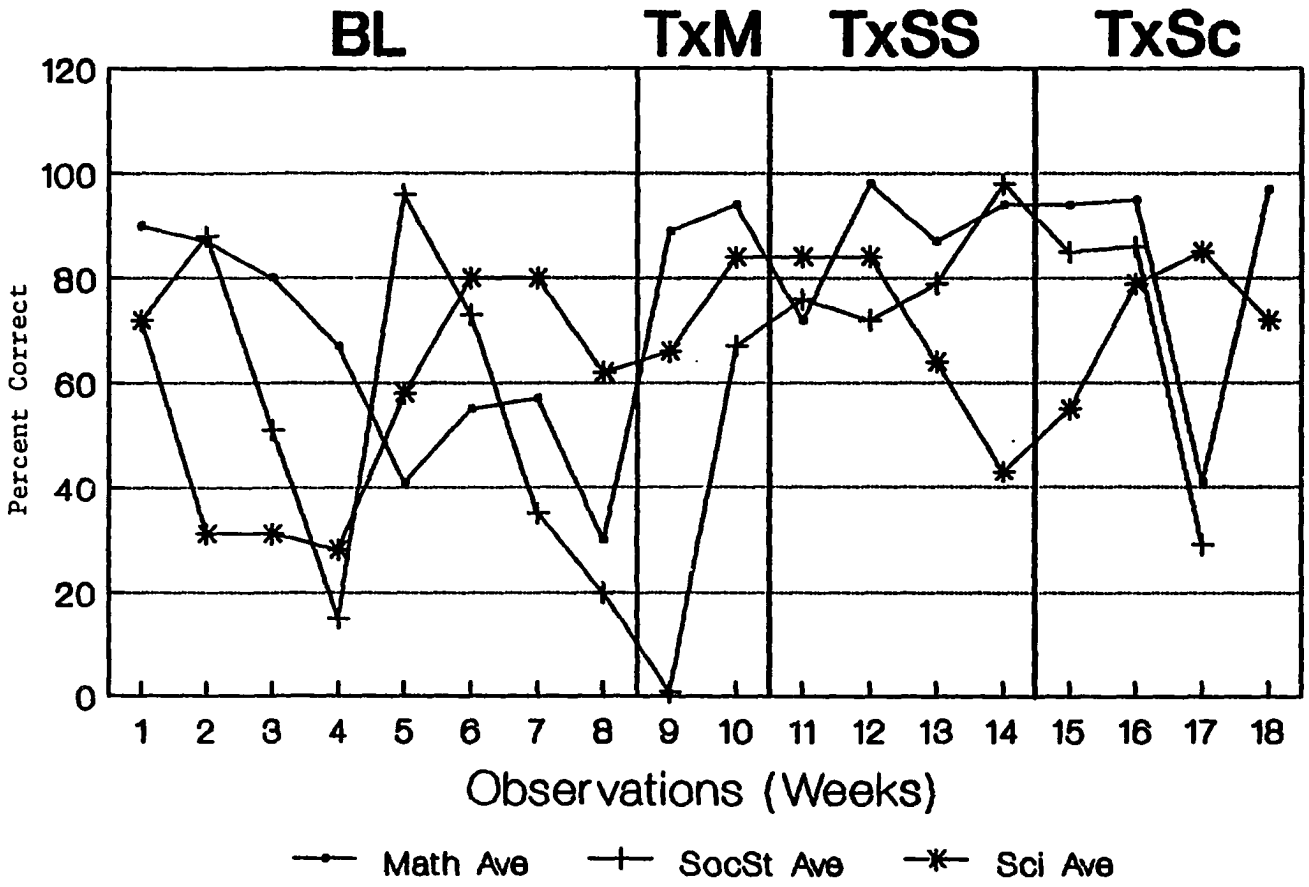

Figure 28. Shawn's academic performance as a function of baseline (BL) and home-based management, cumulatively applied to math (TxM), social studies (TxSS) and science (TxSC)

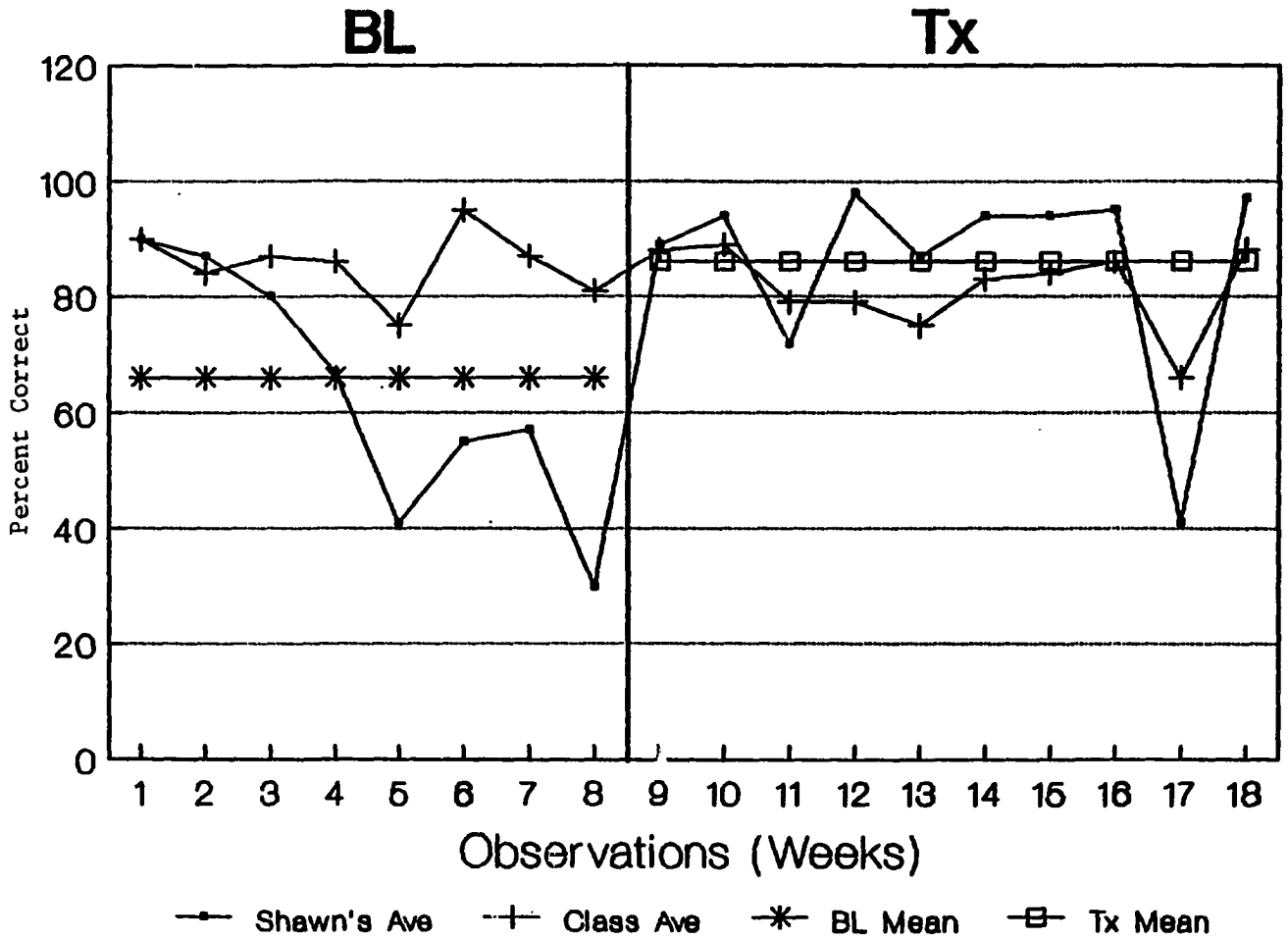

Figure 29. Shawn's math performance as a function of baseline (BL) and home-based management (Tx) conditions

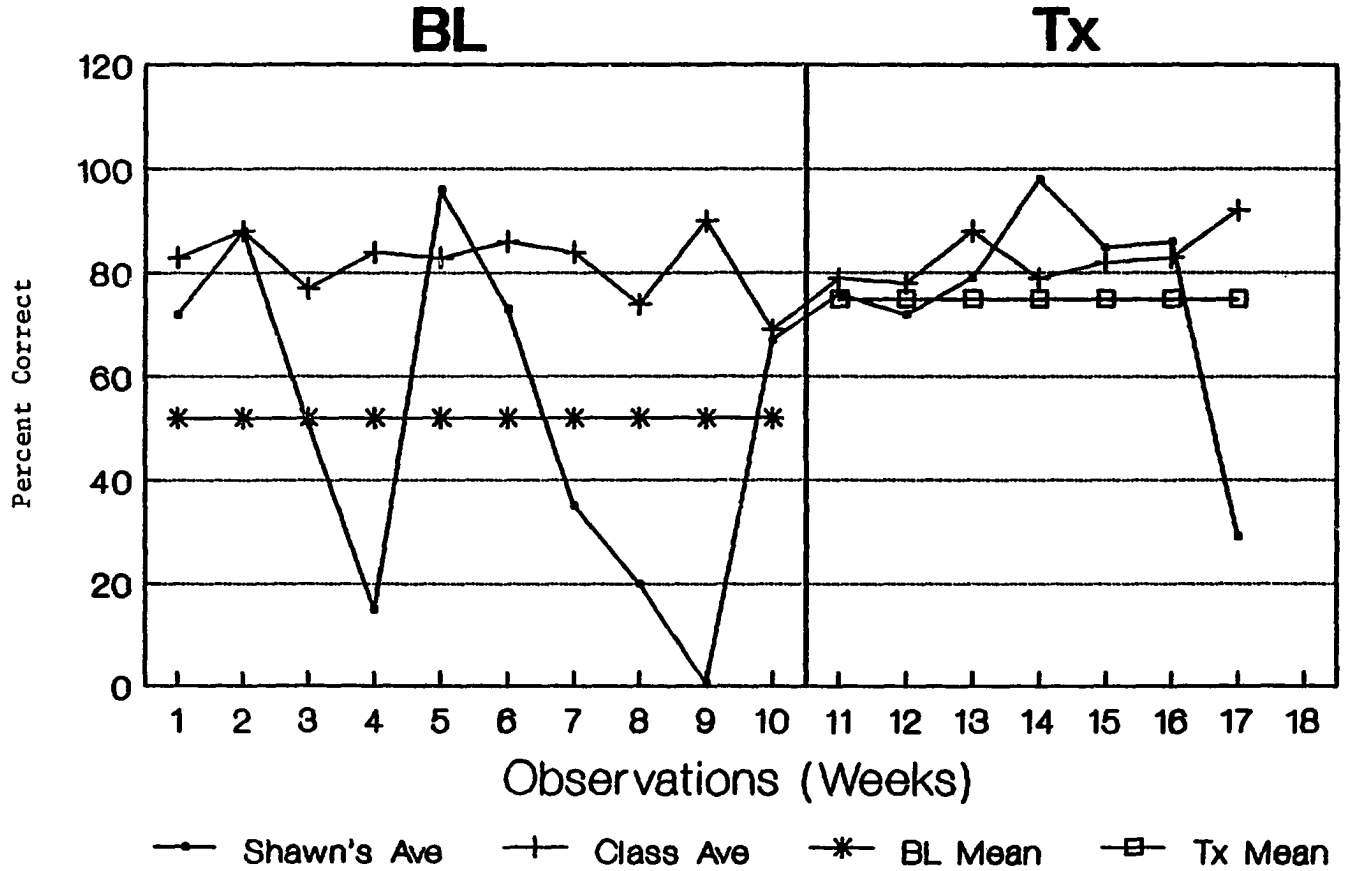

Figure 30. Shawn's social studies performance as a function of baseline (BL) and home-based management (Tx) conditions

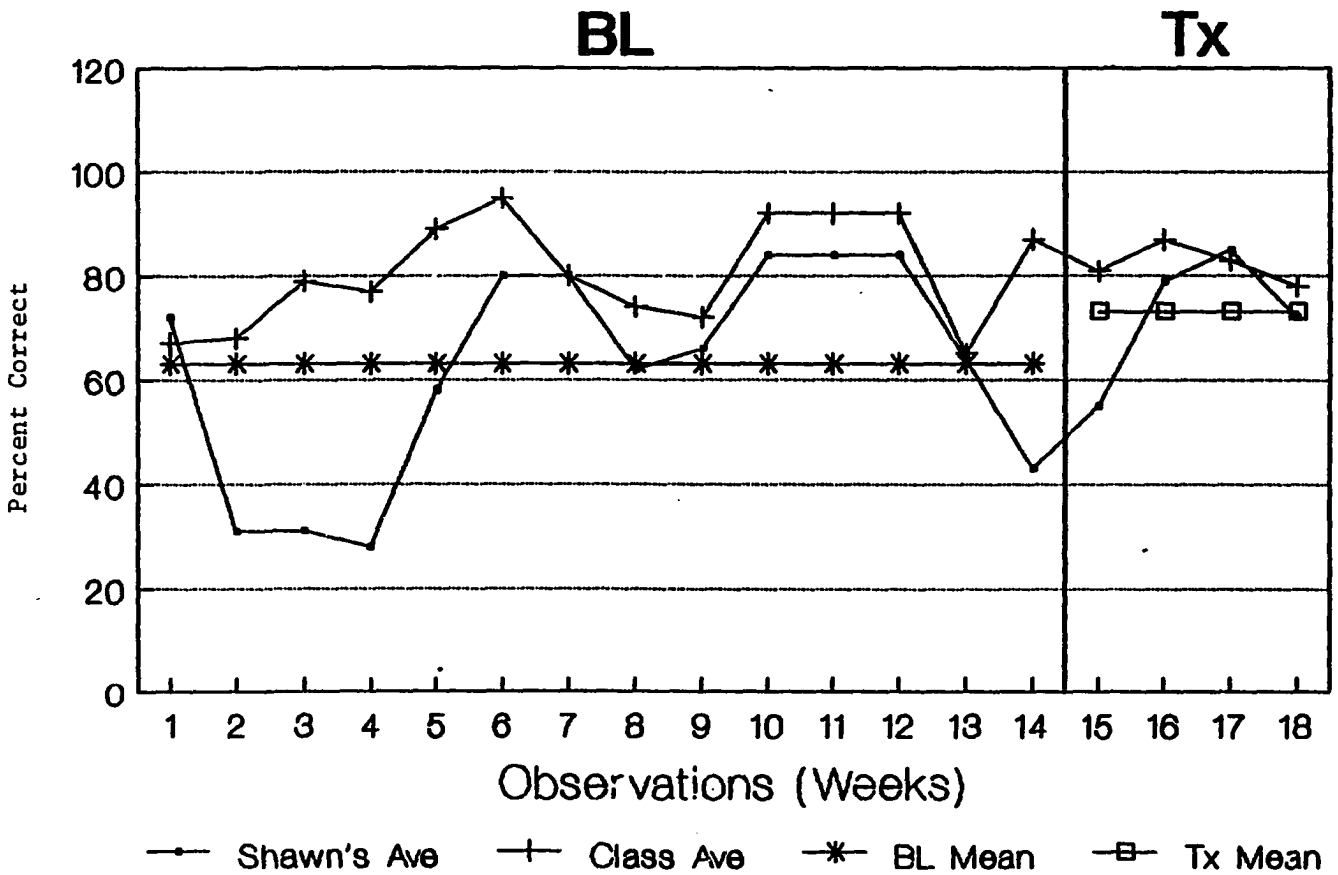

Figure 31. Shawn's science performance as a function of baseline (BL) and home-based management (Tx) conditions

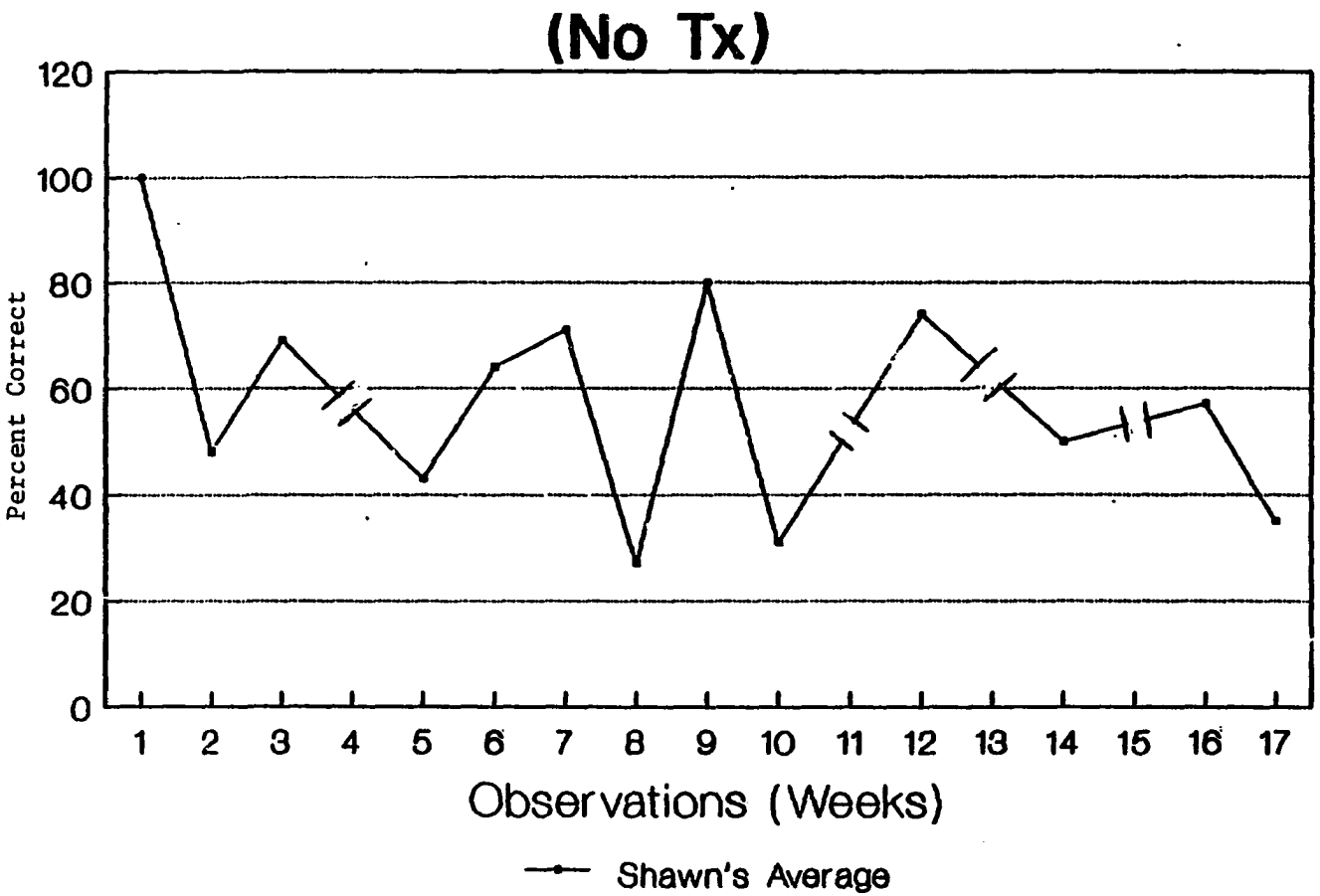

Figure 32. Shawn's English performance during baseline (weeks 1-8) and treatment (weeks 9-17) conditions for targeted subject areas

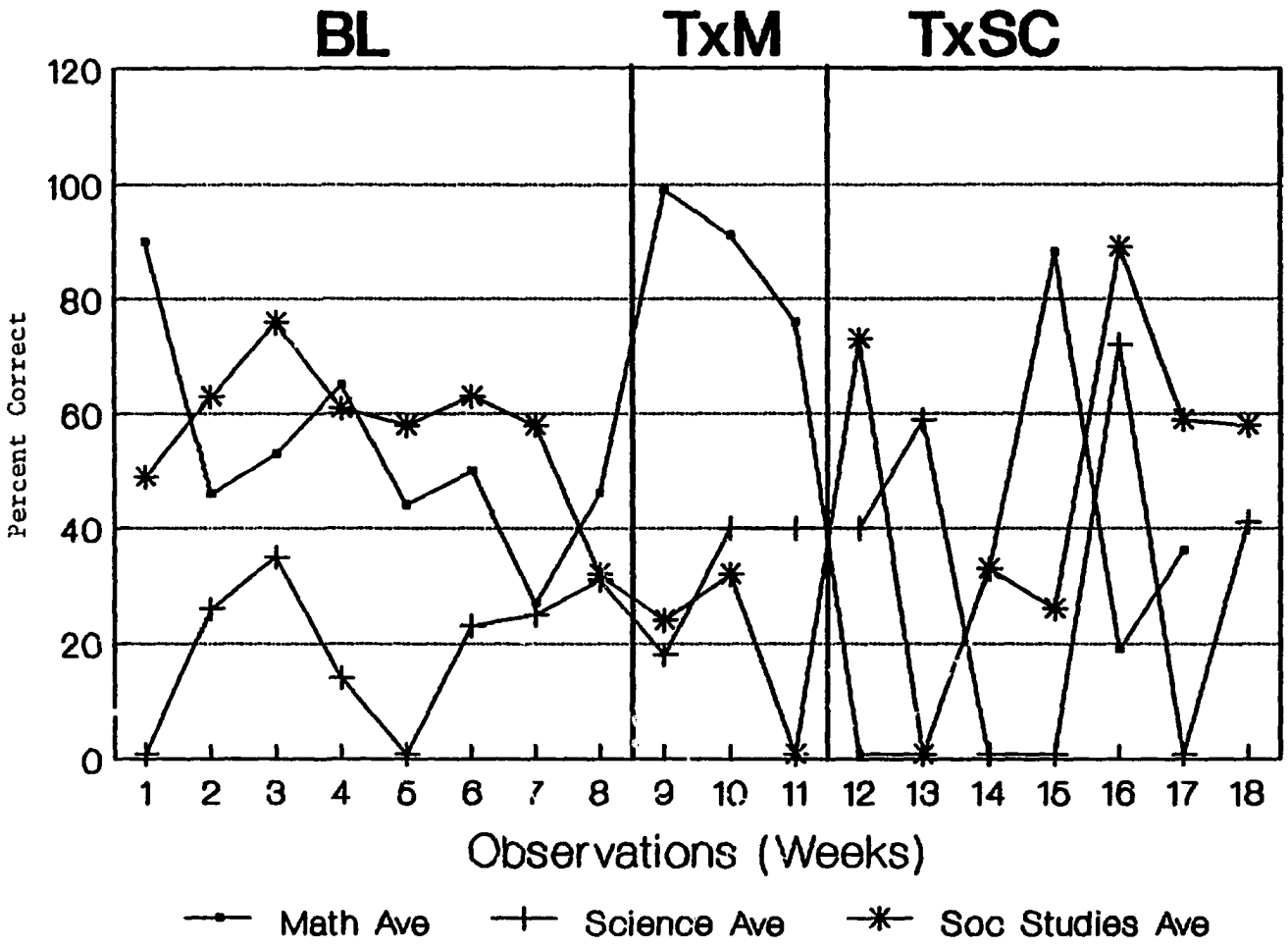

Figure 33. Joan's academic performance as a function of baseline (BL) and home-based management cumulatively applied to math (TxM) and science (TxSC)

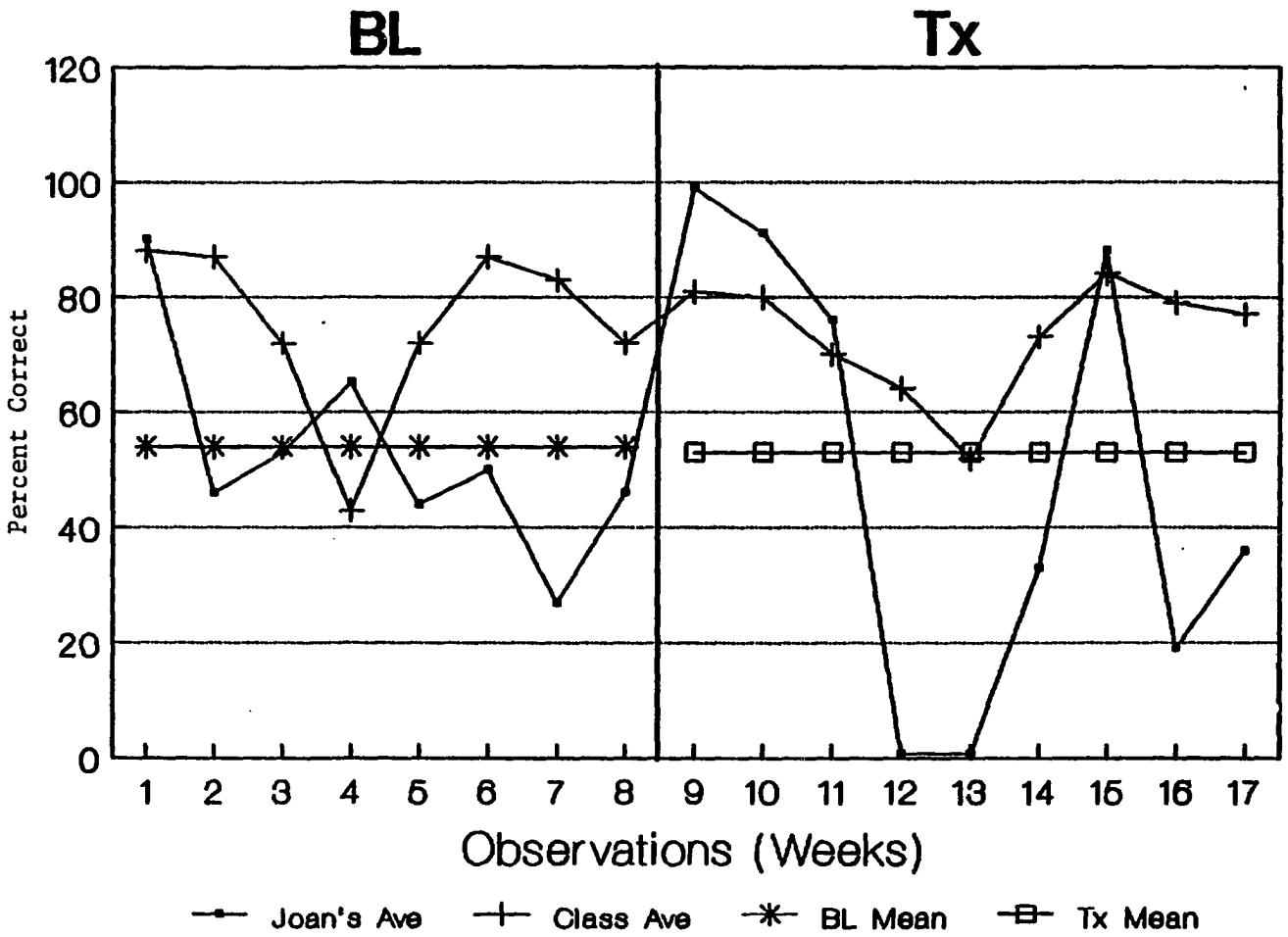

Figure 34. Joan's math performance as a function of baseline (BL) and home-based management (Tx) conditions

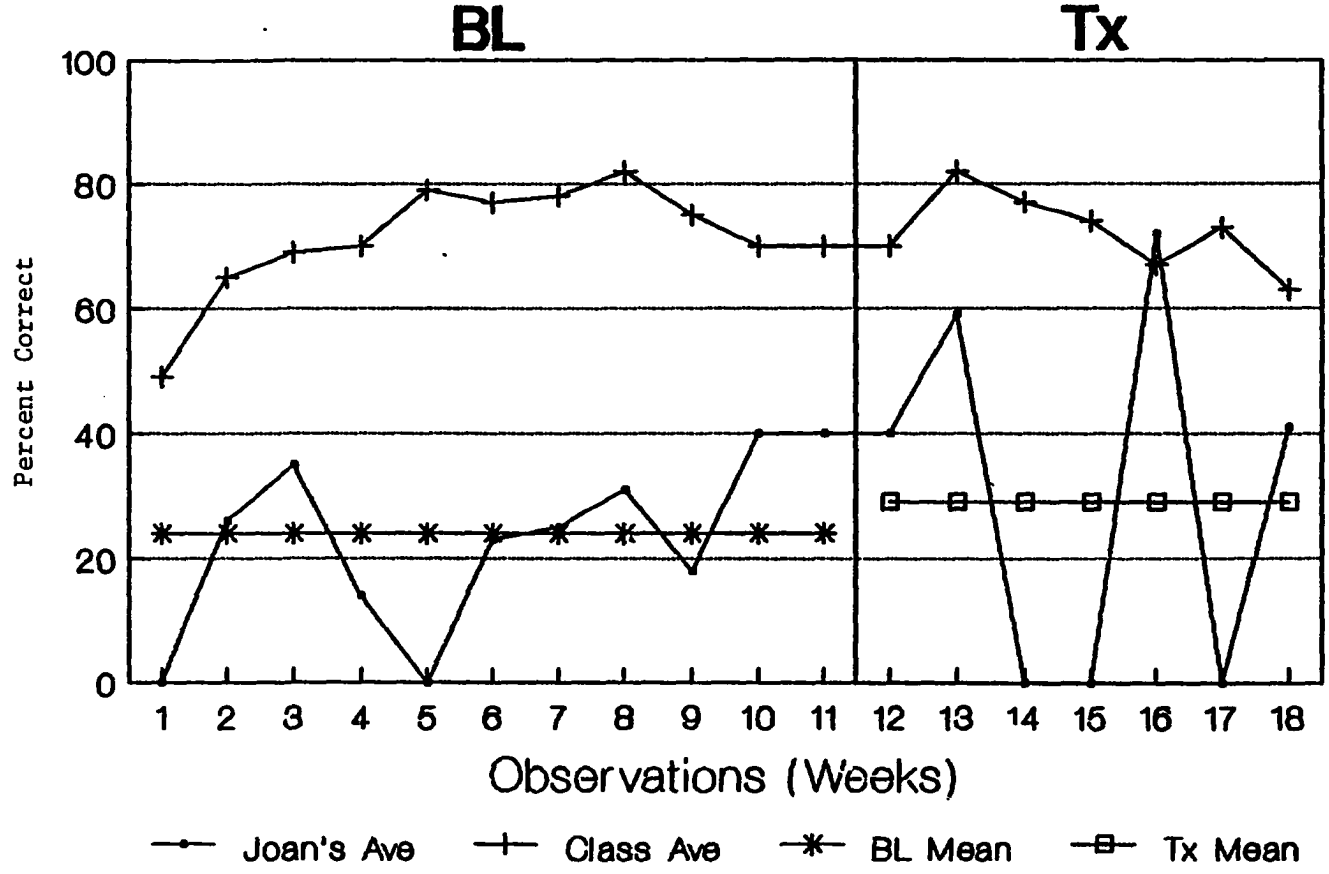

Figure 35. Shawn's science performance as a function of baseline (BL) and home-based management (Tx) conditions

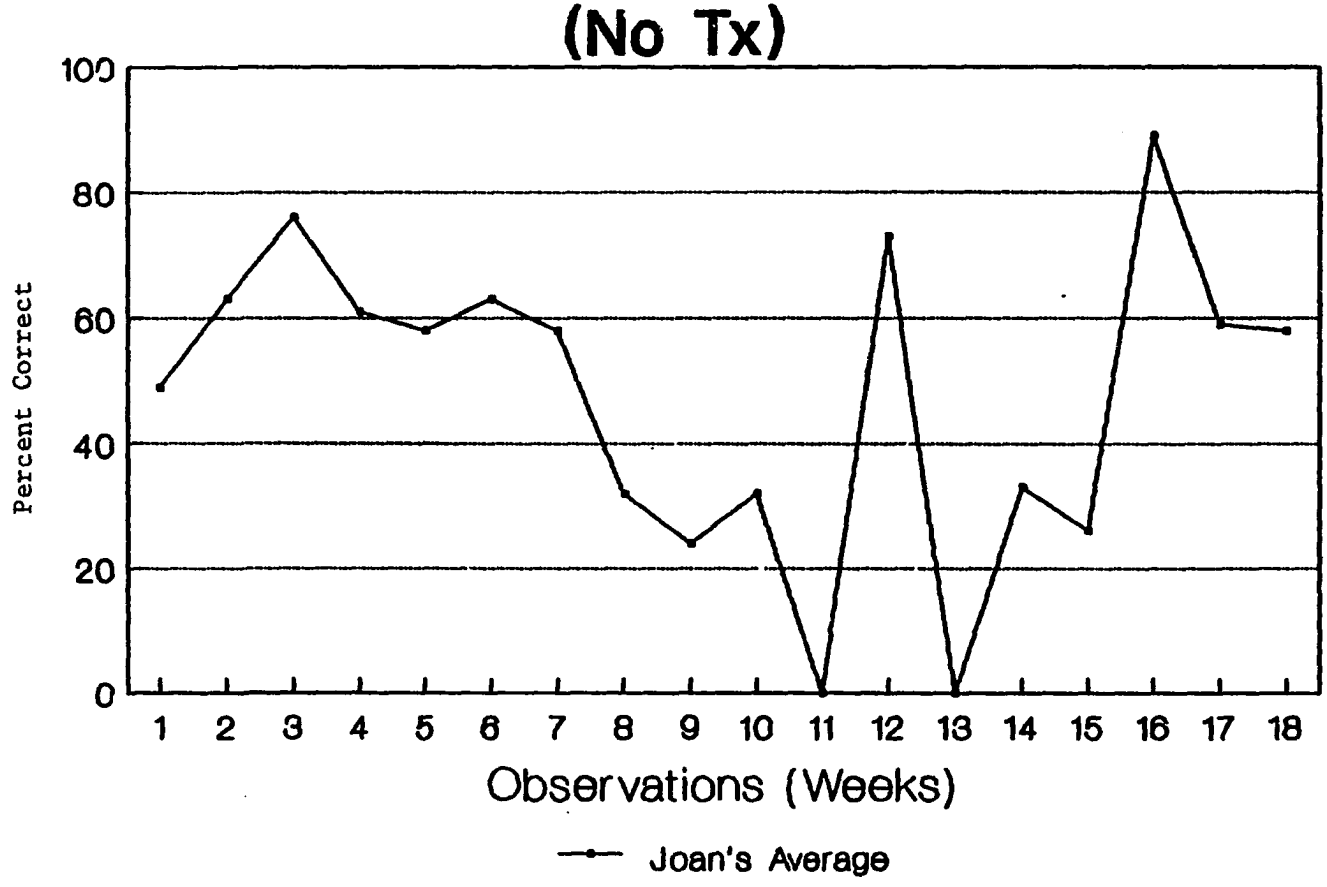

Figure 36. Joan's social studies performance during baseline (weeks 1-8) and treatment (weeks 9-18) conditions for targeted subject areas

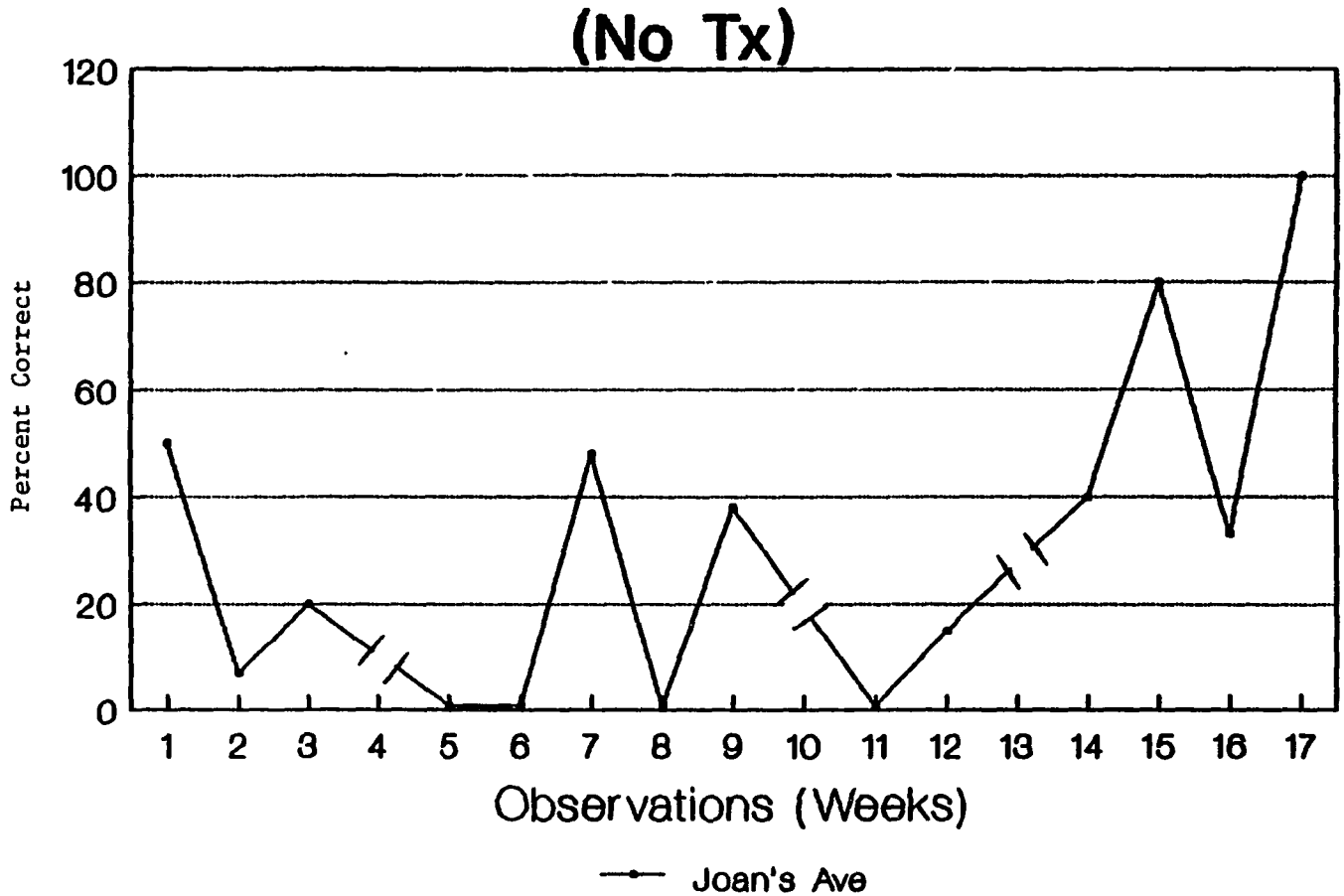

Figure 37. Joan's English performance during baseline (weeks 1-8) and treatment (weeks 9-17) conditions for targeted subject areas

APPENDIX K

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying instructions for completing this form.)

1. Title of project (please type): HOME-BASED CONTINGENCY MANAGEMENT: EXPERIMENT I

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

William B. Matthew (Typed Named of Principal Investigator) | 11-23-87 (Date) | William B. Matthew (Signature of Principal Investigator)

701 Drummond Ct., Ames, IA (~~Campus~~ Address) | (HM) 233-1376; (Off) 515-292-3791 (~~Campus~~ Telephone)

3. Signatures of others (If any) | Date | Relationship to Principal Investigator

Anton Netusil | | Co-Major Professor

Dr. Anton Netusil

Gordon Hopper | | Co-Major Professor

Dr. Gordon Hopper

4. ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- ☐ Medical clearance necessary before subjects can participate
- ☐ Samples (blood, tissue, etc.) from subjects
- ☐ Administration of substances (foods, drugs, etc.) to subjects
- ☐ Physical exercise or conditioning for subjects
- ☐ Deception of subjects
- ☒ Subjects under 14 years of age and(or) ☒ Subjects 14-17 years of age
- ☐ Subjects in institutions
- ☒ Research must be approved by another institution or agency

5. ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- ☒ Signed informed consent will be obtained.
- ☒ Modified informed consent will be obtained.

6. Anticipated date on which subjects will be first contacted: Month JAN, Day 8, Year 88

Anticipated date for last contact with subjects: MAR 1 88

7. If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments: NA (Month, Day, Year)

8. Signature of Head or Chairperson | Date | Department or Administrative Unit

P M Keith | 11-25-87 | Psych. Studies

9. Decision of the University Committee on the Use of Human Subjects in Research:

☒ Project approved with the understanding that parents will be given option to participate and that the written consent from the school system should include all three projects.

George G. Karas (Name of Committee Chairperson) | 12/3/87 (Date) | P M Keith (Signature of Committee Chairperson)

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying instructions for completing this form.)

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(1.) Title of project (please type): HOME-BASED CONTINGENCY MANAGEMENT: EXPERIMENT II

(2.) I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

William B. Matthew (Typed Named of Principal Investigator) | 11-23-87 (Date) | William B. Matthew (Signature of Principal Investigator)

701 Diamond Ct., Ames (Campus Address) | (HM)233-1376 (Campus Telephone) (off)515-292-3791

(3.) Signatures of others (If any) | Date | Relationship to Principal Investigator

Dr. Anton Netusil | | Co-Major Professor

Dr. Gordon Hopper | | Co-Major Professor

(4.) ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- ☐ Medical clearance necessary before subjects can participate
- ☐ Samples (blood, tissue, etc.) from subjects
- ☐ Administration of substances (foods, drugs, etc.) to subjects
- ☐ Physical exercise or conditioning for subjects
- ☐ Deception of subjects
- ☒ Subjects under 14 years of age and(or) ☒ Subjects 14-17 years of age
- ☐ Subjects in institutions
- ☒ Research must be approved by another institution or agency

(5.) ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- ☒ Signed informed consent will be obtained.
- ☒ Modified informed consent will be obtained.

(6.) Anticipated date on which subjects will be first contacted: Month: Jan | Day: 8 | Year: 88

Anticipated date for last contact with subjects: MAR | 1 | 88

(7.) If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments: NA (Month | Day | Year)

(8.) Signature of Head or Chairperson | Date | Department or Administrative Unit

[signature] | 11-25-87 | [signature] Statistics

(9.) Decision of the University Committee on the Use of Human Subjects in Research:

☒ Project approved with the understanding of submission of letter indicating parental approval for release of information for research purposes.

George G. Karas (Name of Committee Chairperson) | 12/3/87 (Date) | A M. Keith (Signature of Committee Chairperson)

INFORMATION ON THE USE OF HUMAN SUBJECTS IN RESEARCH
IOWA STATE UNIVERSITY
(Please follow the accompanying instructions for completing this form.)

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(1.) **Title of project (please type):** Home-Based Contingency Management :

Experiment III

(2.) I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

William B. Matthew — 11-23-87 — William B. Matthew
Typed Named of Principal Investigator — Date — Signature of Principal Investigator

701 Diamond Ct. Ames, IA. — (HM)232-1376, (Off)515-232-3791
Campus Address — Campus Telephone

(3.) **Signatures of others (if any)** — **Date** — **Relationship to Principal Investigator**

X Anton Netusil — Co-Major Professor
Dr. Anton Netusil

✓ Gordon Hopper — Co-Major Professor
Dr. Gordon Hopper

(4.) ATTACH an additional page(s) (A) describing your proposed research and (B) the subjects to be used, (C) indicating any risks or discomforts to the subjects, and (D) covering any topics checked below. CHECK all boxes applicable.

- ☐ Medical clearance necessary before subjects can participate
- ☐ Samples (blood, tissue, etc.) from subjects
- ☐ Administration of substances (foods, drugs, etc.) to subjects
- ☐ Physical exercise or conditioning for subjects
- ☐ Deception of subjects
- ☒ Subjects under 14 years of age and(or) ☒ Subjects 14-17 years of age
- ☐ Subjects in institutions
- ☒ Research must be approved by another institution or agency

(5.) ATTACH an example of the material to be used to obtain informed consent and CHECK which type will be used.

- ☐ Signed informed consent will be obtained.
- ☒ Modified informed consent will be obtained.

(6.) Anticipated date on which subjects will be first contacted: Month JAN, Day 8, Year 88

Anticipated date for last contact with subjects: MAR 1 88

(7.) If Applicable: Anticipated date on which audio or visual tapes will be erased and(or) identifiers will be removed from completed survey instruments: NA
Month Day Year

(8.) Signature of Head or Chairperson — Date — Department or Administrative Unit

[signature] — 11-25-87 — [signature]

(9.) Decision of the University Committee on the Use of Human Subjects in Research:

☒ Project approved with the understanding of submission of letter indicating parental approval for release of information for research purposes.

George G. Karas — 12/3/87 — P.M. Keith
Name of Committee Chairperson — Date — Signature of Committee Chairperson