The Function of Speech (Verbal Mediation) on Corresponding Academic and Social Behavior.

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THE FUNCTION OF SPEECH (VERBAL MEDIATION) ON CORRESPONDING ACADEMIC AND SOCIAL BEHAVIOR

A Dissertation
Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy

in

The Department of Curriculum and Instruction

by

Kimberly J. Callicott
B.S. California State University Chico, 1989
M.S. National University, 1994
May 2000
Dedication

This dissertation is dedicated to my parents Frank Earl Vannest and Karen Kay Vannest for their constant support and unconditional love.
Acknowledgements

I wish to acknowledge the contributions and assistance of my doctoral committee R. Kenton Denny, Timothy Landrum, Neil Mathews, David Houchins, John Northup, and Francis Lawrence. I would also like to thank the efforts and support of Debbie Kamps, Gary Sasso, and Linda Garrison-Harrell. Additionally, I appreciate the encouragement of Debbie Sisco and Debbie Lyons and Building Bridges Alternative School as well as my data collectors and assistants Tara Hanway, Lori Godfrey, Paula Chambers, Brenda Lull and Denise Dickinson.
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Abstract

The role of language in self-control has been of interest to researchers across continents and time. This study attempted to isolate the functional role of language in relationship to subsequent academic and task engaged behaviors with four students aged 10-14. The students were diagnosed with Emotional or Behavioral Disorders had normal intelligence and were receiving their education at an alternative placement facility.

The study used a single subject design and exposed the subjects to conditions of self-declaratory speech (SDS), SDS and reinforcement for correspondence, a return to baseline, SDS and reinforcement for correspondence, and SDS with delayed reinforcement. Results of the study indicate weak effects and variable data for the four subjects across treatment conditions.

Further research is needed to conclusively isolate the functional role of speech or language in self-control.
Chapter One

Introduction

A major goal in the education process for individuals with severe emotional disturbance or emotional and behavioral disorders (SED/EBD) is the development of self-direction (e.g., Hallahan and Kauffman, 1984; Kauffman, 1992; Kirk and Gallagher, 1989; Pierce and Epling, 1995). Certainly, we desire that all children exit school able to set socially acceptable personal and professional goals and to engage in behaviors that promote the accomplishment of those goals. However, students with EBD often do not develop these abilities and, as a result, experience an increased probability of school failure and other negative outcomes (Kazdin, 1981; Patterson, deBeryshe, and Ramsey, 1989). For example, 59 percent of students with EBD drop out or are “pushed out” of school and do not graduate (Wagner et al., 1991; Wagner, 1995). Of those students with EBD who remain in school, 63 percent fail minimum-competency exams and 22 percent are exempt from attempting them. Therefore, only 15 percent of students with EBD pass these exams (U.S. Department of Education, 1994).

Based on these statistics, students with EBD face dismal outcomes for employment or post-school alternatives. Few of them continue their education or obtain additional training, and only 17 percent go on to college or vocational preparation within two years of leaving school. Finding and maintaining employment is also difficult. As data from the National Longitudinal Transition Study (NLTS) indicate, only 41 percent of students with EBD are employed. Beyond academics and
employment, the frequency with which they violate classroom and societal rules and conventions is also troubling; for example, 20 percent of students with EBD are arrested at least once while in school, and 58 percent are arrested within five years of leaving school (Wagner et al., 1991).

The problems presented by students with EBD are not new and have been addressed using behavioral, cognitive, and medical models. Extensive conceptual (Rhodes and Tracy, 1972) and program models (Peacock Hill Working Group, 1991) have identified the large variation in practices currently used in the field of emotional and behavioral disorders. Some of the more successful strategies include systematic data-based interventions (Haring, 1987; Haring and Phillips, 1972; Kerr and Nelson, 1989; Morgan and Jenson, 1988), continuous assessment and monitoring of progress (Howell and Morehead, 1987; Kerr and Nelson, 1989), and programming for transfer and maintenance (Morgan and Jenson, 1988; Wolf, Braukmann, and Ramp, 1987).

However, teacher trainers, practitioners, and researchers continue to debate the effectiveness and evidence of empirically validated interventions (Peacock Hill Working Group, 1991). Despite promise in some areas, two primary issues remain unresolved. First, there is little agreement on how to address the development of self control in students with emotional and behavioral disorders. Second, few of the established program models have produced convincing evidence of long-term effectiveness.

Perhaps due to the lack of success demonstrated by program and conceptual models, there appears to be an opening for treatment to involve the individual student
in a meaningful way. If nothing else, the lack of consensus on empirically validated practices with students with EBD has not diminished the development of interest in self-directed interventions where the student is the primary agent of behavior change. Such practices are linked to early research in language and self-regulation and focus on the desired goals of self-direction.

Researchers have attempted to address this goal through management procedures that incorporate the individual as the agent of control. This type of procedure is broadly termed "self-management" (Thorensen and Mahoney, 1974). Self-management procedures were proposed as a combination of the traditional behavioral approaches (e.g., Heward, 1969; Skinner, 1953/69; Skinner 1957) and approaches based on a cognitive perspective (Thorensen and Mahoney, 1974).

Self-management has been defined as a set of procedures designed to develop the self-regulation of behavior (Meichenbaum, 1979). Self-management broadly encompasses four types of programs that are not mutually exclusive. These programs are self-monitoring or self-recording, self-assessment or self-evaluation, self-reinforcement, and self-instruction. The distinctions between the four types of self-management programs are outlined in the following paragraph.

First, self-monitoring or self-recording is a procedure by which an individual is taught to discriminate and record his or her own behavior (Alberto and Troutman, 1996). Closely tied to this is self-assessment or self-evaluation. In self-assessment or self-evaluation, the individual assesses his or her own behavior by determining the adequacy or inadequacy of the response and recording whether it has occurred (Snider,
The third type of self-management is self-reinforcement. Here the individual chooses and administers a reinforcer, including choosing or controlling access to the reinforcer, and determining the schedule of reinforcement. Finally, self-instruction involves the use of language within the management process. Self-instruction (Meichenbaum and Goodman, 1971) generally refers to speaking the directions or process statements aloud and ultimately fading that speech to a silent, or whispered level. The statement may include directions for problem solving, personal affirmations, accuracy, neatness checks, or other statements that are designed to regulate behavior.

These procedures share the common goal of including the individual as an active participant in the behavior change process. However, self-instruction is the only process that overtly involves the use of language. While behavioral principles such as reinforcement, modeling, and stimulus control are recognized within each of these procedures, the relative contributions of the behavioral procedure and the participation of the individual remain unclear (Kazdin, 1981; McLaughlin, 1984; Rosenbaum and Drabman, 1979). Perhaps the most unclear aspect of current self-management procedures is the role of speech by the individual. That is, what function does the “self-declaratory speech” (SDS) serve and how much control is exerted by its presence?

Several terms, although not identical, have generally been used interchangeably by early scientists to refer to the role of speech and language as a part of self-control, including egocentric speech (Piaget, 1952, 1971, 1977), private speech,
speech-for-self, and inner speech (Kohlberg, 1964; Luria, 1961; Piaget, 1952, 1971, 1977; Reiber and Carton, 1987; Vygotsky, 1962; Vygotsky, 1978). In this study, the general term "self-declaratory speech" or "SDS" will be used to refer to a child's verbalization when the primary intent is not communication with others.

The relationship between thought, language, and behavior has puzzled and intrigued researchers for decades and all major theories of behavior have attempted to reconcile this relationship. It is generally acknowledged in the literature that the relationship between an individual's verbal language (communication with others and speech-for-self) and nonverbal behavior is important (Israel, 1978; Risley and Hart, 1968; Rogers-Warren, Warren, and Baer, 1977).

Piaget (1952) believed that language and thinking are independent processes, suggesting that language does not play an important role in directing behavior but expresses thinking only. Luria (1961), Vygotsky (1962), and Bruner (1975) felt that language was a critical determinant for thought and behavior and that these processes are dependent on language. Their work suggests that language may direct mental processes and that the development of inner speech may be a requirement for self-control. More recently, Deacon and Konarski (1987) concluded from their research on correspondence training that behavior is not necessarily subject to verbal regulation but that the phenomenon of correspondence may be an example of rule-governed behavior.
Skinner (1953/69) believed that language or verbal behavior was an operant subject to the principles of behavior as established in the laboratory setting. As such, language was learned and could be modified, as could any other operant behavior. Because language is a behavior, and thus subject to modification, the relationship between language and subsequent behavior is worthy of research. This relationship has been examined as self-control and correspondence. That is, when an individual orally predicts his or her own behavior successfully, we may infer that this person is demonstrating a form of self-control (Skinner, 1953/69). The act of an individual verbally predicting or verbally reporting behavior accurately has been termed correspondence.

While some theorists (e.g., Luria/Vygotsky) assume that this relationship is a developmental process, research also supports the ability to teach, shape, and train correspondence (Baer, 1990). Stokes, Osnes and Guvermont (1987) describe correspondence as a set of topographically distinct responses that share a common controlling stimulus. For example, the statement "I will play with my doll" may correspond to play behavior with a doll that takes many forms: hugging the doll, cooking with the doll, riding a bicycle with the doll, and so on. Each of these responses is topographically different but all are play behavior with a doll. In an early series of studies, Lovaas (1961,1964) and Sherman (1964) found that modification of the verbal behavior of young children could change related nonverbal behavior such as aggression, food choices, and toy choices.
Regardless of whether verbal control of nonverbal behavior is developed naturally or is trained through reinforcement contingencies, the existence of a functional relationship between the verbal and nonverbal behavior has not been established. Studies of correspondence training procedures have yielded mixed results. Some researchers have found that reinforcement of verbal behavior has led to changes in nonverbal behavior (Baer, Williams, Osnes, and Stokes, 1984; Crouch, Rusch and Karlan, 1984). Others have found reinforcement of verbal behavior to have only minimal effect on correspondence (Baer, Osnes, and Stokes, 1983; Baer et al., 1984; Israel and Brown, 1977; Israel and O'Leary, 1973; Risley and Hart, 1968; Williams and Stokes, 1982).

Due to the lack of consistent findings in the research literature in this area, the purpose of this study was to extend the literature on self-regulation by attempting to identify a functional relationship between SDS and nonverbal academic behavior. This study assessed the effect of the verbal stimuli or SDS on nonverbal behavior by examining rates of academic responding and the duration of academically engaged behavior.

The specific research questions underlying the investigation were as follows:

1. What is the effect of eliciting verbal statements prior to performance trials on student accuracy and speed of mathematics problem solving and attending behavior or task engagement?
2. If eliciting verbal statements prior to performance trials evidences no effect, what is the effect of reinforcement contingent upon task engagement and academic performance?

3. If an effect is evidenced by eliciting verbal statements and/or providing contingent reinforcement on task engagement and academic performance, can maintenance be programmed by separating in time the verbal statement of intent and the opportunity to perform from reinforcement?
Chapter Two

Review of Literature

This study focused on the effects of self-declaratory speech (SDS) on academic responding and social behavior in an attempt to establish a functional relationship between speech and self-management with students identified as EBD. Because no one specific body of literature addresses the components of the research question, several related lines of research were examined. Three closely related areas in the literature were: the research on self-instruction with students with no identified disability and those identified as EBD; research on correspondence training with young children of typical development and no identified disability; and the existence of speech and language disorders in students with EBD.

Self-Instruction

Self-instruction procedures have focused on a variety of behaviors from academic to social, individual to group, and school to home. Of particular importance to this investigation, research suggests that self-instruction procedures are effective in promoting the social and academic behaviors of children and youth with behavioral disorders (See review by Nelson, Smith, Young, and Dodd, 1991).

Bornstein and Quevillon (1976) examined the impact of self-instruction on task performance and generalization in three "overactive" preschool students who were not identified as EBD. The procedures included teacher modeling and talking aloud, student performance and teacher talking aloud, student performance with whispered self-talk, student performance with lip movements, and student performance with
covert self-instruction. Dependent variables were on-task and off-task as observed twice daily in 30-minute sessions four days a week. The intervention was applied in an A/B design. After two hours of self-instruction training, a significant and immediate increase in the on-task behavior of the student was observed. The researchers also found that generalization across settings was facilitated for the on-task behavior of the three children and that the treatment effect magnitude was maintained at 60 and 90 days.

Davis and Hajicek (1985) examined the on-task performance in an academic context of seven distractible students aged 9.7 through 15.5 who were not identified as EBD. Strategy training was compared to self-instruction training in an A/B/C design. Fifteen-minute observations were conducted and data were recorded at 60-second intervals. Accuracy was determined to be the number of problems correct divided by the number of minutes. All students' accuracy rates improved in both conditions but attention improved only in the self-instruction condition.

Snyder and White (1979) conducted a comparative study of the effects of self-instruction and contingency awareness procedures on attendance, impulsive behaviors, and daily living requirements. The subjects were 15 adolescents, aged 14 through 17. Three groups were exposed to either self-instruction, contingency awareness procedures, or a control condition. The self-instruction consisted of six 45-minute sessions of identifying specific problems using adaptive self-verbalizations (including statements of contingencies), rehearsals, and applications. Significant improvement in the frequency of impulsive behaviors, class attendance, and daily living requirements
was reported for the self-instruction treatment compared to the other conditions of nontreatment, and contingency awareness.

Barkley, Copeland, and Sivage (1980) studied the effectiveness of a self-control "package" or multi-element intervention comprised of self-instruction paired with self-evaluation. Six boys with hyperactivity, aged seven through ten, were evaluated for their activity levels, on-task behavior, and misbehavior across classroom settings. Observations were conducted in 10-minute sessions with 15-second interval recordings. An actometer score recorded the motions of students' wrists and ankles. An A/B/A/B design was employed. The intervention of self-instruction and self-evaluation consisted of the teacher presenting and modeling a problem and solution with self-instruction, followed by students having an opportunity to perform similar problems. The authors reported no changes in actometer scores, small decreases in off-task behavior, and increases in on-task behavior. Further, the procedure was more effective for individual seatwork than group work. No treatment effect was found in the regular classroom where the researchers had hoped to see generalization.

Meichenbaum and Goodman (1971) attempted to determine whether a self-instructional procedure, cognitive self-guidance, could change impulsive behavior. The study involved 15 subjects, aged seven through nine, with hyperactivity and poor self-control. Students were not identified as EBD. Measures of impulsive and nonimpulsive behaviors were recorded in 10-second intervals two days a week for an unreported period of time. The intervention consisted of the standard self-instruction procedures of teacher-talk and performance, teacher-talk and student performance,
student performance and whispers, and student performance. The control group received no self-instruction training. Meichenbaum and Goodman (1971) reported that significantly altered behavior resulted from the cognitive self-guidance treatment when compared to the modeling without self-instruction training or the control group.

Dunlap et al. (1995) examined the effectiveness of a self-monitoring package on the task engagement of two students with EBD aged 10 and 11. The self-monitoring package included periodic cueing, self-recording, feedback, and reinforcement for accurate self-monitoring. Fifteen minutes of observational data were collected on one student via a 15-second partial interval system in which the initial 10-seconds were observation and the latter five-seconds were dedicated to recording. The other student's data were collected with a continuous one-minute interval system. Seventy percent of the interval had to be observed as on-task for the interval to be recorded as on-task. An alternating treatments design was employed. Results of high increases in task engagement on academic behavior were reported.

McLaughlin (1984) compared the effects of self-recording and self-recording with reinforcement on 12 students with EBD aged 10.2 through 12.3. Data were taken on percent of assignment completion, on-task, and accuracy of self-recording. Three groups were compared: self-recording; self-recording with a backup reinforcer; and a control group. Significantly higher performance of on-task behavior and assignment completion was reported for the self-recording and the self-recording with backup reinforcement treatment conditions.
These findings appear to suggest that teaching students self-regulatory statements, self-problem solving skills, self-recording skills, and self-monitoring skills improves social and academic performance more than other procedures or no procedure at all. But what happens when the verbalization is an antecedent related to prediction or promise of future behaviors rather than a cognitive restructuring device or consequent to behavior? Additionally, the promising results in self-management studies lead to an analysis of the oral component of the procedures, and beg the question: Is there a functional relationship between antecedent language and subsequent related behavior? This has best been researched in a series of correspondence studies. The transition from self-management literature to correspondence training is important to establish the existence of research that studied and attempted to develop in children a functional relationship between what they say and what they do.

**Correspondence Training**

Correspondence is a person's verbal prediction or verbal report in reference or response to a behavior (Stokes, et al., 1987). Some researchers (e.g., Kanfer and Karoly, 1972) believe that within the correspondence process, the verbalization serves as a discriminative stimulus in its relationship with self-control. Whether or not the verbalization is functionally necessary in order to control the behavior is, however, uncertain.

Research by Baer, Detrich, and Weninger (1988) supports the possibility of some type of verbal mediation within the correspondence process. These authors
outline four components typical of the training procedure: the experimenter prompt, the student verbalization, the opportunity to behave, and the consequence or reinforcement. The experimenter prompt consisted of the supervising adult eliciting a verbalization from the student. This verbalization would relate to, or in some way predict future behavior. The student verbalization could be trained by the adult or volunteered by the student in response to a specific question such as, "What will you play with today?" The opportunity to engage in the behavior promised in the verbalization is observed for a student choice that confirms the accuracy of the verbalization. The behavior is then called to the attention of the child with reinforcement delivered contingently for behavior that matches or corresponds to the antecedent verbalization.

Israel and O'Leary (1973) attempted to develop correspondence with play behaviors with 16 Head Start children whose mean age was 4.4. The dependent variable of play behavior choices was recorded in 20-minute sessions with 20-second observe and 10-second record intervals. Two groups were exposed to different interventions.

Group I experienced phases of a say-do condition where the reinforcement was contingent upon the verbalization (say) and then a correspondence condition where the reinforcement was contingent on the toy selection matching the verbalization. The next phases consisted of a sequence of reinforcement for the play behavior followed by reinforcement for playing and then reporting (do-say). Group II was first exposed to the sequence where playing with the targeted toy was reinforced (do). In the next
condition, the reinforcement was contingent upon the play behavior being reported
correctly (do-say). This study demonstrated that reinforcement of correspondence
resulted in changing nonverbal behavior by reinforcing related verbal behavior. The
data also indicated the superiority of the say-do sequence over the do-say sequence.

Israel and Brown (1977) examined the verbal content phase, with particular
emphasis on any differences between correspondence with prior verbal training and
correspondence with no verbal training. Sixteen Head Start children with a mean age
of 4.8 were assigned to one of two groups. In 15-minute observation periods with 20-
second observe and 10-second record intervals, data were collected on play behavior
as defined by looking at or touching a toy during any portion of the interval.
Reinforcement of verbalization was not necessary for developing correspondence;
further, verbalization training was found to be unnecessary as a part of the procedure.

Jewett and Clark (1979) taught preschoolers to engage in appropriate
dinnertime conversation. Four children aged 4.10 through 5.4 were differentially
reinforced at preschool for correspondence. Data were collected through tape
recordings and a comment scoring system. Results indicated that the behavior of
appropriate dinnertime conversation increased for each subject across targeted topics:
work, school, and appreciation. This increase maintained itself through school and
home phases.

Baer et al. (1983) trained generalized correspondence between verbal behavior
at school and nonverbal behavior at home. One developmentally typical four-year-old
was taught to verbalize intentions on two house chores (picking up PJs in the A.M.
and picking up clothes in the P.M.) and dessert choices (fruit or sweets). Observations of chores and choices were scored as a Y for yes or N for no. Higher rates of behavior occurred with reinforcement of correspondence for the first two targeted behaviors (chores). Correspondence generalized to dessert choice without contingent reinforcement.

Baer et al. (1984) studied delayed reinforcement in verbal/nonverbal correspondence to determine its effect as an indiscriminable contingency. Three experiments were conducted with four children, aged four through five, who were developmentally typical and exhibited no major behavior problems. The intervention targeted six play behaviors: five specific to toys, and one specific to peer play. Each day the child was requested to verbalize his or her play intention and was then observed. Reinforcement was delivered immediately after the observation period. The conditions of immediate reinforcement of verbalization, delayed reinforcement of verbalization, and reinforcement of correspondence were applied in differing sequences to each subject.

Experiment I focused on reinforcement of correspondence and delayed reinforcement of verbalization. Both of these conditions produced higher rates of targeted play behavior. The subject in Experiment I was able to discriminate the condition of immediate reinforcement.

Experiment II used reinforcement of correspondence for only one of the four targeted play behaviors (books, kitchen, beads, or crayons). As in Experiment I, the result was an increase in behavior. This change generalized to the other three targeted behaviors.
play behaviors when a condition of delayed reinforcement was instituted. For the targeted behavior of kitchen use, reinforcement of correspondence was reintroduced to produce increased play when a return to delayed reinforcement after verbalization was not differentiated from baseline. The subject also seemed to produce subsequent and continuously higher play behaviors with the first reinforced behavior of correspondence, playing with crayons. This may indicate that the student generalized the reinforcement for playing with crayons even after an extended return to baseline (50 days).

Experiment III, which replicated Experiment II with two new subjects, indicated that reinforcement of correspondence produced substantial increases in play behaviors. In summary, delayed reinforcement of verbalization maintained behavior acquired in correspondence training with children of typical development.

Baer, Blount, Detrich, and Stokes (1987) examined the effect of intermittent reinforcement on verbal and nonverbal correspondence for children making choices for nutritious snacks. The study was conducted to analyze maintenance of correspondence. Three children aged 4.5 through 5.5 with typical development served as subjects. Observations of snack choices were recorded as Y or N. The snack food menu was developed so that each food appeared twice in a week. The children were given a daily choice via photographs of the four snacks available and asked to verbalize whether they would choose healthy foods. Each child then approached the snack room and selected four chunks (food was proportioned in 1/4 the amounts of normal serving size and children were not allowed to view other student choices).
Consequences for verbalization varied across experimental conditions. Consequences for snack choices were immediate and consisted of tickles, hugs, lifts, stickers or swings; these consequences were written on cardboard squares and selected from a grab bag. The delivery of consequences varied across conditions.

The conditions were varied across children to maintain a criterion level of "mostly healthy snack choices," which was defined as three of four food items. The first baseline condition consisted of the children having a choice from the reinforcer grab bag, the delivery of the consequences, a look at the photographs of snacks then being asked to verbalize their choice, and finally proceeding to the snack room to make their choice.

The second condition involved reinforcement of verbalization. Here the child was told that he or she must verbalize "mostly healthy food" to be allowed to choose from the grab bag and receive the reward. Reinforcement of correspondence was the third condition. The children were given the grab bag when they verbalized and met three of the four healthy food choice criteria.

Consequences were delivered individually after food selection. If the children had not met the criterion they were told by the adult, "You said you would choose mostly healthy food for snack today, but you didn't. That means you can't draw from the bag today" (Baer et al., 1987). In the fourth condition, consequences for correspondence were delivered intermittently and randomly at 67 percent of the trials. When correspondence was maintained for five days the reinforcement was dropped to
33 percent of trials. When the last five consecutive days showed responding at or above criterion for the previous condition of reinforcement, extinction was introduced.

The fifth and final condition was reinforcement for verbalization only. This was implemented when the snack choice behavior had remained at or above criterion for a minimum of 15 days. The overall results showed that healthy food choices increased most significantly and immediately with the reinforcement of correspondence. Healthy food choices were maintained at a higher than baseline level for two of the three subjects for both intermittent reinforcement and reinforcement of verbalization only. For the child whose behavior dropped, reinforcement of verbalization was reintroduced after a consistently high level of correspondence; that is, reinforcement of correspondence was introduced again and the choice behavior regained its previously high level. The intermittent condition for the child was variable for nearly 10 of the 20 days in this condition. The final condition of reward for verbalization only maintained the high choice behavior.

This study supports the idea that reinforcement can be successful in producing correspondence behavior in young, developmentally typical children with no behavior problems.

Deacon and Konarski (1987) looked at reinforcement of the nonverbal target behavior in the absence of relevant verbal behavior to determine if this absence would account for behavior change. Twelve mentally retarded adults served as subjects in two groups. Behavioral targets were responses of selecting one type of item from a display of common objects. The frequency of response was recorded by
microcomputer. Group I experienced reinforcement for correspondence, Group II for exhibiting the behavior only. The results indicated similar outcomes for both groups, an increase of behavior with reinforcement.

Baer et al. (1988) studied six four-year-olds of typical development in a detailed analysis of antecedents. The target behaviors of play were measured in 15-minute periods with 10-second intervals. The data were reported as a percentage of intervals in which the behavior occurred. Experiment I involved three of the subjects. Target behaviors were selected due to their infrequent use prior to baseline (doll play, bristle block play, kitchen play, book play, and crayon play). A child was brought to a small, empty room daily for the “pre-observation” and told what he or she should do during playtime. Consequences for various target behaviors were provided immediately after the 15-minute observation period. Initially, a grab bag of consequences written on slips of paper was used as the reinforcement system. However, the grab bag appeared to lose its function as reinforcement, so stickers were used as a replacement when target behavior declined to low levels. During the baseline condition, the children were asked what they would do during playtime. The children responded verbally 100 percent of the time. In the reinforcement of verbalization condition, an immediate delivery of reward was instituted if the child stated that he or she would play with the target toy.

The next condition was a reinforcement of doing with the experimenter-verbalization used as a prompt. The experimenter told the child what toy to play with. If the observer recorded that the child did indeed play with the toy, the child was taken
aside and told, “You did play with the toy.” Then the appropriate delivery of consequence was completed. The next condition was a reinforcement of correspondence, followed by return to baseline.

Conditional probabilities of saying and doing were calculated and compared to determine if correspondence could be viewed as a response class controlling the child's verbalization. The authors reported that the probability of engaging in the target behavior was approximately equal, regardless of the previous verbalization. Therefore, verbal promise to engage in the target behavior had no effect on the probability that the subjects would act in the previously stated manner on days in which reinforcement was provided after play.

In summary, subjects were exposed to conditions of baseline (noncontingent reinforcement and prompt for verbalization), reinforcement for verbalization, reinforcement of doing with experimenter verbalization, reinforcement of correspondence (child verbalization and child behavior), and a return to baseline with no verbalization prompted. The authors reported a failure to find evidence for the functional role of a student's verbalization, as demonstrated by the lack of consistent differences when conditions were systematically compared to omit one of the four components delineated by Baer, et al. (1988).

In the second experiment, the researchers discovered that the antecedent stimulus of the verbal prompt by the experimenter was important for performance but that the student verbalization was unnecessary. They also found that verbalization by the child exerted no influence on targeted toy behavior. Complete absence of a verbal
antecedent resulted in lower rates of toy play behavior but no difference was
discernible between researcher antecedent verbalization and child antecedent
verbalization. However, high levels of variability were demonstrated with behavior in
each condition ranging from 0-75 percent, 20-85 percent, and 5-95 percent,
respectively. In the student-say and student-do condition, two of the three students
exhibited increases in behavior higher than that of the experimenter say condition.

Paniagua and Baer (1982) compared the effects of reinforcement on a chain of
correspondence behaviors they labeled in five steps: (a) a promise; (b) a series of
behaviors from the promise to the nonverbal behavior (intermediate); (c) the nonverbal
behavior that fulfills the promise; (d) a verbal report; and (e) the nonverbal reported
behavior. Three experiments were conducted with eight children aged three through
five. The first experiment involved three children aged three through four. Following
collection of baseline data on do-say behavior with noncontingent praise and a toy
after the report of the child, the authors instituted contingent reinforcement using the
toy but maintained the praise component noncontingently. The toy was given for true
reporting of the do-say sequence (accuracy of the verbal report and the behavior). The
next phase (b) set up reinforcement contingent on promises of say-do correspondence.
In these two phases, 30 minutes of delay occurred between the verbal promise or
report and the behavior. In the third phase, reinforcement was contingent on promises
to play with the targeted activity, regardless of actual behaviors. To facilitate
reinforcement of intermediate behaviors, tokens plus a descriptive statement (of the
child’s behavior) were used. Tokens were exchanged for the toy at the end of the
sequence of intermediate behaviors. Dependent variables were presence, participation, and nonparticipation. The initial delivery of reinforcement for all three subjects' accurate reporting increased participation slightly and presence significantly. However, when reinforcement was contingent on promises, participation and presence increased to nearly 100 percent.

Experiment II demonstrated that an order effect was produced in the second treatment. Three boys aged three through five underwent the same four phases as in Experiment I, but this time implemented in reverse order. The results of this study supported the findings in Experiment I with a stronger effect shown for the reinforcement of reports.

Experiment III included two subjects aged three and five. These two subjects were exposed to the phases in Experiment I and II but with differing consequences. Additionally, two target activities were programmed rather than one. Results of the first two experiments were reproduced. That is, contingent delivery of reinforcers on either promises or intermediate behavior produced higher rates of presence and participation behavior than either promises alone or true reports.

As seen in the preceding review, correspondence has been developed with reinforcement (Baer et al., 1983; Baer et al., 1984; Baer et al., 1987; Baer et al., 1988; Deacon and Konarski, 1987; Israel and O'Leary, 1973; Israel and Brown, 1977; Jewett and Clark, 1979; Paniagua and Baer, 1982). However, correspondence training research has been unable to elucidate the function of the verbalization on subsequent behavior. The difficulty in transitioning from research on the function of speech as a
part of correspondence into the role of speech in self-regulation and thinking is in the lack of a technology to reliably assess thinking and other covert speech acts. When we leave the realm of the observable, we venture into theory or jump from verifiable acts to "believed" events such as thought. However, the research with children in this area has led to foundational theories that may be inherent in our current research paradigms. As such, this research is important to review.

The Role of Speech in Self-Management

There is evidence to support the theory that as a child develops language, he or she concurrently begins to develop self-regulation of behavior. Piel (1985), for example, found a relationship between language maturity and the mode of aggressive expression. In a sample of 108 second and third graders, he discovered that language immaturity was the best predictor for physically aggressive expression. His study originated from the theory that language development is necessary for self-control.

Inept communication is considered a contributing factor to maladjustment and academic difficulties in students with EBD. In an analysis of expressive language characteristics of students with EBD, McDonough (1989) found a relationship between maladjustment, academic problems, and poor communication skills. A related study of 20 boys with EBD aged 10 through 13.5 found the majority of subjects to have significant unidentified language impairments (Warr-Leeper, Wright, and Mack, 1994). This demonstrated co-morbidity between language problems and emotional disturbance has been under increasing study. This developing interest in the relationship between language disorders and psychiatric disorders led Beitchman
(1985) to examine 1,655 five-year-olds with speech and language impairments. Of these children, almost 60 percent also received a psychiatric diagnosis. This was significant when compared to the control group, which was found to have only 12 percent of its children with speech and language impairments.

Stevenson, Richman, and Graham (1985) reported that weak language skills in preschoolers predicted later behavioral disorders during school years. They found behavior problems and poor language abilities at three years corresponded to behavioral deviance when the same children were eight.

The consistent percentage of language disorders evident in EBD populations has been found to be 71-80 percent. This may support the notion of continuing to examine speech and language in self-management, specifically self-instruction especially in relationship to students with EBD. The conceptual framework provided by a communication model of behavioral disorders (Carr and Durand, 1985; Durand, 1986; Durand and Carr, 1987) is one method of examining this co-morbidity and correlation. This model has led to the development of a technology, which includes functional assessment (hypothesis development) and functional analysis (hypothesis testing). This type of assessment and analysis allows for understanding the antecedents of undesirable behaviors and assists in the development of remedial strategies. This ecological approach to understanding and managing EBD has been effectively used with developmentally disabled populations (Carr and Durand, 1985; Iwata, Dorsey, Slifer, Bauman, and Richman, 1982), and more recently with students of typical intelligence who have EBD (Dunlap et al., 1995).
The relationship between self management in students with EBD and language is still not clearly understood, despite the theory and research in a variety of related fields: speech; language; the relationship of speech and language to self-management and self-regulation; correspondence training; and the co-morbidity of speech disorders and EBD. This ambiguity is perhaps due to the conflicting results of studies on correspondence training; perhaps as a result of the undiagnosed language difficulties seemingly present in the population of students with EBD; or perhaps the lack of conclusive evidence for a functional relationship between speech and self-management in the self-management literature with students with EBD. The research questions posed for this study examined a topic that is both relevant for improved outcomes for students with EBD and has previously been unexamined with this group of students. The effect of eliciting verbal statements prior to performance trials on student accuracy and speed of mathematics problem solving and attending behavior or task engagement has not been examined with students with EBD and may extend the literature in seeking evidence for a functional relationship between language and behavior.
Chapter Three

Materials and Methods

Design

This researcher employed single-case methods (Kazdin, 1982; Sidman, 1960). Single case research is characterized by repeated and direct measurement, carefully delineated and controlled conditions, and systematic introduction and removal of interventions. Repeated observations of performance over time are required to examine the effects of the intervention. If the behavior(s) of interest change in relation to the introduction or removal of the independent variable, then a functional relationship may be inferred. The degree of inference is directly related to the magnitude of the change, the consistency of the data, and the number of times the effect is demonstrated.

This researcher used a withdrawal design (A/B/A/B) with baselines established for each subject. The baseline phase served a descriptive function and provided information about the current level of the behavior while also enabling prediction about the expected performance in the future. Since prediction was achieved by projection, the stability of the data must be achieved by a steady state or trend prior to the implementation of the intervention. The A/B/A/B design (baseline = A) examines the effects of the intervention by exposing the subject to the intervention (B) and comparing that level of behavior or performance with the baseline. Effects of the intervention are established if performance under the B condition differs from the projection of the A condition (Kazdin, 1982). Withdrawal of the intervention allows
the investigator to demonstrate experimental control by restoring the conditions that are purported to result in that behavior (Campbell and Stanley, 1963; Kazdin, 1982).

Subject Screening and Selection

Four subjects were selected for participation in the study based on the following criteria. Each student: (a) was between the ages of 10 through 14, was currently identified as having an emotional/behavioral disorder and was receiving special education services; (b) demonstrated low levels of academic engagement in instructional settings as compared to same-age nondisabled peers; (c) demonstrated high levels of noncompliance with teacher directions; and (d) received parental permission and gave assent to participate in the proposed study.

Teachers at Building Bridges, a separate facility for youth with emotional/behavioral disorders in the St. Joseph School District were asked to participate in the study by identifying students in their classes who met the selection criteria. Following initial identification, permission was requested from each student’s parent or guardian to review the student’s psychological and educational records, administer needed assessments, and proceed with the experiment if the student qualified for participation. Upon permission, each record file was reviewed for current behavioral assessments that verified the presence of the identified target behaviors (high rates of noncompliance and low levels of academic engagement). Students were observed randomly for five to 10 days in their classroom setting to verify the existence of noncompliance and lack of task engagement.
Setting

Testing was conducted in the hallway across from the administrator's office at a round table with four chairs. On a couch, against one wall behind the data collector, students frequently sat and read quietly. Traffic through the building passed by this table and the telephone ringing in the administrator's office was audible. Conferences in the administrator's office were also sometimes audible if the door was open. Medicine was administered out of the administrator's office, which contributed to traffic flow. A high school classroom in the central part of the large room was divided from the testing area by a long bookcase and approximately 25 feet of space.

Test Materials

The test materials used for daily probes were response sheets of math problems developed by the investigator, data collectors, and classroom teachers. These were matched to the child's instructional level (75-85 percent accuracy) as determined by probes, math samples from class, and standardized academic test results. The math response sheets ranged across levels depending on the subject. For example, one student worked on algebra, while another worked on division. No single response sheet or individual problem was used more than once. To control for the threat of repeated exposure to similar problems increasing performance beyond the instructional level (subject exceeds the 90 percent accuracy level for three consecutive days), repeatedly high rates of performance resulted in the presentation of response sheets of additional difficulty. The increase in difficulty was estimated to be .5-1 grade level above the previous Woodcock Johnson-Revised score. If the resulting score, after an
increase in difficulty, did not bring the student to within the instructional range, the
difficulty was increased again and would continue until the appropriate range was
demonstrated.

Dependent Variables

Data were reported on rate of correct and incorrect responses, student
verbalization of the SDS, correspondence with the SDS, academic engagement, and
teacher behavior for script following.

Rate of correct and incorrect responding. The rate of correct responding was
determined by calculating the number of digits correct, divided by the number of digits
attempted, divided by time, and multiplied by the number of digits attempted. Each
calculation was considered as a possibly correct digit. For example, a two-digit by
three-digit problem yielded 18 potentially correct digits. Ten such problems gave the
worksheet a possible value of 180. If 100 digits were correct and 160 digits had been
attempted in 10 minutes, then \(100/160/10*160\) = a rate of 10 digits correct per minute.

A correct response was recorded if the digit written by the subject matched the
digit on the answer key in both place and form. An incorrect response was recorded if
the digit written by the subject did not match the digit on the key in place or in form.
Numbers that were carried were counted as potentially correct. Omission of a number
or symbol counted as an error. If decimals were included in the problem, they were
counted as a possibly correct digit. If symbols or signs such as "+", "+", and/or "-"
were included in the calculation and should be included in the answer, they were also
counted as a possibly correct digit. Commas were also counted.
Academic engagement. A student was considered academically engaged if he or she was actively participating in the assigned task. "Academically engaged" included writing, reading aloud, answering a teacher's question, and attending to the teacher as indicated by eye contact or looking at the assignment. A student was considered "academically unengaged" if he or she was not participating in the assigned task. Academic unengagement included: talking to the teacher about subjects unrelated to the task; talking to classmates or other individuals; putting the head down on the desk; crying, yelling, aggressive or disruptive behavior such as hitting, kicking, turning over desks; crumpling paper; breaking pencils; damaging property; or orally stating an intention to not participate.

Self-directed speech (SDS). The student's statement of intention or "self-directed speech" was recorded as an occurrence or nonoccurrence. Student verbalization was determined by an audiotape of the session. An occurrence was scored when the student emitted the phrase "I'm going to be fast and accurate" in a tone audible to the scorer.

Correspondence. Correspondence was scored as occurring when the subject's prior statement matched the performance of the student during the experimental session. Correspondence of fast and accurate performance was considered to have occurred when the subject's rate of performance exceeded the baseline by a minimum of 15 percent. Correspondence was recorded daily as an occurrence or nonoccurrence during the intervention phases.
Teacher behavior for script following. In order to ensure the fidelity of implementation of the independent variable, each teacher’s behavior was recorded with an audio cassette player. A second observer listened to the tape while checking it against the script for accuracy. An error was scored when the teacher omitted one or more of the components (e.g., statement eliciting the subject’s response or feedback regarding the subject’s statement), had an incorrect ordering of the script lines, or exhibited a failure to follow the directions outlined in the script, such as the presentation of the reinforcer. Self-corrections, mispronunciations, or rereads occurring prior to the end of the session were counted as correct.

Experimental Procedures

Pre-baseline. Each subject was exposed to an academic probe designed to identify the level of math performance and confirm the classroom work samples and standardized test results. Each student was brought to the experimental setting and instructed by the teacher:

Today we are going to take a math probe. Please work each problem on the sheet. You may not know how to work some of the problems and that is okay. If you don’t know the answer to a question try the next one. When I tell you that time is up, please stop and hand the sheet to me. Do you have any questions? Okay, then do your best!

Each probe ended after five minutes or when the student finished the last problem. At the end of the probe the student was thanked for working. The worksheets were then scored by the data collector and the investigator. An error
analysis was conducted and the results were discussed with the teacher and experimenter. Worksheets of math problems at each subject’s performance level were then developed based on these results.

A reinforcement survey was taken prior to baseline and was used to determine appropriate reinforcers. Students were given a small reinforcer choice that would be received daily for participation (like gum or a small candy) and a large reinforcer choice that would be accessible through tokens given during the reinforcement for correspondence phase. Large reinforcers were items like books, video game cassettes, tapes, etc. Students also had the choice of an immediate reinforcer (like a soda or candy bar) rather than the token on any day they were eligible to receive reinforcement.

**Baseline (A).** Baseline measures were collected for each subject at the same time each day. The experimenter escorted the child to the experimental setting and the script was read. Performance was observed for 10 minutes, the worksheet was collected at the end of the session, the student was thanked and then returned to class.

**Experiment Protocol, Baseline (A), Teacher Script:** Thank you, _____, for working with me today (presentation of small reinforcer). Today we are going to do some Missouri math, or M and M. I would like for you to complete this assignment. I won’t be able to help you or speak with you until this timer bell rings (show timer bell). Then we will be finished. Ready? Let’s begin. (Start timer at 10 minutes, 10 seconds. Present student with worksheet. When timer
reflects 10 minutes begin audio cue. When timer sounds, collect paper.) Thank you, _____ for working with me today. You did a nice job on your M and M.

**Intervention (B1): Self-declaratory speech.** The intervention consisted of the experimenter requesting the student to make a statement about his or her future performance to him or herself out loud (self-declaratory speech).

**Experiment Protocol, Training, Teacher Script:** Do you remember when we were doing M and M’s? That’s right, you were working on your math. Now when we do M and M’s I am going to ask you to think about how you work (pause, model thinking while whispering to self, “Hmm, how do I work?”). Then I am going to ask you how you are going to work. I would like for you to tell me you are going to be fast and accurate. Do you know what fast means? (pause) That’s right, it means how speedy or quick you are. Do you know what accurate means? (pause) That’s right, it means how well you do or how many answers you are going to get correct. Now, when I ask you how are you going to work I want you to say, “I’m going to be fast and accurate.” Let’s practice to see if you have it. How are you going to do on your M and M today? (pause, wait for response) Good! And if I say, “How are you going to work today?” (pause, wait for response). Good! And if I ask you “How will you do today?” (pause, wait for response) Excellent!

**Experiment Protocol, Intervention (B1), Teacher Script:** Thank you, _____, for working with me today (presentation of reinforcer). Today we are going to do some Missouri math, or M and M’s. I would like for you to complete this
assignment. I won’t be able to help you or speak with you until this timer bell rings (show timer bell). Then we will be finished. Before we begin, I would like you to think about how you work. (pause) Now I am going to ask you how you are going to work and I would like for you to tell me you are going to be fast and accurate. How are you going to work today? (pause and wait for response) Great! Ready? Let’s begin. (Start timer set to 10 minutes 10 seconds, present student with worksheet, when timer reflects 10 minutes begin audio cue. When timer sounds, collect paper.) Thank you, _____, for working with me today. You did a nice job on your M and M.

**Intervention (B2): Self-declaratory speech with reinforcement.** The intervention paired the SDS with reinforcement for correspondence. Correspondence was determined by the rate of speed and accuracy of the academic responding increasing a minimum of 15 percent. Procedures in phase B1 (above) were followed exactly. Then the paper was scored while the student waited. If the criterion for correspondence was met, the teacher responded with the appropriate choice from one of the two scripts (below); one if correspondence was reached the other if correspondence was not reached.

**Experiment Protocol, Intervention (B2), Teacher Script for Correspondence:**

Thank you, _____, for working with me today. You did a nice job on your M and M. Terrific, _____, you were fast and accurate. That means you get _____ (use choice of large reinforcer from the survey results, token or immediate). Good job.
Experiment Protocol, Intervention (B2), Teacher Script for Failure to Reach Correspondence: You said you were going to be fast and accurate today but you were not, so you will not be able to choose a ____ (large reinforcer from survey, token or immediate). We will try again tomorrow.

Intervention (B3): Delayed reinforcement. This condition attempted to establish maintenance by delaying presentation of the reinforcer by one hour. Procedures in Phase B (above) were followed. One hour after the collection of the paper and the last teacher statement, “Thank you, ____ , for working with me today. You did a nice job on your M and M,” the paper was scored. Depending on whether or not the criterion for correspondence was met, the teacher went to the student one hour after testing and read from one of the following two scripts.

Experiment Protocol, Intervention (B3), Teacher Script for Correspondence: When you did your M and M today you were fast and accurate. That means you get ____ (large reinforcer from survey, token or immediate). Good job.

Experiment Protocol, Intervention (B3), Teacher Script for Failure to Reach Correspondence: When you did your M and M today you said were going to be fast and accurate but you were not, so you will not be able to choose a ____ , (large reinforcer from survey, token or immediate). We will try again tomorrow.
Data Collection and Reliability

Reliability was assessed for each type of data collected: rate of correct academic responses; correspondence; academic engagement; teacher behavior for script following; and student verbalization of the SDS. Raters were trained by the investigator in recording each type of data. The training consisted of the observers memorizing the definitions of academic engagement and unengagement. Then, given short role play vignettes with undergraduate students and the investigator illustrating each behavior, the observers practiced recording each behavior. Agreement was reported by the number of agreements over the number of agreements plus disagreements. The training continued until a minimum of 90 percent agreement across three consecutive sessions was established.

**Speed and accuracy.** Reliability was assessed on speed and accuracy using the permanent product of a math worksheet. Raters independently scored the daily work of the students. A second rater rescored the product on 20 percent of the response sheets and consensus was reached when necessary.

**Academic engagement, correspondence, and student verbalization.** Reliability on academic engagement, correspondence, and student verbalization was assessed in 20 percent of the sessions by a second observer with interval matching required (when appropriate) for agreement to be counted.

**Teacher behavior for script following.** Reliability was assessed on teacher behavior for script following by comparing an audio recording to the script. Errors were circled by the rater and daily feedback was given to the teacher. In 20 percent of
the sessions a second rater listened to the audiotape and compared it to the script. Matching of errors was required for agreement to be counted.

**Data Evaluation**

Data were evaluated to determine a therapeutic criterion. A therapeutic criterion was determined by the effectiveness or significance of the intervention in a clinical or applied setting. The effect of the intervention was determined by the presence of systematic changes in behavior during each phase. Judgment was based on visual inspection of the graphed data. Consistency and stability of intervention effects determine or contribute to reliability.
Chapter Four

Results

Criteria for Evaluation of Results

In applied research, experimental and therapeutic criteria serve as benchmarks for determining the effectiveness and importance of the demonstrated effects (Risley, 1968; Kazdin, 1982). The experimental criterion is either met or not met by establishing differing effects for the intervention at points in the experiment and the establishment of an overall pattern (Kazdin, 1982). Visual inspection serves as the method for determining effect.

This visual inspection seeks two characteristics to determine effect: the magnitude of changes across phases and the rate of the change. Magnitude of change is established by an analysis of mean and level. The rate of change is determined by evaluating trend and latency. Each subject's data will be discussed in terms of mean, level, trend, and latency.

Data are reported by subject for each phase and phase change in the study. The data will also be reported by phase, comparing each subject's results. The conditions that all subjects were exposed to consisted of Baseline (A); Self-declaratory speech (B1); Self-declaratory speech with reinforcement for correspondence (B2); repeated exposure Baseline (A'); to with reinforcement for correspondence (B2'); and self-declaratory speech with delayed reinforcement (B3).
Data on Dependent Measures Reported by Subject

Data for the rate of academic responding are reported and then discussed according to each subject's results. These results are analyzed by each phase and phase changes.

William. The rate of academic responding for William while in baseline ranged from 2.19 to 19.09 with a mean of 7.56. When exposed to condition B1: Self-declaratory speech, William's rate of academic responding immediately decreased to 0 and ranged from 0 to 9.8 with a mean of 5.278. He indicated to the data collector that he thought this was "dumb." William was then introduced to B2: Self-declaratory speech and reinforcement for correspondence. His rate increased from 5.29 on the last day of self-declaratory speech to 14.79. His range of responding while in the B2 phase was 14.79 to 19.6 with a mean of 16.495. He corresponded each session and received a reinforcer. William was then returned to baseline. His score dropped from 19.6 on the last day of B2 to 18.09 but this was not a significant decrease as it remained within previous performance levels. His scores remained high and ranged from 12.79 to 21.99 with a mean of 19.108. This was significantly higher than all previous means. Replicating the effects by reintroducing B2' increased performance again to 22.19, a new rate high. The range in this phase was 22.19 to 16.69 with a mean of 17.12. William corresponded every session and received a reinforcer. These rates while in B2' were higher than the first baseline (A), higher than the B1: Self-declaratory speech condition, and slightly higher than the first B2: Self-declaratory speech with reinforcement for correspondence but not higher than the return to baseline (A').
Figure 1 Academically Engaged Time William
Figure 2  Academic Responding William
When the last phase, B3: Delayed reinforcement was introduced, William’s performance dropped from 16.69 on the last day of B2' to 8. His rate ranged from 8 to 9.2 with a mean of 8.72. William did not correspond on the first day of B3: Delayed reinforcement but corresponded on the following days until the end of the study.

William was academically engaged above 80 percent across all phases except two days in the B1: Self-declaratory speech condition. Those two days’ data showed William to be engaged at 0 percent of intervals and 57 percent. William’s engagement ranged from 0 to 100 percent. On average, he was engaged 92 percent of the time.

Ben. The rate of academic responding for Ben while in baseline ranged from 0 to 7.5 with a mean of 4.89. When exposed to condition B1: Self-declaratory speech, Ben’s academic responding immediately increased from 6.6 to 7.29 and ranged from 4.39 to 7.39 with a mean of 6.49. The mean for B1 was higher than baseline (A), 6.49 compared to 4.89, but the range of scores were within similar limits. Ben was then introduced to B2: Self-declaratory speech and reinforcement for correspondence. His rate remained fairly constant, decreasing slightly from 7.39 on the last day of B1: Self-declaratory speech to 7.2 on the first day of B2. His range of responding while in the B2 phase was 2.2 to 7.2 with a mean of 4.06. This performance was lower than both baseline (A) and self-declaratory speech (B1). Ben corresponded and received a reinforcer the first session only. Ben was not thrilled about the reinforcer he had selected and with probing from the data collector changed his reinforcer for use in the later phases. However, he was outwardly ambivalent about receiving his choice. Ben returned to baseline after a four-day absence. He had been quite sick the last five days.
Figure 3 Academically Engaged Time Ben
of B2, which may have affected his scores. Back in school and healthy, his scores now increased to 7.3 from the previous 3.19 on the last day of B2. His rate of academic responding ranged from 5.19 to 7.3 with a mean of 6.3. Replicating the effects by reintroducing B2' increased performance to 7.6 from 6.89, this was a new rate high. The range in this phase was 5.29 to 7.6 with a mean of 6.67. Ben corresponded every session but the last in this phase and received a reinforcer each session of correspondence. The last phase, B3: Delayed reinforcement, was introduced and Ben's performance dropped from 5.29 on the last day of B2 to 4.9. His rate ranged from 4.9 to 8.7 with a mean of 6.42. Ben did not correspond on the first or fourth day of B3: Delayed reinforcement but corresponded on the remaining second, third, and fifth days.

Ben was academically engaged above 80 percent across all phases except one day in baseline. That day Ben was engaged at 57 percent of the intervals. Academic engaged time for Ben ranged from 57 percent to 100 percent. On an average, Ben was academically engaged 95 percent of the intervals.

Kyle. The rate of accurate academic responding for Kyle ranged from 2.79 to 13.09 with a mean of 5.84. Data was collected for four consecutive days. Then Kyle was dropped from the subject pool due to his incarceration as a result of criminal activity in the community. Data will not be reported by graph for Kyle.

Kyle was academically engaged over 80 percent on three of his four days of data. His fourth day's data indicate academic engagement at 50 percent. Kyle was
academically engaged an average of 79 percent. Data will not be reported by graph for Kyle.

**Robert.** The rate of accurate academic responding for Robert in baseline ranged from 2.79 to 6.5 with a mean of 4.075. When exposed to condition B1: Self-declaratory speech, Robert’s rate of accurate academic responding increased to 4.19 from 3.29 on the previous session. This increase was not outside previous performance. Rate while in B1: Self-declaratory speech ranged from .7 to 4.59 with a mean of 3.16. Robert was becoming increasingly agitated in this phase and after three days of increasing threat of violence he was introduced to B2: Self-declaratory speech and reinforcement for correspondence. While in B2: Self-declaratory speech and reinforcement for correspondence, his rate increased from .07 on the last day of B1: Self-declaratory speech to 5.7 on the first day of the phase B2. His range of responding while in the B2 phase was 4.6 to 8.9 with a mean of 6.14. He corresponded every session and received a reinforcer each time. Robert was then returned to baseline. His score increased from 4.6 on the last day of B2 to 6.5 on the first day of returning to baseline. His scores remained high and ranged from 5.09 to 8.79 with a mean of 6.61. Replicating the effects by reintroducing B2’ increased performance mean again to 7.63, the range in this phase was 2.69 to 10.29. Robert was absent five of the 10 days in this condition. However, Robert corresponded every session but the last and received each reinforcer when correspondence occurred. The mean rate for the replication of B2’ was higher than the first baseline (A), higher than the B1: Self-declaratory speech condition, slightly higher than the first B2: Self-
Figure 5 Academically Engaged Time Robert
Figure 6 Academic Responding Robert
declaratory speech with reinforcement for correspondence, and higher than the return to baseline (A'). When the last phase, B3: SDS with delayed reinforcement, was introduced Robert’s performance increased from the 2.69 on the last day of B2 to 8.2 on the first day of B3. His mean score of 8.5 was the highest of any condition and scores ranged from a 7.1 to a 9.3. Robert corresponded and received reinforcers each session of the phase B3: SDS with delayed reinforcement.

Robert was academically engaged over 80 percent across all phases except three days. Two days in baseline with 72 and 67 percent and one day in B1: Self-declaratory speech with a percent of 75. His engaged intervals ranged from 67 percent to 100 percent. Robert was academically engaged on an average of 89 percent.

Travis. The rate of academic responding for Travis while in baseline ranged from 21.59 to 28.19 with a mean of 25.65. When exposed to condition B1: Self-declaratory speech, Travis’ rate of academic responding increased to 32.79 and ranged from 17.50 to 32.79 with a mean of 26.71. Travis loved math and was eager to perform. When introduced to B2: Self-declaratory speech and reinforcement for correspondence, his high rate was maintained. His range of responding while in the B2 phase was 22.69 to 29.89 with a mean of 26.59. He corresponded only one session and received a reinforcer. Travis was then returned to baseline. His score dropped from 29.89 on the last day of B2 to 23.69 on the first day of baseline. His scores in the return to baseline phase ranged from 16.79 to 24.65 with a mean of 23.4. Replicating the effects of self-declaratory speech by reintroducing B2’ increased performance again, this time to 26.6. The range in this phase was 21.69 to 26.6 with a mean rate of
Figure 7 Academically Engaged Time Travis
Figure 8 Academic Responding Travis
Travis did not correspond in any session nor was he eligible to receive a reinforcer. When the last phase, B3: SDS with delayed reinforcement was introduced, Travis' performance increased to 28.1 compared to his rate on the last day of B2, 21.69. While in B3 his rate ranged from 23.7 to 44.5. The mean for this phase was 33. He corresponded the last two days of the study while in B3: SDS with delayed reinforcement.

Travis was academically engaged above 80 percent across all phases. His engaged time ranged from 86 percent to 100 percent. Travis was academically engaged an average of 97 percent.

**Evaluation of Data by Criterion of Mean, Level, Trend, and Latency**

**Means and trends.** Evaluating changes in means can be especially useful if intervention effects are not particularly strong (Kazdin, 1986). One shortcoming, however, is that comparing means will hide a trend in highly variable performances. To compensate for this, trend will be discussed along with mean changes for each phase of the study.

Mean increases were observed for two subjects, Ben and Travis, when the first phase of the intervention B1: Self-declaratory speech was introduced. Mean decreases were observed for the other two subjects, William and Robert. A change in trend was not observable for any of the four subjects between phase change A to B1. An increase in mean from A to B2 was evident for three of the four subjects, William, Robert, and Travis. An increasing trend, however, was established by the split halves method for Ben, the one subject whose mean for B2 did not increase.
The return to baseline produced increased mean scores for three subjects, William, Ben, and Robert. No changes in trend were evident. Replication of the increase in mean scores from A to B2 was expected, and three subjects produced these results. The mean scores of B2' were higher than baseline (A') for three subjects, Ben, Travis, and Robert. Mean scores of B2' were higher than the first baseline (A) for all four subjects. The condition of SDS with delayed reinforcement maintained or increased scores for two subjects, Robert and Travis as compared to B2'. Mean levels for B3 were higher than the first Baseline (A) for all four subjects. No changes in trend were evident.

Level and latency. Change in levels refers to the discontinuity or shift in the data at each point that the experimental conditions are changed. This change can contribute to establishing effect if the last day of one phase and the first day of the next phase is shifted enough to depart from the expected, given variability. The evaluation of level statistically can sometimes be done but is not appropriate here due to serial dependency and the violation of the independence of error terms.

The change from A to B1 produced no level change for William. The change produced an increase for Ben from 6.6 to 7.29 but this was within the expected performance range and, therefore, not significant. Robert’s performance also increased from 3.29 to 4.19 but was also within the expected performance range. Travis, however, demonstrated a large increase from 21.59 to 32.79.

The next phase change B1 to B2 produced large gains for William, 5.29 to 14.79. Ben’s rate decreased just slightly going from 7.39 to 7.2 then falling again to
4.6. These scores were again within the range of performance found in baseline. Robert's performance jumped from .7 to 5.7, a significant increase. Travis essentially remained constant, 27.79 to 27.2.

Replication included a return to baseline, the repeated exposure to B2, and the introduction of B3. The return to baseline decreased performance for William, 19.6 to 18.09, and Travis, 29.89 to 23.69, but increased the performances for Ben, 3.19 to 7.3, and Travis, 4.6 to 6.5.

A' to B2' in replication increased or maintained scores for all subjects: William from 21.99 to 22.19; Ben from 6.89 to 7.6; Robert from 8.79 to 8.79; and Travis from 23.39 to 26.6. The introduction of SDS with delayed reinforcement (B3) increased scores again for Robert, 2.69 to 8.2, and Travis, 21.69 to 28.1, but decreased the performances of William, 16.69 to 8, and Ben, 5.29 to 4.9. All subjects' scores in B3 were above the original baseline.

Data Reported on Reliability

Reliability for the direct observation of academic engagement ranged from 90 to 100 percent on 20 percent of sessions. The reliability for teacher script following, the verbalization by the student of the self-declaratory speech, and correspondence was 100 percent for 20 percent of each session or product.

Data Reported on Student Accuracy and Instructional Range

An instructional range was established and maintained to control for repeated exposure to a level of material difficulty that would eventually become easier.

William had one occurrence of three consecutive days over 90 percent resulting in an
increase of material difficulty. His minimum score was zero, his maximum 99 with a mode of 98 and a mean of 90. He was in the instructional range of 75 to 85 percent four days. Ben had three consecutive days over 90 percent on four occasions. His minimum score was zero, his maximum 100, his mode 100, and his mean was 87. Ben was in the instructional range on three days. Robert had zero consecutive days over 90 percent. His minimum was 53, his maximum 100, the mode 100, and the mean 87. Three days were in the instructional range. Travis experienced three occurrences of three consecutive days over 90 percent. His minimum score was 72, his maximum 98, the mode 98, and the mean 90. Travis was within the instructional range six days.
Chapter Five

Discussion

A thorough discussion of the results will include a comprehensive analysis of the threats to internal and external validity in order to make conclusions regarding the results of the study. Internal validity considerations include precise determination of behaviors, collection of continuous and stable baseline data, data stability in each phase, interobserver agreement, and interrater agreement (Kazdin, 1982; Neuman and McCormic, 1995; Tawny and Gast, 1984). External validity is assessed with regards to direct replication and systematic replication (Kazdin, 1982; Neuman and McCormic, 1995; Tawny and Gast, 1984).

Strengths

Strengths of this study include the precise definitions of the dependent and independent variable behaviors, and the reliability of the interobserver and interrater agreement. Interobserver reliability for academic engagement ranged from 90 to 100 percent in 20 percent of the sessions. Interobserver agreement for student verbalization of the SDS was 100 percent in 20 percent of the sessions. Interobserver agreement for teacher script following was 100 percent in 20 percent of the sessions. Interrater reliability for student performance of academic responding was 100 percent in 20 percent of the sessions. Interrater reliability for student correspondence was also 100 percent for 20 percent of the sessions. These numbers indicate that the definitions of the variables were precise and the reported data reliable. In a scientific study, precise measurement is required for evaluation (Baer, Wolf, and Risley, 1968).
Weaknesses

A weakness of this study is found in the variability of the baseline data for two of the four subjects, William and Robert. Baseline data for Ben and Travis were experimentally stable (less than 20 percent variability) for the three consecutive days prior to the introduction of treatment B1. William and Robert, however, have both visually and numerically identifiable variable data. A threat to the validity of this study is in the inability to interpret results as a result of excessive variability. However, excessive variability is a relative notion according to Kazdin (1982). Because most reversal designs are assessed by a visual inspection, the assessment is relegated to judgement calls of the audience (Kazdin, 1982). This leads to potential problems in discussing the results of studies whose merits are not self-evident or that fail to demonstrate strength by the magnitude and clarity of the behavior change. Several studies on this topic reveal that judges, even when expert in the field, disagree frequently regarding data patterns and agreement on reliable effects (DeProspero and Cohen, 1972; Gottman and Glass, 1978; Jones, Weinrott and Vaught, 1978 in Kazdin 1982).

Confounding Variables

The results of this study are mixed and the data are variable. The lack of clear and stable results requires an additional discussion of possible contributing factors. There were several confounding variables to consider as threats to validity. A set of these variables was grouped by their relationship as antecedents or temporally distant
setting events in the classroom (Sasso, G. personal communication, December, 1999); a second set was the setting; the third was the relationship of family and community; and the fourth were the subjects themselves.

**Antecedent or classroom setting events.** Students who were not subjects would respond to the tester entering the classroom for the removal of a subject by comments that appeared reinforcing to the subject. Comments such as, "Why does he get to be tested?" and "Will you test me?" appeared to elevate the peer status of the subject and encouraged participation. The discipline problems of other students appeared to have a "spill-over" effect on the subject even if he was not involved. An angry, threatening, or aggressing student in an altercation with the teacher, paraprofessional, or another student appeared to result in an agitated and distracted student. Interactions among students were highly regulated and supervised but there was a disruptive effect on the class when one student engaged in verbal or physical outbursts and was subsequently manually removed from the room for isolation and time out. Also, the subject's interactions with teachers and peers immediately and up to two hours prior to the testing appeared to affect effort and concentration; for example, a student wanting to return to class for a fight or wanting to discuss issues of that morning with the tester. The schedule of the classroom, although standardized, was not identical on a daily basis. For example, one day a week the class would visit a nursing home in the community to participate in reading to the senior citizens. Student subjects and non-subjects usually performed better on these days. Substitute teachers and guest speakers generally resulted in a non-typical schedule and an opportunity for students
to challenge the authority figure more. This related also to the variables outlined above.

**Physical setting.** Another group of uncontrolled for variables related to the physical setting and structure of the psychiatric facility. The setting described earlier for testing was not controlled for distractions. Due to the nature of these subjects, data collectors were not allowed to be isolated or unsupervised. An individual trained in physical restraint had to be nearby. Therefore, the table and seating area were not in an isolated or absolutely quiet area. In fact, the proximity of this work area and test center to the time out room, the administration office, doors to two classrooms, the elevator, and hallway beyond provided occasions for a variety of noises and distractions.

**Home and community.** Outside variables that this study could not account for took two forms, the home and the community at large. The shootings at Columbine High School in Littleton, Colorado, occurred during the time that data were being collected. Littleton had two effects on subjects, the first was the appearance of new threatening behavior by the subjects. Bomb threats which had not been previously observed or documented occurred and resulted in two suspensions. The second was a brief preoccupation or fascination with the topic. The subjects wanted to engage in discussions related to the latest news hype. This interest waned after a few days. Family concerns affected attendance and participation. One subject’s mother went to jail; another subject was dropped from the study when arrested and incarcerated. Another subject was engaged in a court custody battle, which contributed to
absenteeism and emotional outbursts. Two subjects regularly reported failing to take their medicine prior to coming to school. One subject was sent home for not bringing the prescription refill back to the office for distribution during school hours. Finally, clothing and shelter needs could be inferred from the anecdotal data.

Subject selection. The subjects selected all deviated significantly statistically from the norm in terms of behavior rating scales and previous contacts with juvenile justice or mental health facilities. The implication here is that their behavior has not demonstrated a tendency for stability in the past.

Conclusions

The foregoing discussion of confounding variables makes any conclusion regarding the effects of self-declaratory speech tentative at best. Nonetheless, the results of the study do suggest that self-declaratory speech may have the potential to impact the behavior and academic performance of students with EBD, and more importantly sheds considerable light on avenues for future research.

A review of the results of the treatment effect of SDS and SDS with reinforcement on the rate of academic responding led to the following possible conclusions. One of the two subjects with stable baseline data, Travis, demonstrated modest gains in both treatment conditions. His performance reversed on the return to baseline and results were replicated with strongest gains in the delayed reinforcement condition. Travis' data would make the strongest case for treatment effect, although the gains were modest. However, disregarding small gains, especially in new treatments, would be a mistake (Sidman, 1960). It may be that small but reliable gains
are important initially to assist us in developing stronger interventions and refining the aspects of the experiment needed for more control.

Robert and William both demonstrated a drop in the rate of academic responding during the SDS condition, with a marked and dramatic increase in the SDS with reinforcement condition. Neither William's nor Robert's performance dropped in a return to baseline condition. William's performance maintained itself through a return to baseline and a reintroduction to SDS with reinforcement then dropped in the delayed reinforcement condition. William and Robert's data, although variable, demonstrates effect by the magnitude of the change. (Kazdin, 1982)

Ben was variable across all phases of the study creating difficulty in drawing clear inferences for treatment effect. A comparison of means in the case of Ben, reveals evidence for effect in the first introduction of SDS but not in SDS with reinforcement. A return to baseline did not drop performance levels but a reintroduction to SDS with reinforcement produced levels similar to the first intervention of SDS. However, performance levels overall were within a similar range and I believe Ben would be the weakest subject for demonstrating any conclusive effect.

In a highly controlled laboratory setting, the standard for conclusive proof of results includes clear control of behavior by its ability to eliminate variability and to reproduce effect repeatedly. Applied research, however, "often cannot approach this arrogantly frequent clarity of being in control of important behaviors" (Baer et al.,
Many psychologists accept the premise that the subject matter itself is intrinsically variable over and above experimentation (Sidman, 1960). That is not to say that variability is irreducible in any given experiment. Ideally, variability will be eliminated by experimental manipulation. Returning, however, to the original design and setting of the experiment, one can elucidate that prior to a study one estimates all the variables that will contribute to error and makes attempts to control for them.

It is the reasonable possibility that any of these confounding variables alone could contribute to variable performance data for the subjects. A strength of analyzing the rate data by mean changes may be the "straightening out" of those erratic and variable individual data points. Despite the variability in the data and the confounding variables, I believe the data provide some evidence for effect. Some effect is evident in both the first demonstration of self-declaratory speech and self-declaratory speech with reinforcement and the replication of these effects. The classroom teachers reported that the students talked about the "testing" and were motivated by the attention and act of testing itself (as demonstrated by reported outside studying).

Finally, although unsubstantiated, teachers reported observing that the students who participated in the study were eager to continue doing well in math. They believed that the students' performances did not fall when the intervention was removed because of our inability to take away something they saw in the students, confidence and self-control.
Further study certainly needs to be conducted to eliminate the possible sources of error while maintaining the setting. One possibility would be to test all subjects in the classroom, another would be to use a multiple baseline design, a third idea would be to limit subject selection to only those students who, like Travis, demonstrate stable responding. Testing all subjects is problematic for logistical considerations. Multiple baseline designs with this particular population met with some resistance for ethical considerations from the teachers, parents and staff of those associated with these students. An extended baseline in this experiment proved difficult because it appeared to encourage aggressive responses from the students after day six. In this study, as many as nine days of data were taken on two subjects in an attempt to get stable data, but the determination was finally made that this data reflected accurately typical performance for these two individuals. The third consideration, to choose only students with demonstrated stable performance, was determined to be the best option for a systematic replication of this study. The mixed and tentative results of the study would certainly be strengthened by replication that was able to produce stronger or clearer effects. Further research would need to expand this study by establishing more clearly the role of SDS in behavior change.
References


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Appendix 1

Parent Permission Form

Project Title: The function of self-declaratory speech on corresponding academic and social behaviors of students with emotional and behavioral disorders.

Performance Site: St. Joseph and Cameron R-1 School District Schools

Investigators: The following investigator is available for questions, M-F 9:00 a.m. to 4:30 p.m.
Kimberly J. Callicott, Department of Education, Missouri Western State College (816) 271-4301

Purpose of the Study: The purpose of the research project is to evaluate the effects of students' oral verbal statements about the speed and accuracy of their academic performance on the assigned 10-minute math task.

Inclusion Criteria: Children who meet the age requirements or who have been identified with an emotional or behavioral disability and who have not been identified as mentally retarded and who have been referred for high rates of not completing assignments quickly or accurately.

Description of the Study: Daily observations will be conducted at 10 second intervals for 15 minute periods with a teacher of teacher's aide assigning a math worksheet and an observer recording engagement/non-engagement. The teacher or teacher's aide will ask the child to repeat a phrase about speed and accuracy on the math assignment. Positive reinforcement will be used each day. Phases of the child speaking about his/her academic behavior will be alternated with phases where the child will no speak about the behavior. Additional reinforcement will be used it the student's academic performance does not increase with the verbal statements.

Benefits: Subjects will have the opportunity to improve their academic performance in math. The teachers and subjects may have the opportunity to identify a behavioral technique (verbal mediation) that could be used with other behavior. The benefit to other students and the teacher is identification of techniques to help provide a classroom environment more conducive to learning.
Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child’s participation. At any time, either the subject may withdraw the subject from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: The school records of participants in this study may be reviewed by investigators. Results of the study may be published, but no names or identifying information will be included for publication. Subject identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participation in the study, nor is their compensation to the subjects for participation.

Signatures: The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigator,

Kimberly J. Callicott (816) 271-4301
Department of Education
Missouri Western State College

If I have questions about subjects’ rights or other concerns, I can contact or call collect, R. Ken Denny, Associate Professor, and (504) 388-2299. I will allow my child to participate in the study described above and acknowledge the investigator’s obligation to provide me with a signed copy of this consent form.

Parent’s Signature Date

The parent has indicated to me that he/she is unable to read. I certify that I have read this consent form to the student and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

Signature of Reader Date
Appendix 2

Student Permission Form

Project Title: The function of self-declaratory speech on corresponding academic and social behaviors of students with emotional and behavioral disorders.

Performance Site: St. Joseph and Cameron R-1 School District Schools

Investigators: The following investigator is available for questions, M-F 9:00 a.m.-to 4:30 p.m.
Kimberly J. Callicott, Department of Education, Missouri Western State College (816) 271-4301

Purpose of the Study: The purpose of the research project is to evaluate the effects of students’ oral verbal statements about the speed and accuracy of their academic performance on the assigned 10 minute math task.

Inclusion Criteria: Children who meet the age requirements or who have been identified with an emotional or behavioral disability and who have not been identified as mentally retarded and who have been referred for high rates of not completing assignments quickly or accurately.

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Benefits: Subjects will have the opportunity to improve their academic performance in math. The teachers and subjects may have the opportunity to identify a behavioral technique (verbal mediation) that could be used with other behavior. The benefit to other students and the teacher is identification of techniques to help provide a classroom environment more conducive to learning.
Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child’s participation. At any time, either the subject may withdraw the subject from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: The school records of participants in this study may be reviewed by investigators. Results of the study may be published, but no names or identifying information will be included for publication. Subject identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participation in the study, nor is their compensation to the subjects for participation.

Signatures: The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigator,

Kimberly J. Callicott (816) 271-4301
Department of Education
Missouri Western State College

If I have questions about subjects’ rights or other concerns, I can contact or call collect, R. Ken Denny, Associate Professor, and (504) 388-2299. I will participate in the study described above and acknowledge the investigator’s obligation to provide me with a signed copy of this consent form.

Student’s Signature Date

The student has indicated to me that he/she is unable to read. I certify that I have read this consent form to the student and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

Signature of Reader Date
Appendix 3

Data Collection Forms

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Vita

Kimberly J. Callicott currently teaches at Missouri Western State College in the Department of Education in St. Joseph, Missouri. She serves on multiple state and national committees dedicated to the improvement of education and learning for all children. Her research on verbal mediation and self-control in adolescents diagnosed with behavior disorders has been nominated for the Phi Delta Kappa national outstanding dissertation award.

Kimberly moved to Cameron in 1997 after living and working in Baton Rouge, Louisiana. While in the south, she was a researcher for the Governor's policy advisor and served as staff for the LEARN Commission, a bipartisan committee who worked on K-12 education reform. After co-authoring several state grants for Louisiana she served on those grants to teach positive behavioral supports to school districts throughout the state.

Kimberly was born and raised in the North County of San Diego, California and earned her bachelors of science in business administration from California State University at Chico in 1889. She was granted her California Teaching Credential from The United States International University in San Diego and was then a high school teacher and varsity coach in Southern California from 1990-1994.

She is married to Ralph J. Callicott, a veterinarian and they are expecting their first child in May of 2000.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Kimberly J. Callicott

Major Field: Curriculum and Instruction

Title of Dissertation: The Function of Speech (Verbal Mediation) on Corresponding Academic and Social Behavior

Approved:

[Signatures]

EXAMINING COMMITTEE:

[Signatures]

Date of Examination:
December 15, 1999