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ABSTRACT

Fifty-four elementary school children who had been identified as consistently inattentive to classroom activities were involved in a four-week treatment program. Attention was assessed using a time-sampling observational instrument developed for the study, based upon a previously-developed technique. Subjects were assigned randomly to either an experimental (E), out-of-class (OC), or stay-in-class (SC) condition. Subjects were observed in the treatment lessons and in their regular classrooms before, during, and after the treatment period, and their attention was assessed using the observational instrument. Analysis of variance tests revealed that the attention and vigilance scores of subjects in the E condition were significantly higher than scores of subjects in the OC condition during the treatment lessons. In-class attention scores of the E, OC, and SG groups were not significantly different during or after the treatment period, however. Inservice training for teachers did not affect the in-class attention scores of the subject. (Author)

Final Report

Project No. 2F050
Contract No. OEC-6-72-0732-(509)

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Anita E. Woolfolk, Ph.D.
The University of Texas at Austin
Austin, Texas

INCREASING STUDENT ATTENTION: A LEARNING THEORY APPROACH WITH AN EMPHASIS ON TRANSFER TO THE REGULAR CLASSROOM

August 30, 1972

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Office of Education

National Center for Educational Research and Development
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Finally, it is to my family, Charles, Marion, Robert, and Eric Pratt, for that which has gone before and to Rob, for that which is now and is to come, that I dedicate the completion of this dissertation.

A.E.W.

Austin, Texas
August, 1972

A B S T R A C T

Fifty-four elementary school children who had been identified as consistently inattentive to classroom activities were involved in a four-week treatment program. Attention was assessed using a time-sampling observational instrument developed for the study, based upon Hewett's (1969) technique. Subjects were assigned randomly to either an experimental (E), out-of-class (OC), or stay-in-class (SC) condition.

Subjects in the E and OC conditions left their regular classrooms each day for 30 minutes to meet with a specially-trained teacher in a small group lesson. In the E condition, attention to a standard lesson series was reinforced by making the earning of token points contingent upon appropriate responses to a signal-detection task embedded in the lessons. Token points were exchanged for back-up reinforcers on an increasingly delayed schedule. OC subjects participated in the same lesson series without the token reinforcement system. SC subjects remained in their regular classrooms. Four of the nine participating classroom teachers received three hours of inservice training in operant conditioning techniques of maintaining student attention.

Subjects were observed in the treatment lessons and in their regular classrooms before, during, and after the treatment period, and their attention was assessed using the observational instrument. Analysis of variance tests revealed that the attention and vigilance scores of subjects in the E condition were significantly higher than scores of subjects in the OC condition during the treatment lessons ($p < .01$). In-class attention scores of the E, OC, and SC groups were not significantly different during or after the treatment period, however. Inservice training for teachers did not affect the in-class attention scores of the subjects.

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INTRODUCTION AND STATEMENT OF THE PROBLEM

Introductory Remarks

The Concept of Attention

The concept of attention has been woven throughout the fabric of psychology and education. Trabasso and Bower (1968) identify three theoretical domains in which a concept of attention is important--neurophysiological research, discrimination learning, and rapid information processing in humans. Attention has also been studied as a developmental construct (assuming that the origin and growth of attention can be traced from infancy), and as a personality trait. An example of the former school is Blum and Adcock (1968), while Gilmore (1968) presents a personality trait analysis of attention. The definition of attention varies from theory to theory and from school to school, but in each the construct is related to some important aspect of human behavior. The area of concern in this project involved the importance of attention in the elementary school classroom.

Attention in the Classroom

Many educators and psychologists have testified to the importance of attention in the classroom. Mostofsky (1968) is an example:

> Even a cursory reading of most expositions of the concept of attention will reveal that effective learning is highly correlated with conditions which may be said to foster attention (p. 16).

Gagné and Rohwer (1969) included in their discussion of instructional psychology a section on attention and instruction. Gilmore (1968) stated that during the last decade "the great amount of research on academic achievement has found attention to be one of the variables differentiating high and low achievers (p. 41)." A positive relationship between attention and school learning has been demonstrated by Kohlberg (1968) with kindergarten subjects, and by Lahaderne (1968) with sixth-grade students.

Other authors have described attention as a basic skill, underlying or preceding other learning. Gagné (1970) enumerated three receptive sets which he considers essential in school situations. They are: (a) "attending to verbal stimuli," (b) "responding to verbal requests," and (c) "following verbal directions." This idea of receptive sets is extended by Hewett (1968), who listed

attention as the first and most basic step in the hierarchy of educational tasks leading finally to mastery and achievement.

It would seem safe to conclude that attention is an important factor in learning and school achievement. This relationship between attention and learning does not, however, exhaust the evidence for the importance of attention in the classroom. According to Murdock and Phillips (1971), hyperactivity is one of the most common problem behaviors which precipitate the referral of a student to a Child Guidance Clinic. These authors stated that "such children emit low rates of attending behavior and, as a consequence, their behavior is aversive to adults, particularly teachers" (p. 231). Attention, therefore, is not only related positively to achievement in school, it is also a variable of probable importance in the relationship between pupil and teacher. In keeping with this hypothesis, Wagner and Guyer (1971) found that increasing the span of attention in their eight- to fifteen-year old subjects seemed to bring about more favorable teacher ratings of these students' behavior.

Increasing Attentional Skills

Given the importance of appropriate attending behaviors on the part of students, the question of developing

and improving these skills in poor attenders becomes an area of concern for psychologists and educators alike. Not all children respond to the usual methods employed by teachers to maintain appropriate classroom behaviors, including attention (Altman and Linton, 1971). For these children special help may be needed to develop their attentional skills.

One approach to this problem is through the application of the principles of operant conditioning--the use of reinforcement to increase the rate of selected behaviors. Martin and Powers (1967) have presented an operant conditioning analysis of attention span, demonstrating that the span of attending of one child can be increased by rewarding the child for incrementally longer and longer periods of constant attention to a task. This is basically the challenge to the elementary school teacher, as described by Gagné and Rohwer (1969):

> To the elementary school teacher, the problem of attention is often seen as one of bringing about an increased time span during which the child can maintain an attentional set, or even a more gross "focus" to his behavior in the face of distracting stimulation from the external environment and from his own body (p. 386).

The individual clinical approach of Martin and Powers does not lend itself well to the large classroom, however.

Increasingly, the knowledge and techniques of operant conditioning are being moved from the laboratory and clinic into the classroom.

Problem

In this study an operant conditioning technique, designed to improve student attention, is examined. The technique involves the use of a vigilance task and a token reinforcement system in a special class setting. A second aspect of the study is an investigation of the transfer of attentional skills from the special treatment setting to the regular classroom. One variable frequently overlooked in studies which involve special class placement for a student is the involvement of the child's regular classroom teacher. This study assesses the impact of in-service training for the regular classroom teacher on the child's transfer of improved attention from the special class setting to the regular classroom.

C H A P T E R I I

RELEVANT RESEARCH

Because the concept of attention has been discussed by so many varying areas of psychology and education, this chapter presents an extensive review of the research. The first section surveys three theoretical domains in which attention has been a central concept. The second section presents a discussion of several developmental constructs of attention. In the third section, attention and instruction are related. The importance of attention in the classroom is then discussed. Operant conditioning approaches to improving classroom attention are presented in the fifth section. Finally, various measures of attention are summarized.

Three Theoretical Approaches to the Concept of Attention

Attempting to construct an adequate definition of attention, Mostofsky (1968) said of the concept:

> While the age of a concept may bear little correlation to its validity, its lengthy history has been shaped by many talents, and it will be difficult under these circumstances to attempt to be entirely original. (Mostofsky, 1968, p. 5.)

Although not every theorist defines attention in identical terms, many of the definitions tend, as Mostofsky implies, to overlap. Gilmore (1968) has identified three elements which are common to many of the conceptualizations. Gilmore quotes Hinsie and Campbell for the first element: the "application of energy in the sphere of consciousness by an individual aware of the application of the energy." The second element involves the receptivity to the stimulus on the part of one or more senses of the nervous system. The final element of a definition of attention assumes that the individual cannot attend simultaneously to all stimuli occurring in the environment at a given time; therefore attention implies some kind of selectivity to these stimuli.

Early Conceptualizations of Attention

The systematic concept of attention has, as Mostofsky indicates, enjoyed a long, if sporadic, popularity. No recognition was given to the concept by the early British empiricists, but later both the functionalists and the structuralists placed great importance on attention within their theoretical framework (Trabasso and Bower, 1968). Maltzman (1967) cites the work of Pillsbury (1908), Titchener (1908), and Wundt (1897) as evidence that

attention was the "cornerstone" of consciousness-centered psychology during that period and was, in fact, the bond which held together the constructs of consciousness, feeling, and sensation--replacing the laws of association of the British Associationists in this function.

Despite the central role played by attention in consciousness-centered psychology, the concept quickly lost favor when Behaviorism became the dominant approach to psychological questions. Trabasso and Bower (1968) describe the concept's fall from grace:

> Thus, not having a firm experimental toehold, attention was one of the first mentalistic concepts to be cast aside in the behaviorist revolution. It was said to be a vague construct which explained too much or too little, which added complications of indeterminism to the S-R framework, which rested on little systematic evidence except introspections, and whose sole factual content (insofar as it was unambiguous) referred to a motoric readiness to react to particular stimuli upon which the receptors (eyes) were focused. (Trabasso and Bower, 1968, p. 3).

Beginning in about 1950, however, a renewed interest has been developing in several experimental domains of psychology. As noted by Trabasso and Bower (1968), the major domains are neurophysiological research, discrimination learning, and studies of rapid information processing in humans.

Attention in Neurophysiological Research

Although Pillsbury (1908) described physiological correlates of attention to stimulus change, the more recent work in this area has been generally the province of researchers in the Soviet Union. Pillsbury (1908) described the constriction of peripheral blood vessels, the dilation of cephalic vessels, a change in the color of capillaries in the cortex, an increase in cerebral temperature, and an increase in blood temperature as correlates of attention. He also emphasized motor manifestations which include movements of sense organs which facilitate stimulus reception. This final emphasis is important because the neurophysiological approach to attention tends to focus exclusively upon the orientation reaction, considered to involve many physiological changes which, in general, function to make the organism more sensitive to incoming stimuli. Animals are often the subjects of these experiments and the survival value of the orientation reaction is stressed (Lynn, 1966).

Physiological changes accompanying the orientation reaction can be categorized under five general headings: increase in the sensitivity of sense organs, changes in the skeletal muscles that direct sense organs, changes in general skeletal musculature, EEG changes, and vegetative changes.

A second area of concern for those studying the orientation reaction is the area of individual differences in attention. Maltzman (1967) emphasizes the importance of individual differences by stating:

> If individual differences in the OR (orienting reflex) are stable across different situations, the result would be stable differences in many learning and perceptual tasks. (Maltzman, 1967, p. 97.)

A typical study demonstrating these important individual differences is described by Maltzman (1967). The experiment involved occasional words, noise, or silence transmitted to subjects through earphones. Words, following several minutes of silence and background noise, served as the change in stimulation and subjects were classified as either high or low orienters depending upon their GSR--in relation to the other subjects--following the first word. GSR differences between the two groups persisted throughout habituation, conditioning, semantic generalization, and extinction trials. (Habituation involved repetition of the word list; conditioning was accomplished by repeating one word nine times, followed by a burst of white noise; generalization was studied by presenting words associated with the conditioned stimulus word; and extinction was accomplished by omitting the unconditioned stimulus after the presentation of the conditioned stimulus word.)

Individual differences in instrumental observing responses have also been described. Mackworth, Kaplan, and Metlay (1964) studied eye-movements during a vigilance task and concluded that a considerable range of individual differences in frequency of eye shifts was demonstrated. Frequency of eye shifts was found to be related to frequency of success on the vigilance task with two deals as opposed to one.

The idea of an orientation reaction which functions to make the organism more receptive to stimuli is not the exclusive domain of the neurophysiologists. Spence (1940) observed that an organism could form associations only with respect to those stimuli which affected his receptors. Spence anticipated the issue of learned receptor-orienting acts when, in 1937, he wrote:

> That is, the animal learns to "look at" one aspect of the stimulation rather than another because of the fact that this response has always been followed within a short interval by the final goal response. (Spence, 1937, p. 432.)

Trabasso and Bower point out, however, that if the concept of orienting response is presumed to operate at the molar level (for instance, looking at the stimulus display), then evidence can easily be amassed to demonstrate the inadequacy of this conceptualization. It would be

necessary only to show "selective learning of components in a compound stimulus discrimination under conditions that ensure the subject's gross orientation of the relevant receptor toward the stimulus display" (Trabasso and Bower, 1968, p. 7). The study by Reynolds (1961) is one of the many such demonstrations.

Trabasso and Bower (1968) believe that the "orienting-response interpretation of attention, even at the molecular scanning level, can be sustained only at the expense of inelegant and implausible confabulations" (pp. 10-11). Their interpretation of attention moves into the domain of discrimination learning.

Attention in Discrimination Learning Research

Just as the orienting response interpretation of attention was not altogether a recent product of research in neurophysiology, the idea of attention already had been linked with discrimination learning by a few early researchers. Lashley (1938) described a process, which he called abstraction, by which the organism responds to one attribute of a stimulus, while disregarding or not sensing other attributes. The organism was believed to respond in an all-or-none fashion to the abstracted attribute, while

changes in the other attributes had no effect on the reaction.

More recently authors have begun to emphasize the importance of some kind of concept of attention in discrimination learning. Deese and Hulse (1967) state that:

> . . . a study of the things which determines how organisms come to attend to one set of cues as compared with another lies at the root of many problems associated with the development of the capacity to discriminate. (Deese and Hulse, 1967, p. 200.)

Investigators currently addressing this question include Bower and Trabasso (1964), Levine (1970), Restle (1962), and Zeaman and House (1963).

Though these theoretical approaches vary somewhat, a common set of assumptions can be identified. One formulation is that of Trabasso and Bower (1968). The following is a summary of the assumptions which they identified for a simple theoretical model:

1. The stimulus patterns are analyzed into their component dimensions. (For example, a large, red triangle would be coded as to size, color, and shape.) Mechanisms utilized in this process are called coders.
2. No assumptions are made about how many coding mechanisms exist or whether they are learned or

only modified in learning. The solution required in experimental tasks usually involves determining which dimension is relevant (for example, color), and then assigning each color to the correct response category (for example, red is "A" and blue is "B").

3. There is a certain probability associated with responding, "A," when output "red" is given by the "color" coder. This probability is affected by reinforcement such that the feedback "correct" following the response "A" to the "red" output increases the probability (converging to unity) of again responding "A" to a "red" output.
4. The coders are presumed to vary in strength. The central assumption of attention theories is that not every coder operates on a single trial. The simplest theoretical model assumes that only one coder is utilized on each trial; therefore "attention" is directed toward only one dimension on each trial.
5. Major concern is focused upon the choice of the coder on each trial. Besides reinforcement history, other factors affect the choice of a coder. These include perceptual salience of a dimension, prior experience, and instructions.

6. Inherent in this model is the idea that dimensions which are not coded on any one trial cannot affect the response on that trial, nor can their outcome-responses be modified by reward or nonreward on that trial. The stimulus-as-coded is the effective stimulus. (Trabasso and Bower, 1968.)

A more complex model has recently been presented by Levine (1970) which involves a subset sampling assumption. On the basis of this assumption the subject is presumed to consider more than one dimension per trial.

The above discussion of responses to the stimulus-as-coded serves as an introduction to the final domain of experimental psychology which addresses itself to attention--rapid information processing in humans.

Rapid Information Processing by Humans

A central question in the study of rapid information processing is: By what mechanisms is the organism enabled to respond selectively to important elements of his environgment while ignoring other elements which are of little importance (Egeth, 1967)?

The model implicit in the rapid information processing approach to attention involves a conceptualization

of the nervous system similar to that of Sperling (1960). Input information is assumed to be held briefly in a large capacity short-term sensory storage and is withdrawn to be responded to immediately or to be transmitted to a more permanent memory. Experimental designs utilized in this area of research usually involve the presentation of a complex stimulus to a human subject who has been directed before stimulus presentation (or will be directed after stimulus presentation) to respond to only certain dimensions of the stimulus. Egeth (1967) groups experiments into four areas: briefly presented visual stimuli, multiple auditory message, filtering in speeded classification tasks, and visual search. His conclusions as the results in these four areas can be summarized as follows:

1. Briefly presented visual stimuli. When a complex visual stimulus is presented, "information may be extracted from it, one dimension at a time" (p. 55). Dimensions may be coded in any order, but the first dimension coded "enjoys an advantage in later recall . . . " (p. 55).
2. Multiple auditory messages. Inputs into one ear may be attenuated if the subject is attending to input from the other ear. Certain words, however,

reaching the unattended ear, may be clearly perceived if they are important to the subject.

3. Speeded classification tasks. While attempting to classify complex stimuli quickly, it is sometimes difficult for subjects to ignore irrelevant dimensions, especially if those dimensions had previously been relevant.
4. Visual search. Recognition of both visual and auditory stimuli "is the result of a hierarchy of tests performed upon sensory input" (p. 55). By adjusting the testing procedure, it is possible to allow the recognition of only one pattern or a set of patterns.

Considering these results, Egeth (1967) observes that an adaptive mediational process appears to be intervening which he calls a coding strategy. He notes that this is consistent with Lawrence's (1963) model which states that the effective stimulus is the stimulus-as-coded. Coding strategies are seen as instrumental behaviors which can be modified by instruction, motives, attitudes, and prior experience. The recognition hierarchy mentioned above is described by Egeth as a system which codes sensory input, then, depending on the task, examines coded items in various combinations, performs higher order coding

processes on the combinations, and repeats the process until a given character is recognized or rejected.

Developmental Constructs of Attention

The Development of Attention from Infancy

Attention is a concept which appears often in the research into early learning in childhood. Blum and Adcock (1968) have reviewed several such investigations. Studies begin as early as infancy. Stechler and Latz (1966) conclude that attention becomes apparent in the first weeks of an infant's life. Carpenter and Stechler (1967) give a more general description of the development of attending behavior. They assert that visual movement and gross motor movements increase in frequency from the first to the second week of life, decrease from the second to the third, and increase steadily thereafter. Fantz (1966) describes the influence of past experience on attending behaviors when, at about the third month, human faces are attended to longer than other stimuli. Scrambled human features are attended to longer than normal faces by older children. A preference for complex stimuli on the part of infants has also been reported (Ames, 1966). The

preferences for human faces, scrambled human features, and complex stimuli can be classified, using Berlyne's (1960) categories, as preferences for stimuli of special significance to the infant (faces) and preferences for novelty or complexity (scrambled faces and complex stimuli).

Attention and Cognitive Development

Citing Gollin and Wohlwill, Maccoby (1968) lists, as one dimension of change with cognitive development, an increase in the amount of irrelevant stimulation that can be tolerated without disrupting task-related responses. More frequently, however, attention is related to cognitive growth through the concept of hyperactivity. Grinsted (1939), in an unpublished dissertation cited by Maccoby (1968), related activity to cognitive growth by placing children in a "fidget chair" and tracing the relationship between movement and problem-solving success. The child became increasingly still, then, just after solving the problem or giving up, he became very active. Grinsted concluded that inhibition of activity was, in some way, related to problem-solving success. Maccoby et al. (1965) reached a similar conclusion. These investigators found that a child's ability to inhibit motor activity when instructed to do so was related to measures of cognitive

performance (both IQ and CF). Maccoby (1968) notes that Kagan, Moss, and Sigel (1963) report corresponding findings with inhibition tests.

The above discussion implies the existence of differential attending and activity inhibiting skills across individuals. The question could be asked, "Is the ability to attend in various situations a stable personality trait?" Kohlberg (1968) cites Grim et al. (1967) and Krebs (1967) as evidence that even though "empirical research has not established the existence of a cross-situational 'faculty' of attention, it does suggest that there is a consistency to attentional behaviors which is related to, but distinguishable from intelligence" (Kohlberg, 1968, p. 110).

Gilmore (1968) has, in fact, developed a personality model to account for selective attention to stimuli. Within Gilmore's model the ego is posited as the mechanism which attempts to reconcile the needs of the organism with the realities of the external environment. The quality and quantity of attention which the organism directs toward a stimulus will depend upon the previous experience that the ego has had with the stimulus and the intensity of the anticipated reward. Within this system a child will develop a characteristically short attention span if his social environment is characterized by conflicting, inconsistent,

and ambiguous degrees of acceptance. After several years' experience in a contradictory environment, the child will constantly be alert for threatening cues.

Maccoby (1968), on the other hand, cites research demonstrating that attention is, for the most part, situationally determined. Only a moderate level of intrapersonal consistency was identified in this research (Maccoby, 1966). Two experiments emphasize the importance of the stimulus in achieving attending responses. Moyer and Glimer (1954, 1955) carefully designed toys so as to make them as interesting as possible to children. Four hundred and twenty-six children, ages 18 months to seven years, were allowed to play with the toys. The mean time spent by each age group with each toy was then computed. It was found that, for each age group, there was a toy which elicited a mean attention span approaching 30 minutes. Even for the youngest group (18 months) a stimulus-toy was designed which elicited a mean attention span of 24.3 minutes. The longest mean attention span for any group with any toy was 39.7 minutes (six-year old group). Moyer and Glimer concluded that it may be more appropriate to speak of situationally-affected attention spans as opposed to conceptualizing attention span as a unitary personality dimension.

In light of the importance of situational as well as personality correlates of attentional behavior, Maccoby (1968) contends that researchers need both to identify those aspects of attentiveness which reflect stable personality characteristics and also to determine how transferable these characteristics are between situations. Any program which hopes to improve attentional skills in children should, in Maccoby's opinion, have a dual focus. The first emphasis should be that of training children in attentional skills applicable to a wide range of situations. The second should be that of structuring an environment which will elicit attention from children who are capable of it.

Having surveyed some of the major theoretical approaches to the study of attention, we will now turn to a consideration of attention as it has been related directly to instruction. The following section will draw heavily from an article by Gagné and Rohwer (1969), which includes a discussion of attention and instruction.

Attention and Instruction

In order to relate attention to instruction, it is necessary first to determine which of the many conceptualizations of attention will be investigated. Gagné

and Rohwer (1969) suggest that the meanings of attention which are most relevant to instruction are embodied in the questions:

> (a) What factors in the instructional situation bring about the establishment of an attentional set? (b) What factors in instruction operate to maintain an attentional set? (c) What conditions operate to overcome the effects of distracting stimuli on the maintenance of an attentional set? (Gagné and Rohwer, 1969, p. 383)

Establishing an Attentional Set

Gagné and Rohwer (1969) list several factors which can influence the establishment of an attentional set. The first is the presence of certain pre-existing dispositions or capacities. An example of the effect of a pre-existing disposition upon the establishment of an attentional set is demonstrated by Suchman and Trabasso (1966). They found that "the learning of concepts of object-categories was facilitated when a preferred dimension (color or form) was relevant to the category . . ." (Gagné and Rohwer, 1969, p. 383). When the preferred dimension was irrelevant, learning was retarded.

A second factor which pertains to the arousal of an attentional set is motivation or motivating conditions. Two studies, cited by Gagné and Rohwer, serve as examples

of this factor. Paradowski (1967) determined that both incidental and intentional learning were better when the verbal information to be learned was presented with pictures of strange-looking, as opposed to familiar, animals. This phenomenon suggested to Paradowski the operation of some curiosity-like motivation. The second study, Crandall (1967), demonstrated that unfamiliar words elicited greater attention--as measured by frequency of alterations of eye fixation--than did familiar words.

Another kind of motivation is suggested by the results of Coats and Smidchen's (1966) study involving lectures delivered with a great deal of animation and eye contact as opposed to lectures which are read. In the former condition immediate recall of the lecture material was significantly better. Before all instructors decide to animate their lectures, however, they might consider another view--that of B. F. Skinner.

In his book, The Technology of Teaching, Skinner emphasizes the importance of understanding what is being reinforced when multimedia, surprising sounds or movements, and other attention getting techniques are utilized by the teacher. In Skinner's opinion, the incorporation of these methods within a lesson merely capitalizes upon the students' instinctive responses to novel stimuli, but does not encourage

the development of attention to the lesson. In fact, such techniques may make the student "less likely to pay attention to things which are not on their face interesting" (Skinner, 1968, p. 121).

Skinner explains this phenomenon within an instrumental conditioning context. The attention getting techniques come at the wrong time to strengthen the behavior which is of consequence in the school learning situation. For example, a page printed in bright colors only reinforces opening the book and looking at the page. If, however, viewing an interesting and colorful stimulus was contingent upon carefully reading the text, then attention to the lesson would be reinforced. Skinner's programs for teaching attention will be discussed more fully in a later section of this ~~paper.~~ investigation.

Within the system presented by Gagné and Rohwer, it is possible to understand reinforcement both as a factor which will encourage the establishment of an attentional set and as an influence in the maintenance of attention. Representative of the former are two experiments involving the directing of attending behaviors through reinforcement of attention to certain aspects of a stimulus display. Santos et al. (1963) differentially reinforced the viewing of several animal pictures. These investigators found that

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their eight to ten year old subjects could find more quickly on a pegboard the picture which had received the most reinforcement. Fisch and McNamara (1963) induced subjects, using reinforcement, to shift attention from their preferred side of a field to the other side of the field.

The second category, using reinforcement to maintain attention, would include the many studies which seek to demonstrate that the attention span of a subject can be lengthened by using behavior modification techniques. One such study, Allen et al. (1967), attempted to modify the hyperactive behavior of a four and one-half year old boy by reinforcing attention of one continuous minute or more to any activity. Results indicated that the reinforcement techniques were successful in lengthening the attention span of the boy. Other studies involving the reinforcement of attending behavior will be discussed in a later section of this study. At this point we will turn a consideration of other factors which can influence the maintenance of attention.

Maintaining an Attentional Set

Moving from establishing an attentional set to maintaining this set may be one of the most important steps

for the student in a school learning situation. Skinner's opinions, mentioned earlier in this study, are relevant at this point. It is not difficult to capture the immediate attention of the child. The more difficult and more important task is, in Skinner's view, to arrange the contingencies of reinforcement such that originally uninteresting things become interesting when they have been attended to (Gagné and Rohwer, 1969).

Other investigators, Moyer and Glimer (1954), for example, emphasize the importance of the stimulus in maintaining attentional behavior. Their study, cited earlier in this report, demonstrated that carefully designed toys could elicit mean attention spans of approximately 30 minutes, even from the youngest children in the sample (18 months old).

The Importance of Attention in the Classroom

Attention and School Achievement

> Since Binet's pioneer work in the measurement of intelligence over half a century ago, psychologists and educators have found attention to be one of the factors associated with intelligent behavior. Within the last decade the great amount of research on academic achievement has found attention to be one of the variables differentiating high and low achievers. (Gilmore, 1968, p. 41.)

According to Gilmore (1968), high achievers tend to be able to attend to a given stimulus for longer periods of time than low achievers. They are also more selective in the stimulus to which they attend.

Jerome Kagan (1966) goes a step farther in relating attention to school achievement. He states:

> If the child pays close attention to information that is presented to him, either by book or by speech, he is likely to learn something important about the information. (Kagan, 1966, p. 79.)

Kagan's comments might raise the question, "Can attention really bring about learning?" One study, Hendrickson and Muehl (1962), points toward an affirmative answer to this question and two other reports, Lahaderne (1968) and Kohlberg (1968) demonstrate at least a positive relationship between attention and learning. The Hendrickson and Muehl study is an experimental test of the hypothesis that kindergarten children would learn more rapidly to discriminate between the letters b and d if they made motor responses which directed their attention toward the stimulus letter. Results confirmed this hypothesis. Children who consistently pushed a lever in the direction of the stimulus learned the discrimination more rapidly than the children who sometimes pushed the lever toward the stimulus, sometimes away from the stimulus (Hendrickson and Muehl, 1962).

The Lahaderne study involved an attempt to relate attention (as determined by observers in the classroom) to IQ and achievement measures. Lahaderne (1968) concluded that attention was positively related to achievement in the four sixth-grade classes studied. Finally, Kohlberg (1968) found that increase in IQ scores for 10 Negro children in a year-long Montessori program was positively related to increase in attention ratings ($r = .65$). The mean IQ increase was 17 points and the mean attention rating increase was 2 points (on a 9-point scale). Kohlberg also found IQ decrease in a more traditional Head Start summer program to be positively related to increase in distractability scores ($r = .63$).

It is possible that the changes in IQ scores identified by Kohlberg do not necessarily imply improvement in verbal ability. The children may simply be more familiar with test-like situations and more able to maintain attention to the test, an important ability with the Stanford Binet.

Two other authors who consider attention essential in the school situation are Olsen (1966) and Edelberg (1966). Each of these educators--writing in magazines which are widely read by public school teachers--contends that the teaching of listening skills should be included in the daily curriculum.

Learning Hierarchies
Involving Attention

A second way in which attention has been related to school learning is by including attentional skills as one step within a hierarchy of learning tasks. Gagné (1970) discusses attending behaviors as basic skills underlying or preceding other learning. He asserts that a receptive set (attentive set) can be considered a unitary capability because these sets "bring about a kind of behavior that precedes the learning of many other things" (p. 119). Three sets are enumerated as being important in school situations: (1) attending to verbal stimuli; (2) responding to verbal requests; and (3) following verbal directions. Strategies to develop receptivity sets in each case involve arranging the contingencies in such a way that the desired behavior is most likely to follow, then providing appropriate reinforcement. In other words, the problem is approached as an instrumental learning task. This approach to the development of receptivity sets will be the basis of experimental treatments proposed in the research design section of this study.

Finally, Hewett (1967) presents a more formal hierarchy of educational tasks in which the first and most basic step is attention. He has represented this hierarchy

as in Figure 1. The first five levels are seen by Hewett as readiness levels which are mastered for the most part by children before they begin school. The last two tasks are supposedly the primary concern of the schools. The first two tasks include paying attention to the relevant stimulus and responding to it in some appropriate manner. The third level involves being able to work within some structure and within certain limitations imposed by the school setting. Being able to explore the multisensory stimuli of the environment is the fourth task level. Hewett contends that exploratory activities are more likely to be successful if the child is functioning on an order-task level. The final readiness task (social) is the ability to get along with others.

The sixth task level is the beginning of the school-related tasks. This level involves the acquisition of essential information about and the understanding of the environment--the development of the intellectual and vocational skills necessary for social survival. At the last level--achievement--the child has become self-motivated in learning, socially well integrated, and is achieving at his potential (Hewett, 1964, 1967).

Based upon this hierarchy of educational tasks, Hewett has devised a program, utilizing techniques of

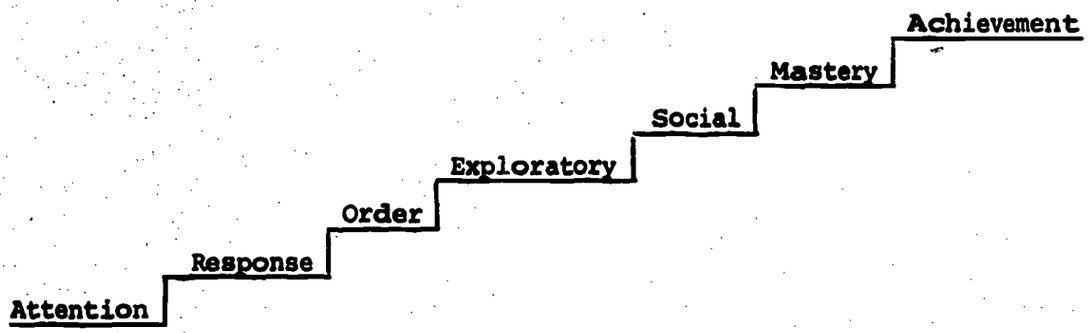

Fig. 1. Hewett's Hierarchy of Educational Tasks

operant conditioning to deal with emotionally disturbed children. The following section of this chapter discusses operant conditioning in the classroom with an emphasis on studies which sought to increase task-attention or study-behavior.

Operant Conditioning in the Classroom

It is possible to group operant techniques into four categories according to the kinds of behaviors selected for reinforcement and the kind of reinforcement used (Altman and Linton, 1971). The method described in this study draws upon techniques from each of these four categories. A brief discussion of several research studies in each category serves to describe potential uses of operant conditioning in the classroom in addition to providing a foundation for this study. The four categories are teacher attention, peer attention, token reinforcement, and vicarious reinforcement.

Teacher Attention

Several studies have demonstrated that teacher attention can serve to increase the rate of student behavior,

even if that attention--in the form of a reprimand, for example--was intended to discourage the behavior (Altman and Linton, 1971). In the Becker et al. (1967) study, five teachers were instructed to present to their classes rules for good conduct, then provide praise and smiles contingent upon appropriate behavior while ignoring inappropriate behavior. Two target children in each of the five classrooms were observed. Average deviant behavior during the pretreatment phase was 62.13 percent, decreasing significantly to 29.19 percent during the experimental period. Madsen et al. (1968) determined in a follow-up study that merely emphasizing rules while ignoring inappropriate behavior was not effective in decreasing deviant behavior. The addition of praise for appropriate behavior did lead, however, to a significant decrease in deviant behaviors. Carnine et al. (1968) also demonstrated that the combination of teacher approval for appropriate behaviors and ignoring of inappropriate behaviors led to a decrease in disruptive behaviors in the classrooms studied.

One final investigation presents evidence for the powerful effect of teacher attention on student behaviors. Hall et al. (1968) found that teachers could increase the frequency of either study or nonstudy behaviors by attending selectively to one or the other. The preceding

studies provide support for the hypothesis that teacher attention serves to increase whatever student behavior it follows. Wetzel (1970), Krumboltz and Goodwin (1966), and Murdock and Phillips (1971) discuss inservice training programs for teachers in the use of selective attention and other operant techniques. Similar training for teachers participating in this project is an important aspect of the study.

Peer Attention

A second factor affecting student behavior in the classroom is peer attention. Murdock and Phillips (1971) noted that children in a classroom situation often model the actions of their teachers toward particular disruptive students, frequently criticizing a child openly after hearing the teacher do the same. This can cause the criticized child to respond disruptively to the taunts from his peers, leading in turn to more teacher criticism, more peer rejection, and increasing isolation on the part of the child (Patterson and Brodsky, 1966).

Several studies have made rewards for an entire group contingent upon the appropriate behavior of a disruptive student, thus causing peers to encourage and reward

the student in an attempt to improve his behavior. Murdock and Phillips (1971) is an example of this approach. A variation of this technique was used by Hinds and Roehlke (1970). In this study reward for the entire group was contingent upon each child earning his quota of points for appropriate behavior. The effects of peer attention are taken into consideration in the design of this project.

Token Reinforcement

The Hinds and Roehlke study cited above is also an example of another category of operant conditioning techniques--the use of token reinforcement. In the past decade at least 100 token reinforcement programs have been established, many in classrooms (O'Leary and Drabman, 1971). These programs generally involve rules describing for the class the behaviors that will be rewarded, a means for distributing the tokens--for example, checkmarks or points--when a child displays the appropriate behavior, and a method for exchanging the tokens for rewards that the children desire, such as prizes or special privileges. Often the dispensing of tokens is paired with praise in order to establish praise as a reinforcement for children who do not readily respond to teacher approval.

Walker et al. (1969) designed a special class treatment program for hyperactive, inattentive, and disruptive fourth, fifth, and sixth graders. The program combined several features, including programmed instruction, individual and group points for appropriate behavior, and parent involvement. In their regular classes, the children in this study had averaged 39 percent task-oriented behavior. In the special class this figure rose to 90 percent. After four weeks of treatment, the six children maintained the same 90 percent level during the one-hour-per-day period that they returned to their regular classrooms.

The token reinforcement system used by Wagner and Guyer (1971) involved checkmarks on a card contingent upon 15 minutes of continuous attention to a task. Using this system in a Learning Disabilities Center, the Center teachers were able to effect a significant increase in the span of attending of the 99 students. The program continued for 12 consecutive weeks. Teacher and principal ratings of pupil behavior and pupil adjustment were also collected. The authors concluded that "conditioning a student's attending behavior to a given task seems to affect general adjustment behaviors positively and thus decreases disciplinary problems in school" (p. 289).

The study by Hinds and Roehlke (1970) was similar in design to the proposed project. In this study 40 children from 4 different classrooms were identified by their teachers as displaying behavior that interfered with learning. These 40 subjects were assigned randomly to an experimental or a control group. Children in the experimental group met with the authors for 20 group sessions of 30 to 40 minutes each. In these sessions the children received points for appropriate behaviors including attention, concentration, and participation in the group activity. When each child earned his quota of points, all children were allowed to choose a game to play for the remainder of the session. Control group children remained in their classrooms. One subset (five students) of this larger control group was seen by the authors for the same period of time and number of sessions as the experimental group. This was done to determine whether simply leaving class for a special activity would have any effect on the behaviors of the children.

All subjects were observed in their regular classes before and after the experimental period as well as during the experimental treatment itself. On measures of adaptive and interfering classroom behaviors, the two groups were not significantly different before the experiment began.

During the treatment phase, results of observational measures indicated that the number of adaptive behaviors increased and the number of interfering behaviors decreased for the experimental group. The differences between experimental and control groups were significant and the experimental group retained this advantage after returning to the regular classrooms.

Many other studies successfully utilizing token reinforcement programs could be cited. Both Altman and Linton (1971) and O'Leary and Drabman (1971), in their recent reviews of token reinforcement programs in classroom settings, conclude that this approach is a potentially powerful resource for the maintaining of appropriate behaviors in the classroom.

Vicarious Reinforcement

A final factor to consider is the role of vicarious reinforcement. Very little work has been done to determine whether the actions of one child in a classroom will be affected as a consequence of seeing another child rewarded for certain behaviors. Cardine et al. (1968) concluded that any changes in students as a consequence of vicarious reinforcement were "weak and short lived." This technique is only an incidental part of the study.

The Utilization of a Vigilance Task

Many of the above-mentioned studies rely upon the teacher's judgment that a child is paying attention to the task. It is sometimes difficult to distinguish between true attention and daydreaming. By reinforcing this kind of behavior, a teacher runs the risk of encouraging stillness, but not true concentration. To counter this dilemma, Reeback and Ebert (1969) devised a reinforcement technique using a simple auditory-visual signal given by the teacher during a small group lesson. The students earned points by responding appropriately to the signal. Response to the signal served as an alertness indicator. Attention was reinforced using candy and trinkets in exchange for the points earned by responding to the signal. Subjects were 10 Navaho children, ages 5 and 6, and the lessons involved group instruction in English. The authors concluded that attention, as measured by performance on the vigilance task, was greatly improved with the introduction of the reinforcement and that this attention was "positively related to performance in the primary task of monitoring the lessons" (p. 18). A vigilance task similar to the one used by Reeback and Ebert is incorporated into this study.

Transfer of Attentional Skills to the Regular Classroom

In any project which seeks to improve the attentional skills of students, the question must be asked, "Will improvements persist after the project has ended?" Few studies which involve special class placement have followed subjects back into their regular classrooms. Walker et al. (1969) and Hinds and Roehlke (1970), cited earlier, represent the exception rather than the rule. Baer et al. (1968) emphasized that merely checking for generalization of behavior change is not enough--"generalization should be programmed rather than expected or lamented" (p. 97). Though some studies do include elements which are intended to make transfer of behavior change more probable, to the knowledge of this investigator, no study has systematically manipulated variables believed to be associated with such transfer. Bandura (1969) has commented on this regrettable situation:

> By far the most important but most neglected aspect of behavior change processes is the appropriate generalization of established patterns of behavior to new situations and their persistence after the original controlling conditions have been discontinued (p. 619).

This study attempts to program generalization of behavior change to the regular classroom. A second goal

is to isolate some of the variables which are associated with such transfer.

Measures of Attention

Three Approaches to the Measurement of Attention

Though few actual measures of attention can be found in the literature, those few instruments can be roughly divided into three different categories. The first type and the earliest to emerge includes measures which associate inattention with restless activity or alterations in eye fixation. The second type relates attention to vigilance research, and the third set of instruments utilizes observational schedules.

Grinsted (1939), mentioned earlier, placed children in a "fidget chair," much like a stabilimeter, and then traced the relationship between the child's movements and problem solving success. He found that the child became more and more still as he continued to attend to the problem. Then, just after finding the solution or giving up, there was a burst of activity. Lore (1965) also used restlessness as a measure of inattention. He determined that economically deprived children look at visual patterns for

a shorter period of time than do middle class children and that these disadvantaged children also attend to the visual patterns less intensely as measured by a smaller reduction in restless activity. Some relationship between attention and control of restlessness may be important, especially in light of the Maccoby et al. (1965) conclusion that a child's ability to inhibit motor movement on demand (as measured by an actometer on the child) is related to measures of cognitive performance (IQ and CFT). Finally, Crandall (1967) measured attention using the frequency of alterations of eye-fixation as an indicator.

Those measures of attention which utilize vigilance tasks have as a theoretical foundation the vast vigilance literature. The traditional vigilance task demands that a subject make a specific detection response to a low probability, low intensity signal. The measure of attention within this traditional vigilance paradigm is taken to be the number of signals detected as estimated by the number of correct detection responses emitted (Frankman and Adams, 1962).

Secondary vigilance tasks have also been incorporated into measures of attention. Baker (1961) stated that performance on a secondary task could be used as an "alertness indicator" for the primary monitoring task.

Reeback and Ebert used correct detection responses in a secondary task as a measure of attention with five- and six-year-old children and determined that, "This measure of attention was positively related to performance in the primary task of monitoring the lesson" (Reeback and Ebert, p. 18). The secondary vigilance task for the children in this experiment was to respond to the signal, "touch your nose," given by the teacher to the children eight times in a 30-minute lesson. The percentage of children responding appropriately within 2.0 seconds after the signal was given was taken as an indication of the attention level of the group.

An observational schedule is the third kind of instrument utilized in the measurement of attention. Early forms involved simply global judgments made by a classroom observer of the number of students thought to be attending for each minute of class (Morrison, 1926). A recent variation of this global judgment kind of measure was presented by Lahaderne (1968). Using this method, "the observer looked at each pupil in turn and immediately recorded the state of his attention." Behavior was coded as either clearly attentive, clearly inattentive, uncertain, or unobservable.

A few observational instruments attempt to specify behavioral criteria used to assess attention. One is the SWCEL Classroom Observer Rating Schedule (Liberty and Bemis, 1969) which includes a section assessing attention. Criteria defining inattention include pupil fidgeting in seats, pupil leaving seat for nonacademic reason, pupil speaking inappropriately, pupil looking at observer, pupil interrupting at other pupils directly, pupil dropping objects or picking them off floor, pupil refusing teacher request, pupil not participating, pupil not working on assigned task, pupil making inappropriate disruptive response.

Time-sampling techniques which credit a student for attention during a specified interval, based on specific behavior criteria, are a second form of observational schedule. Hewett (1969) designed a system in which an observer watches a child for five minutes, assigning one point for each second during the interval that the child was paying attention to the appropriate task. Other systems utilized varying time-sampling intervals. For example, Blackham and Silberman (1971) discuss a system which records whether inattentions occur each ten-second interval.

A complete method of observing and recording classroom behavior is reported by Werry and Quay (1969). One of the three categories of behavior assessed is

"attending behaviors." Subcategories include: (1) attending (the child must have eye contact with the task or teacher for not less than 15 out of 20 seconds), (2) irrelevant activity (not the assigned task), and (3) daydreaming (more than 5 seconds out of 20). Behavior observations are recorded each 20 seconds for a 15-minute period. This system counts the frequency of the occurrence of behaviors rather than assessing their duration.

The instrument developed for this study is based upon Hewett's (1969) time-sampling technique. An expansion of Hewett's task attention criteria serves as the behavioral criteria for attention. A 20-second sampling interval is used instead of Hewett's 5-minute interval. This was done so that the behavior of all children in a large class could be sampled several times in one morning observation period. The instrument is discussed more fully in the following chapter. (See Appendix A for a copy of the instrument and criteria developed.)

C H A P T E R I I I

PROCEDURES AND OPERATIONAL HYPOTHESES

In this chapter is a description of the instruments, subjects, and procedures utilized in this research project. In keeping with the objectives stated in Chapter I, four questions are presented which will be answered by analyses of the data gathered during the project. These four questions are further broken down into specific operational hypotheses which are stated in the latter section of the chapter.

Procedures

Instrumentation--Operational Definitions of Attention

Because student attention is not only the outcome variable of this research project, but also the basis for subject selection, a description of the measures which were used to assess attention is necessary before any procedures can be adequately described. Two instruments were devised to assess student attention during this project.

Attention Rating Instrument. The first instrument devised was an observational technique based upon the one developed by Hewett (1969). The instrument developed for this study, called the Attention Rating Instrument, is a time-sampling technique which rates attention during 20-second intervals. The child being observed receives one point for each second during the 20-second interval that he is attending to the task at hand. Specific behavioral criteria were established to determine whether a child could be considered attentive during each one-second interval. (See Appendix A for a copy of the Attention Rating Instrument and the behavioral criteria developed.)

The Attention Rating Instrument was used in two different settings during the project. The first setting was the regular classroom and the second was the special treatment lesson (in which two of the three groups of subjects participated). When a subject was observed in his regular classroom the score he received was designated his in-class attention score. When he was observed in the special treatment lesson, the score he received was designated his treatment attention score. These two scores are the primary outcome measures of attention used in this study. The steps taken to insure the reliability and validity of

this instrument are discussed in the later section of this chapter which details the training of observers for the project.

Vigilance Score. A second indicator of student attention used in this study was a subject's vigilance score earned during the special treatment lesson. This score represents the number of correct responses made by the subject to a signal-instruction given by the special treatment teacher. This signal-instruction procedure is central to the teaching technique tested in this study, and will be fully discussed in a later section of this chapter.

Participating School and Subjects

The elementary school participating in this study had an enrollment of 482 students. Built in 1951, the school employs 22 teachers for its kindergarten through eighth grade student body. Over the past three years, the school has made the rapid transition from predominantly Anglo to predominantly minority group enrollment. During the spring of 1972, when this study was conducted, the student body was 48 percent Black, 27 percent Anglo, 24.6 percent Chicano, and .4 percent Oriental. Socioeconomic status of the students, though widely distributed, could

be described as lower to lower-middle class, based upon number of siblings and family income. This school was the first one approached about participating in the project. Their response was favorable at that time and continued to be favorable throughout the project.

In order to assure adequate experimental control, 54 subjects participated in the study: 18 from the first grade, 18 from the second grade, and 18 from the third grade. Three classrooms from each grade and six children from each classroom were involved in the project. The Attention Rating Instrument was used to select the 10 least attentive children in each classroom. From this pool of 10 subjects from each of the 9 classrooms, 6 subjects were chosen in each classroom on the basis of comparability of reading group level and socioeconomic status. All children selected for participation in the study were in the lowest achievement level reading group in their classroom. (This was done for practical reasons as well as being an attempt to achieve relatively homogeneous ability groups. The treatment lessons occurred during the reading instruction period. Taking children from more than one reading group would have denied some children reading instruction during the treatment period.) Children of socioeconomic status higher than lower-middle class, as determined by the

principal's knowledge of family income and size, were not included in the study. Children with severe auditory or visual impairments, as indicated by school records, were not included in the study.

From each classroom, 2 of the 6 children selected were assigned randomly to an experimental (E) condition, 2 to an out-of-class (OC) control condition, and 2 to a stay-in-class (SC) control condition. The final goal of subject selection and assignment to condition was to obtain three comparable groups, each containing 18 subjects identified as consistently inattentive in the classroom. The assignment of subjects is depicted in Figure 2.

Three subjects were later eliminated from the study, one from the E condition and two from the OC control condition, because they were absent for more than half of the special treatment lessons. A conditions by grades analysis of variance indicated that there were no significant differences among the E, OC control, or SC control conditions by grade on the pretreatment measure of in-class attention. Therefore, the subjects in the three different conditions can be considered comparable on initial level of attention. (See Table 2, Chapter IV, for a summary of this analysis of variance.)

Classroom	E Experimental Group	O Out-of-Class Control Group	S Stay-in-Class Control Group	Total
A	E_A n=2	O_A n=2	S_A n=2	6
B	E_B	O_B	S_B	6
.				.
I	E_I	O_I	S_I	6
	18	18	18	54

X_Y = students from classroom Y in the condition X.

Fig. 2. Assignment of Subjects to Conditions.

Treatment Procedures

Experimental (E) Condition. Children assigned to the experimental group left their regular classroom for 30 minutes each school day for 4 weeks. During this time, the students from each grade level met in small groups of 6 with a specially-trained certified teacher. For example, all 6 first grade students assigned to the E condition met together with a special teacher.

During these 30-minute sessions, subjects in the E condition took part in a language arts lesson series--SRA's Listening Skills Program--developed by Dorothy Kendall Bracken of the Southern Methodist University Reading Clinic, Dallas, Texas. Within these lessons, a token reinforcement program using a vigilance task was incorporated. Through these experimental procedures, attention to the lesson was reinforced. The following paragraphs are a more thorough description of the attention reinforcement program.

The lessons themselves consisted of both live-teacher and audio-taped presentations. The cassette tape recordings contained stories, songs, sound effects, etc. The lesson moved back and forth between the live teacher's presentation and that on the tape recording. Children were

instructed to listen carefully to both the teacher and the tape recording, and to follow the instructions given to them by their teacher or by the tape recording. At 10 randomly preselected times during each session, seemingly as a part of the lesson, the teacher gave instructions to the students. These directions might include, for example, "touch your nose." Instructions were chosen so that comprehension and vocabulary abilities were not factors for the child in making the appropriate response. In other words, if the child was "paying attention," he was able to respond immediately to the instruction signal. This signal was the vigilance task to be performed by the student.

After the signal was given, the teacher counted the number of students who responded appropriately within two seconds. (Reeback and Ebert [1969], using similar procedures, determined that utilizing a two-second limit excluded students who were not attending to the teacher but merely mimicking the behavior of their fellow students.) This procedure, in effect, "asks the child if he is paying attention," and provides a measurable student response to that question. Each child was able to earn a token point each time that he responded appropriately to the vigilance signal within the two second limit.

In order to record the points earned by each child, a special scoreboard was designed. On this board each child's name was followed by a row of 10 moveable wooden beads on a wire. As the child earned a point one bead was moved from the left to the right side of the board. Thus a score, represented by a certain number of beads, was tallied on the right side of the board. This technique gave the child immediate feedback about his performance, provided a visual representation of his progress, and allowed the teacher's hands to be free during the lesson. (See Figure 3 for a representation of the scoreboard.)

At the end of each lesson the teacher recorded the child's daily vigilance score on a score card for her records, and on a total chart for the class record. (See Appendix C for a copy of the score card and tally chart.)

A second reinforcement contingency was added to the experimental program as the lessons progressed. After the children became familiar with the individual point earning system, a group based reinforcement contingency was added. Starting the second week of the program, the teacher stopped at five randomly preselected times to reward group attention. If all members of the group were paying attention (as defined by the attention criteria in Appendix A),

SCOREBOARD

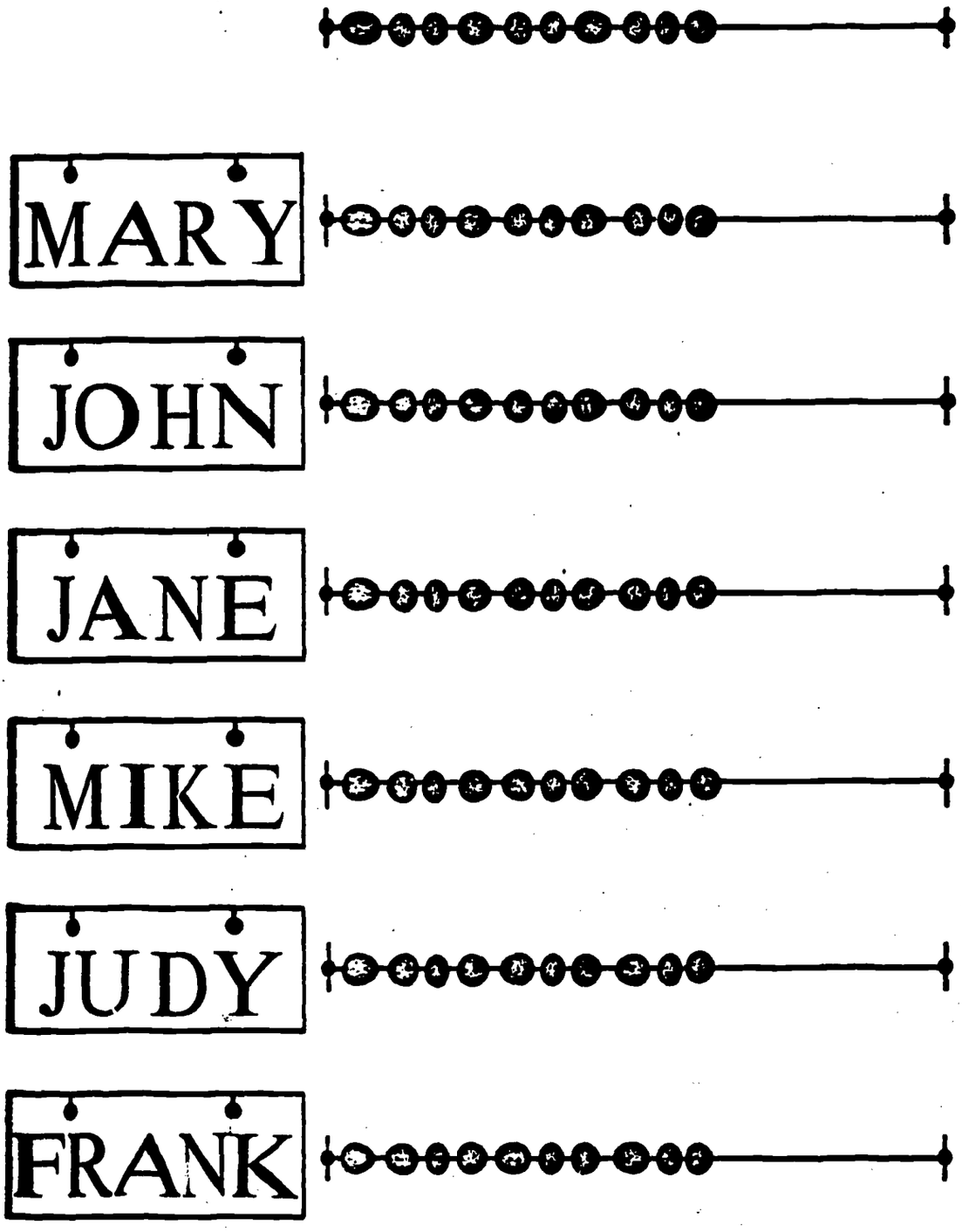

Fig. 3

a group bonus point was awarded by moving a large gold bead from the left to the right side of the scoreboard. This bonus point added one point to each child's score for the day. If, however, not all members were attending when the teacher stopped to assess attention, a bonus point was taken away. (See Appendix B for the instructions given to the subjects before the treatments began.)

Throughout the point tallying procedure, a child's name was used only when he earned a point. Names of children not earning points were not mentioned. Praise was associated with the awarding of points. If any child became so disruptive that he interfered with the lesson, he was put into a time-out condition. The child was seated alone outside the treatment area and was not allowed to earn points. When he had remained quiet for five minutes, he was allowed to return to the group and resume earning points. This time-out condition was employed three times during the four-week treatment program.

As the weeks progressed, it became clear that the children were learning to attend to the live teacher, but were having difficulty listening to the tape recordings. A modification was added to the lessons. The content of the lessons was increasingly provided by the tape recording with less interruption by the teacher. By the final

week of the project, all lessons and vigilance signals were on the tape recording, thus demanding that the children focus on the recording for the entire lesson. This task proved harder for the children than listening alternately to the live teacher and to the tape recording. During this final phase, children were still able to receive bonus points at randomly preselected times for group attention. The daily total of group bonus points and vigilance points which the child could earn during this final week always equaled 10, though the ratio of bonus points to vigilance points varied somewhat from lesson to lesson.

The exchange of token points earned during the lesson was an important part of the study. For the first two days of the project, candy was exchanged for the points at the end of the lessons. The third and fourth days' points were saved to be exchanged for candy at the end of the fourth day. Friday's and Monday's points were saved to be exchanged for candy after Monday's lesson. At this point, the children were told that they would begin to save their points to exchange for playing with a collection of toys. (See Appendix D for a list of the toys provided for the children.) Each child's daily points were charted and the groups were told that when every child had earned a

required number of points, all children in the group would be allowed to play with toys after a shortened lesson. The number of points needed to earn the playing time was adjusted so that points had to be saved for increasingly longer periods of time before a playtime would be earned by every child. For example, two days' points were saved for the first playtime, but the second playtime required the saving of three or four days' points. When points were tallied, any points earned by a child in excess of the number required to play with the toys were saved by the child toward the "purchase" of one of the toys. On the final day of the four-week lesson series the children tallied their "extra" points and chose their toys. These toys were given to the teachers to be sent home with the children at the end of the day.

Because the children were out of their classes for only 30 minutes and could not be allowed to take rewards back with them to the classroom, the question of proper backup reinforcers was complicated. The initial pairing of candy with points served well to establish the value of the points, but could not be continued for the entire four weeks of the lessons. In order for the children to save their points to exchange for playing with toys, all children had to play at the same time and for the same

number of minutes. If not the lessons would have been continually disrupted by children leaving to play with toys. This meant that points could not be exchanged for minutes of playing time. By requiring that every child earn, for example, 30 points before a playtime was allowed, all children were able to play at the same time. By allowing the children to save all their points in excess of 30 when the tally day arrived and using these accumulated excess points to purchase a toy at the end of the treatment period, children were rewarded for earning as many points as they could, not just stopping when they reached their 30-point mark. (Table 1 describes the reinforcement exchange schedule followed by the three grade levels of the experimental condition.)

Out-of-Class (OC) Control Condition. Studies in the school are often criticized for not controlling for the possible Hawthorne effect of removing children from their regular classrooms and giving them obviously special treatments. To allow for this possible effect, the 18 students assigned to the OC control group left their classrooms to engage in the same language arts lessons as the children assigned to the experimental condtion. These children met in small groups divided by grade level with a specially-trained teacher. (Training procedures are described fully

TABLE 1

REINFORCEMENT EXCHANGE SCHEDULE

Grade	M T W T F	M T W T F	M T W T F	M T W T
Grade 1	C C S C S	C S S T S	S S T S S	S S T P
Grade 2	C C S C S	C S S T S	S S T S S	S S T P
Grade 3	C C S C S	C S S T S	S S S T S	S S S T,P

Key: C = Candy

S = Save points

T = Play with toys

P = Use accumulated excess points to purchase toy

in the following section of this chapter.) The children in the OC condition were given the same vigilance signals as the children in the E condition. They did not, however, receive points for their response to the signals. The teacher praised the children for some of their appropriate responses. This praise was given in a ratio of praise to opportunities for praise comparable to that ratio found in a representative elementary classroom. The only difference between the E and OC conditions was the presence of the token reinforcement procedures in the E condition. The two specially-trained teachers were randomly assigned to E or OC condition for each grade.

On the days when E group subjects received candy, children in the OC groups also received candy. They were told that some days they would receive candy, other days they would not. When E group subjects earned a play day, OC group subjects were also allowed to play with identical toys. The candy and toys were never made contingent on any performance by the OC group subjects.

Stay-in-Class (SC) Control Group. In order to control for possible effects due to maturation and environmental change over time, the remaining subjects remained in their regular classrooms during the study and continued

their usual activities. This group served as a control in identifying possible increases in classroom attention levels due to a regression-effect. Also, possible changes in attention level due to curriculum changes or changes in teacher behavior would have been reflected by this subject group.

Steps to Maximize the Transfer of Attentional Skills to the Regular Classroom. The importance of transferring new skills from the special class to the regular classroom has already been discussed. O'Leary and Drabman (1971) list 10 suggestions for enhancing the possibility of generalization. Of these 10, the following 4 suggestions were incorporated into the experimental treatment.

1. The treatment involved lessons which sought to improve academic as well as attentional skills. Auditory discrimination, recall, following directions, sequence, and topic skills were emphasized by the lessons.
2. Children were given the expectation, through the encouragement of the special treatment teacher, that they could succeed and that they would be able to work without the help of tokens as they became more mature learners.

3. Rewards were increasingly delayed and paired with praise.
4. The children's regular teachers were involved in the project.

The effects of this last factor were systematically studied. Four of the participating classroom teachers received inservice training in the encouragement and maintenance of student attention using teacher attention and praise. The nine teachers were divided into two groups by age and number of years of teaching experience. From each of these two groups, two teachers were randomly selected to participate in the inservice training.

The four teachers met after school with the investigator three days after the treatment program had been initiated. Training consisted of a brief presentation and the dissemination of two handouts prepared for undergraduate courses in Educational Psychology at the University of Texas, Austin, Texas (Scott and Emmer, 1972). The handouts were discussed and specific behaviors to be praised or ignored were then enumerated. Finally each teacher role played rewarding an attentive child verbally and nonverbally and ignoring an inattentive child. Training required two and one-half hours. (See Appendix E for a copy of the presentation made to the teachers and the handouts given to them.)

In order to determine whether training affected actual teacher classroom behavior toward students, an extensive study was conducted by one of the special treatment teachers, as her master's research paper. A summary of the results of this study (Malloy, 1972) will be presented in the results chapter of this study.

The remaining five teachers received no training during the experiment and were asked to continue managing their classes as they had in the past. Trained teachers were asked not to discuss their training experience with their fellow untrained teachers. After the inservice training, no further discussions of the techniques were held with the trained teachers.

Staff Training

In addition to the four participating classroom teachers, two other staff groups were trained for the project. These were special treatment teachers and observers.

Special Treatment Teachers. Two special teachers were trained during the two week pilot study preceding this project. (See Enos, 1972, for a complete description of this pilot study.) As master's degree candidates in School

Counseling, these two women had already had training and experience in the classroom. Both were certified teachers and both were in their final semester of degree work. During the pilot study the teachers alternated teaching lessons and observing each other teach small groups of six children. The children in the pilot study were the same age, ethnicity, and socioeconomic status as those participating in this project. Through the pilot study lessons, the teachers were able to practice giving vigilance signals, dispensing tokens, and exchanging tokens for rewards. Each teacher taught and observed six different lessons. When the project began, these teachers had participated in approximately 15 hours of training and pilot study practice.

Classroom Observers. Because the major outcome measure utilized in this study was an observational variable, observer training was an important factor in the accomplishment of valid and reliable assessment. Observers were first trained using video tapes of live classroom situations. This training continued for four hours, until the observers demonstrated an interrater reliability of greater than a predetermined limit of .80. Using an intraclass correlational technique, the final interrater reliability determined for the video-tape training session was .98.

Observer training was then moved to a live classroom at the participating school. A large (60 member) sixth grade health class served as a practice session for the observers. All observers coded one child simultaneously for 20 seconds, then moved to a second child, to a third, and so on. Interrater reliability during this coding session was found to be .78.

Nine observers were trained so that all classrooms could be rated simultaneously. Observers did not know the treatment assignment of the children they observed. In order to assure continuous consistent assessment of attention, periodic spot checks were made by this investigator and by a naive rater. On these occasions the second observer went into each classroom and rated the attention of several students simultaneously with the regular observer assigned to the classroom. Interrater reliability on the two spot checks made by this investigator were .97 and .98. The attention instrument was explained to a naive observer for the final spot check. Interrater reliability on this check was found to be .93.

Data Collection

Before the experimental treatments began, observers rated each of the nine classrooms on three different

days. Each daily observation required four hours. On these three sample days, the attention of every child in the classroom was rated using the Attention Rating Instrument. At least 10 20-second samples of each child's behavior were rated each of the 3 days. Using the results of this assessment, the 10 least attentive children from each classroom were chosen and the 54 subjects were selected. The average in-class attention score earned by these 54 subjects during the 3 days of observation served as a baseline level of attention for the pretreatment phase of the study.

During the treatment phase of the project, observers assessed the attention of the E and OC control condition subjects during the special treatment lessons as well as in their regular classrooms. In-class attention scores and treatment attention scores were assessed on the same day. All observations were completed before the lunch hour. On these observation days the in-class attention of the SC control condition subjects was also assessed. In order to minimize observer bias, the observer who coded attention in one in-class group was assigned to code a different treatment group. (An observer assigned to a first-grade room, for example, never coded in a first-grade

special treatment lesson.) In this way, observers measuring attention in the regular classroom were never aware of the treatment assignment of the subjects whom they rated. Also, observers were not aware that two different types of treatment lessons existed. Each observer was led to believe that the type of lesson she observed was the only type utilized in the study.

During the four-week treatment period, four different observation days were scheduled. Observation was always conducted on a Tuesday, Wednesday, or Thursday, in the belief that Monday and Friday might not provide entirely representative samples of student attention. The scores earned by subjects on the first two observation days were averaged to yield an attention score for the initial treatment period phase. Similarly, the scores earned by subjects on the final two observation days were averaged to yield an attention score for the final phase of the treatment period.

After the treatments were terminated, observers returned to the classrooms on three different days during the following seven weeks to assess the in-class attention of the 54 subjects. The attention scores earned by the subjects on these three observation days were averaged to yield a posttreatment attention score for each child.

In addition to these assessments of attention using the Attention Rating Instrument, attention in the E condition was also measured by determining a daily vigilance score for each subject. As described earlier, this vigilance score was recorded routinely as part of the experimental treatment procedure.

Although vigilance performance of the OC control subjects was not reinforced, a check on the vigilance responses of these subjects was made. On seven randomly selected days an observer monitored the OC subjects and recorded the number of times that each child responded appropriately to the vigilance signal within two seconds. Therefore a sample of the OC subjects' vigilance performance is available.

Finally, from school records, Metropolitan Readiness or Achievement test scores were available for most subjects. Using these scores, the relationship between attention and achievement was examined.

Questions Addressed by the Study

Four basic questions are addressed by this study:

1. Does the token reinforcement program improve attention during the treatment lesson?

2. Is participation in the token reinforcement program associated with improved attention in the regular classroom?
3. If improvements in attention are identified in the regular classroom as a consequence of participation in the token reinforcement program, do these improvements in attention persist after the project has ended?
4. Does inservice training for the participating classroom teacher lead to increased transfer and endurance of attentional skills acquired by students in the special treatment program?

These four basic questions can be addressed by breaking down each question into several operational hypotheses which, in turn, can be tested using appropriate statistical procedures. The following sections of this chapter will present these operational hypotheses.

Major Questions--Operational Hypotheses

Question 1: Does the token reinforcement program improve attention during the treatment lesson? Two separate measurements are available to answer this question. The primary measurement is the treatment attention score as

assigned weekly to each child by a trained observer using the Attention Rating Instrument. The second indicator of attention during the treatment is the vigilance score of the individual child. Daily vigilance scores are available for the E condition subjects. For subjects in the OC condition, observer-assigned vigilance scores are available for seven randomly selected days, thus allowing comparisons to be made between the E and OC conditions.

Given these two sets of data, the following hypotheses can be tested:

1a. The mean treatment attention score of the subjects in the E condition will be significantly higher than the mean scores of the subjects in the OC control condition.

1b. The mean vigilance score of subjects in the E condition will be significantly higher than the mean vigilance score of subjects in the OC condition.

1c. The vigilance scores of the E and OC conditions will change differentially over time such that the differences between the mean scores of the two groups will become greater.

Question 2: Is participation in the token reinforcement program associated with improved attention in the regular classroom? Within the regular classroom, the only measurement of attention was made using the Attention Rating Instrument. All participating subjects were observed in their regular classrooms on the same day that they were observed in their treatment lesson. Testing the following hypotheses will provide an answer to Question 2.

2a. During the treatment phase, the mean in-class attention scores of the subjects in the E condition will be significantly higher than the mean in-class attention scores of subjects in either the OC or SC control conditions.

2b. Vigilance scores of the subjects in the E condition will be positively related to their same-day in-class attention scores.

2c. Treatment attention scores of the subjects in the E condition will be positively related to their same-day in-class attention scores.

2d. In each grade-level group treatment attention scores of subjects in the E condition will be positively related to their same-day in-class attention scores.

2e. In each grade level group, vigilance scores of subjects in the E condition will be positively related to their same-day in-class attention scores.

Question 3: If improvements in attention are identified in the regular classroom as a consequence of participation in the token reinforcement programs, do these improvements in attention persist after the project has ended? Using the in-class attention scores for all participating subjects as assigned by observers on three randomly selected days during the seven weeks following the termination of the project, the following hypotheses will be tested:

3a. During the follow-up period the mean in-class attention scores of the subjects in the E group will be significantly higher than the mean scores of the subjects in either the OC or SC control groups.

Question 4: Does inservice training for participating classroom teachers lead to increased transfer and endurance of attentional skills acquired in the special treatment program?

4a. During the treatment period, the mean in-class attention scores of all subjects whose regular classroom teachers received training will be significantly higher than the mean scores of all subjects whose teachers received no such training.

4b. During the posttreatment period, the mean in-class attention scores of all subjects whose regular classroom teachers received training will be significantly higher than the mean scores of all subjects whose teachers received no such training.

4c. Considering the E condition, OC control condition and SC control conditions separately, the mean in-class attention scores of the subjects whose teachers received training will be significantly higher than the mean scores of the subjects whose teachers received no such training. This will be true both during the treatment phase and the follow-up phase.

4d. Considering the E condition and the OC condition separately, the mean treatment attention scores of the subjects whose teachers received training will be significantly higher than the mean scores of the subjects whose teachers received no such training.

Secondary Questions--
Exploratory Hypotheses

The data gathered during the project made it possible to test two final hypotheses. In addition to data already described, these data included Metropolitan Readiness Test Scores for the first grade subjects, the Metropolitan Achievement Test, Primary II level for the second graders, and the Metropolitan Achievement Test, Elementary level for the third grade subjects.

Hypothesis 5: There is a relationship between measured school achievement and pretreatment in-class attention for each grade level.

Hypothesis 6: In each grade for subjects in the E condition, there is a relationship between vigilance scores and same-day treatment attention scores.

C H A P T E R I V

STATISTICAL ANALYSES AND RESULTS

In this chapter are the results of the statistical tests of the hypotheses presented in Chapter III. In each case the operational hypothesis will be restated briefly, as needed to discuss the tests of significance, and the statistical tests performed will be described. Appendix G contains the means for all analysis of variance comparisons.

Major Hypotheses

Before any hypotheses could be tested, it was necessary to determine whether the three subject groups were comparable on their pretreatment level of attention. This initial comparability of the E, OC, and SC conditions was demonstrated by the results of a multiple classification, conditions by grades analysis of variance (Table 2). No significant differences were found among the three conditions by grade on the pretreatment measure of in-class attention.

Operational Hypothesis 1a

A multiple-classification, conditions by grades by trials analysis of variance (see Table 3) was used to

TABLE 2

ANALYSIS OF VARIANCE COMPARING E, OC, AND SC CONDITION MEAN IN-CLASS ATTENTION SCORES BY GRADE DURING THE PRETREATMENT PERIOD

Source	Mean Square	d.f.	F-Ratio	P
Total	2.411	26		
Between	2.398	8		
Conditions	4.638	2	1.9168	.1744
Grades	2.447	2	1.0123	.3849
Conditions x Grades	1.254	4	.5186	.7255
Within	2.417	18		

TABLE 3

ANALYSIS OF VARIANCE COMPARING MEAN TREATMENT ATTENTION SCORES OF E AND OC CONDITIONS BY GRADE-LEVEL GROUPS ACROSS INITIAL AND FINAL TREATMENT PERIOD TRIALS[1]

Source	Mean Square	d.f.	F-Ratio	p
Between				
Conditions	474.794	1	64.300	.0001
Grades	50.124	2	6.788	.0044
Conditions x Grades	88.723	2	12.016	.0004
Error (Between)	7.384	27		
Within				
Trials	34.282	1	5.489	.0253
Condition x Trials	65.376	1	10.468	.0035
Grades x Trials	16.312	2	2.612	.0902
Conditions x Grades x Trials	26.114	2	4.181	.0255
Error (Within)	6.245	27		

[1]As tested in Hypothesis 1a.

test the hypothesis that mean treatment attention scores of subjects in the E condition would be significantly higher than the mean scores of subjects in the OC control condition. In addition to the significantly higher mean score for the E condition (E = 16.4, OC = 10.5, $F = 64.300$, $p < .0001$), several other significant effects were found. These include a significant effect for grades ($F = 6.788$, $p < .0044$), for trials ($F = 5.489$, $p < .0253$), and significant interaction effects for conditions by grades ($F = 12.016$, $p < .0004$), conditions by trials ($F = 10.468$, $p < .0035$), and conditions by grades by trials ($F = 4.181$, $p < .0255$). Figure 4 presents mean treatment attention scores for each grade level group in the E and OC conditions. All grades in the E condition maintain a high level of attention (mean scores of 15 or higher). The first and second grade OC conditions are lower than the E groups on the initial treatment trial and fall much lower on the final trial. The third grade OC group maintains a moderately high level of attention. Figure 5 presents the trial means of the two conditions, all grades averaged. The superiority of the E condition is apparent.

Operational Hypothesis 1b

As indicated by Table 4, the predicted higher mean vigilance score for subjects in the E condition as

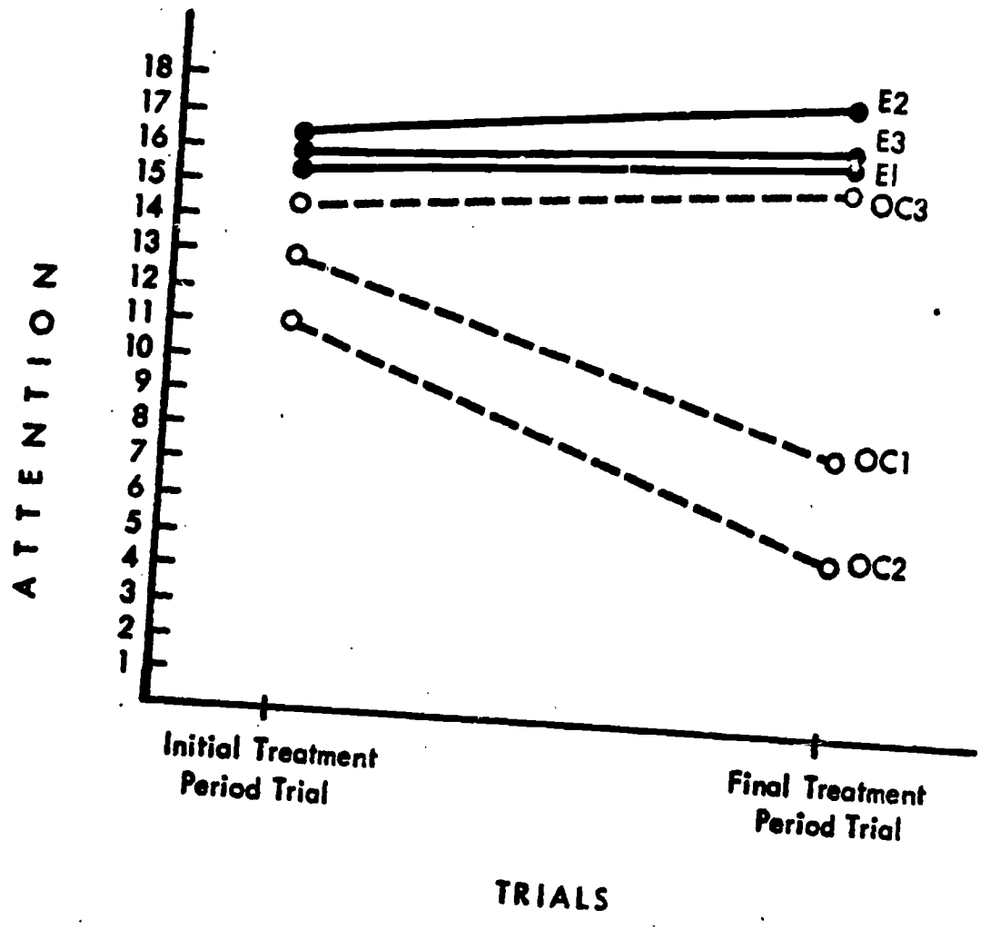

Fig. 4. Mean Treatment Attention Scores of Each Grade-Level E and OC Group on Initial and Final Treatment Period Trials.

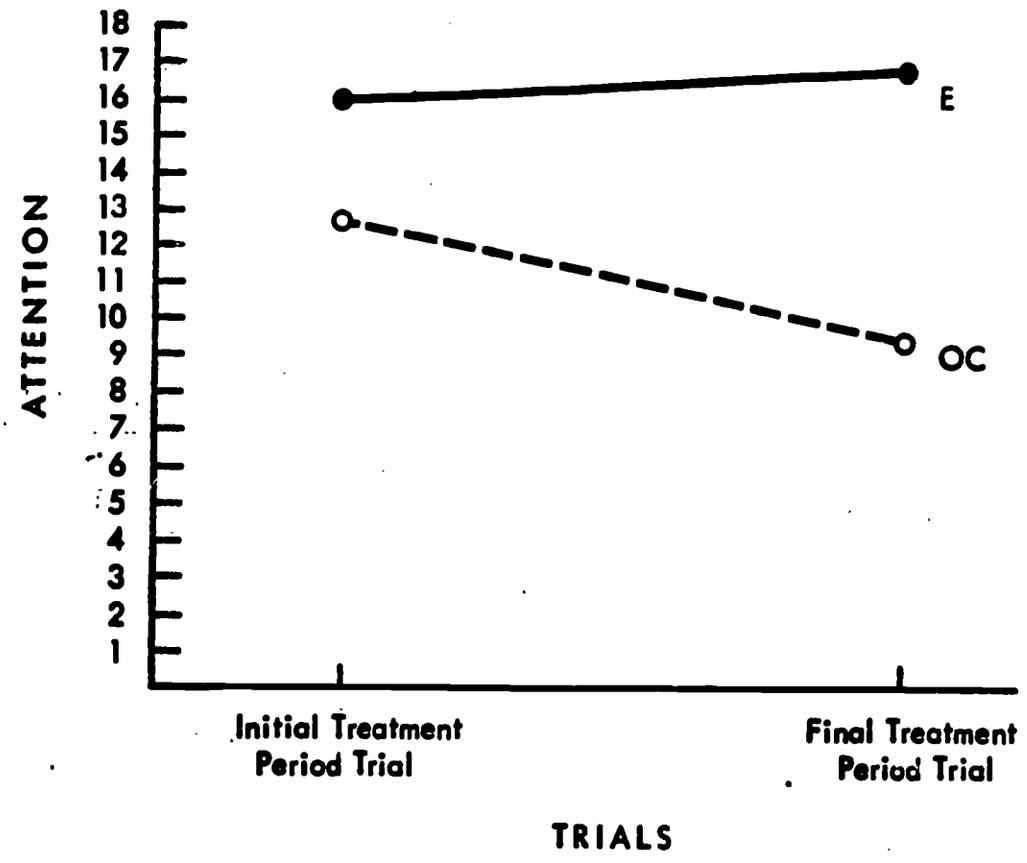

Fig. 5. Mean Treatment Attention Scores of E and OC Conditions on Initial and Final Treatment Period Trials.

TABLE 4

ANALYSIS OF VARIANCE COMPARISON OF E AND OC CONDITION MEAN VIGILANCE SCORES OVER SEVEN RANDOMLY SELECTED TRIALS[1]

Source	Mean Square	d.f.	F-Ratio	p
Total	10.0323	230		
Between	48.0928	32		
Conditions	1450.4353	1	507.863	.0001
Error (Between)	2.8560	31		
Within	3.8811	198		
Trials	35.3608	6	17.931	.0001
Conditions x Trials	31.5818	6	16.015	.0001
Error (Within)	1.9721	186		

[1]As tested in Hypotheses 1b and 1c.

compared with subjects in the OC control condition was confirmed using a groups by trials analysis of variance ($F = 507.863$, $p < .0001$). Averaging all seven sample trials together, the mean vigilance score of the E group was 7.3210 (out of a possible 10) whereas the mean score of the OC group was 2.3071. A significant groups by trials interaction was also found ($F = 16.015$, $p < .0001$).

Operational Hypothesis 1c

The prediction of a differential change over time of the vigilance scores of the E as compared with the OC subjects was supported. As indicated by Table 4, the groups by trials interaction was found to be significant ($F = 16.015$, $p < .0001$). Figure 6 illustrates the mean vigilance scores of the E and OC conditions across the seven randomly selected trials. The scores of the E subjects remain at a high level while the scores of the OC subjects fall sharply toward the last half of the treatment period.

Operational Hypothesis 2a

Before any hypothesis concerning in-class attention scores could be tested, it was necessary to determine

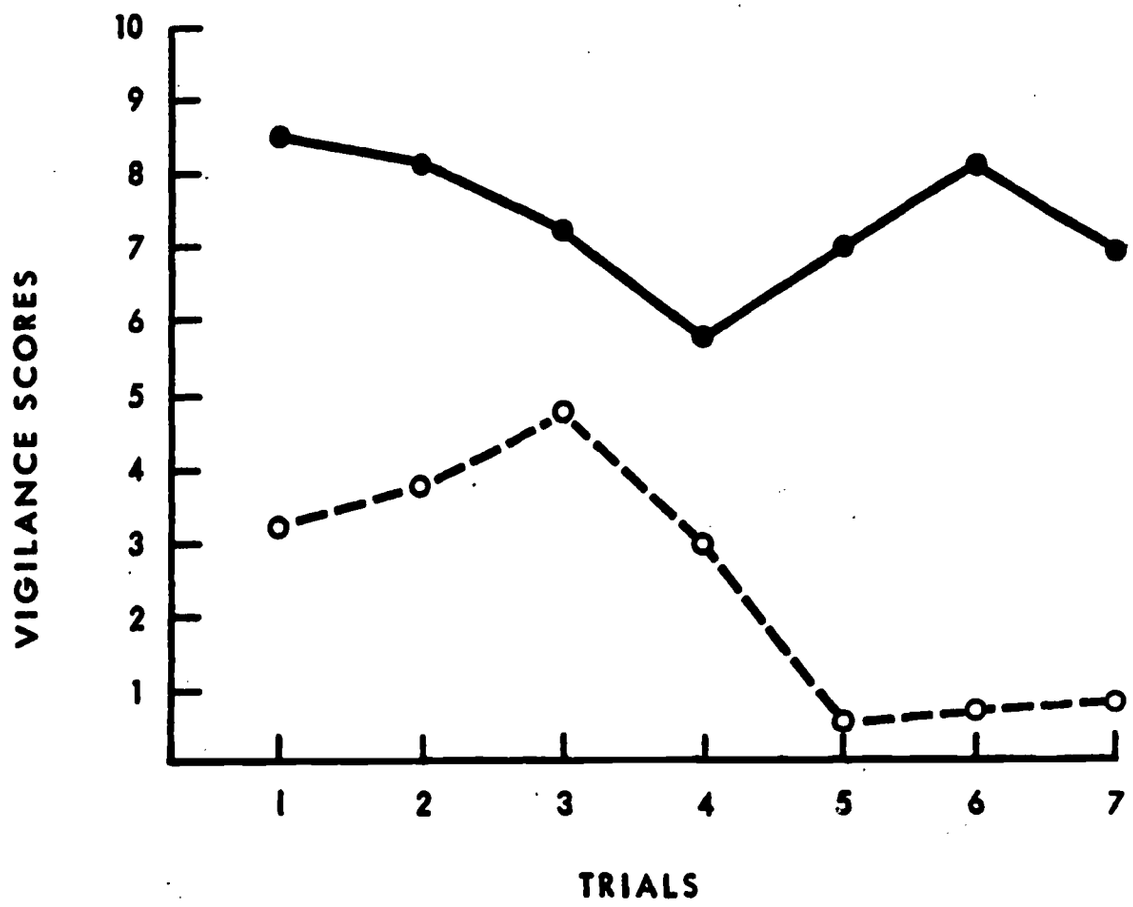

Fig. 6. Mean Vigilance Scores of E and OC Conditions Over 7 Trials.

whether any effect was present as a consequence of subjects being nested within classrooms. Because the inservice training given to four of the teachers might contribute to between teacher differences, two separate analyses were done--one for subjects whose teachers had received training and one for subjects whose teachers received no training. A multiple classification, classrooms by conditions analysis of variance revealed no differences among trained teachers. A significant difference among untrained teachers was found, however, on the pretreatment and on the posttreatment trials (pretreatment trial, $F = 3.7437$, $p < .0281$; posttreatment trial, $F = 8.2908$, $p < .0015$). See Table 5 for a summary of the results of this test for classroom-effect with subjects whose teachers received no inservice training.

Because a classroom effect was found, the following transformation of the data was made before any statistical tests were performed on the in-class attention scores. For each classroom, the scores of the two E subjects were averaged, the scores of the two OC subjects were averaged, and the scores of the two SC subjects were averaged. All hypotheses tested using in-class attention scores were then performed on these paired averages, instead of on the individual subject scores. Thus the effect for the nesting of

TABLE 5

ANALYSIS OF VARIANCE COMPARING THE FIVE UNTRAINED TEACHER CLASSROOMS BY CONDITION-ASSIGNMENT OF SUBJECTS

Source	Mean Square	d.f.	F-Ratio	p
	Pretreatment Trial			
Total	3.867	28		
Between	5.236	14		
Classrooms	9.351	4	3.7437	.0281
Conditions	.451	2	.1807	.8373
Classrooms x Conditions	4.374	8	1.7512	.1715
Within	2.498	14		
	Initial Treatment Trial			
Total	8.049	28		
Between	4.580	14		
Classrooms	4.790	4	.4157	.7958
Conditions	1.160	2	.1007	.9043
Classrooms x Conditions	5.331	8	.4629	.8625
Within	11.517	14		

TABLE 5--Continued

Source	Mean Square	d.f.	F-Ratio	p
Final Treatment Trial				
Total	12.867	28		
Between	11.380	14		
Classrooms	28.492	4	1.9851	.1518
Conditions	5.172	2	.3604	.7080
Classrooms x Conditions	4.377	8	.3049	.9514
Within	14.353	14		
Posttreatment Trial				
Total	21.200	28		
Between	33.469	14		
Classrooms	74.039	4	8.2908	.0015
Conditions	46.952	2	5.2576	.0195
Classrooms x Conditions	9.813	8	1.0989	.4189
Within	8.930	14		

students within classrooms was removed as a factor in further analyses.

Operational Hypothesis 2a predicted significantly higher mean in-class attention scores for subjects in the E groups when compared with subjects in either the OC or SC control groups during the treatment period. Table 6 presents the results of a multiple classification, conditions by grades analysis of variance test of this hypothesis. No significant differences were found among E, OC control, or SC control conditions, for any of the grade levels on either the initial or final treatment period trials.

Operational Hypothesis 2b

This hypothesis predicted a positive relationship between vigilance scores of subjects in the E condition and their same-day in-class attention scores. Computing Pearson product-moment correlations indicated that only for the first observation day was this prediction supported ($r = .4178$, $p < .05$). Table 7 summarizes the correlation coefficients for each observation day.

Operational Hypothesis 2c.

The predicted positive relationship between treatment attention scores and same-day in-class attention scores

TABLE 6

ANALYSIS OF VARIANCE COMPARING E, OC, AND SC CONDITION MEAN IN-CLASS ATTENTION SCORES BY GRADE DURING THE TREATMENT PERIOD[1]

Source	Mean Square	d.f.	F-Ratio	p
Initial Treatment Period Trial				
Total	4.300	26		
Between	3.983	8		
Conditions	3.796	2	.8548	.4451
Grades	4.197	2	.9451	.4075
Conditions x Grades	3.970	4	.8941	.4893
Within	4.441	18		
Final Treatment Period Trial				
Total	5.944	26		
Between	5.858	8		
Conditions	2.763	2	.4618	.6425
Grades	6.940	2	1.1601	.3365
Conditions by Grades	6.865	4	1.1476	.3665
Within	5.983	18		

[1]As tested in Hypothesis 2a.

TABLE 7

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN VIGILANCE SCORES AND SAME-DAY IN-CLASS ATTENTION SCORES FOR SUBJECTS IN THE E CONDITION[1] (n = 17)

Observation Day	r	p(ρ=0)
1	.4178	.05
2	-.1949	n.s.
3	.3747	n.s.
4	.0660	n.s.

for E subjects was tested by computing Pearson product-moment correlations for each observation day. The prediction was not supported. See Table 8 for a presentation of the results of this test.

Operational Hypothesis 2d

When Pearson product-moment correlations were computed between treatment attention scores and same-day in-class attention scores for each grade-level E condition separately, two significant coefficients were found. In grade three, a positive relationship ($r = .8419$, $p < .05$) was found for observation day 2. A negative relationship was, however, determined for observation day 4 ($r = -.8124$, $p < .05$). Table 9 illustrates the analysis of these data.

Operational Hypothesis 2e

This hypothesis predicted a positive relationship between vigilance scores and in-class attention scores for each grade-level group of E condition subjects. Table 10 illustrates Pearson product-moment correlations describing the relationship between these scores for each observation day. For grade one, a positive relationship was found on observation day 1 ($r = .9420$, $p < .005$). For grade two, a

TABLE 8

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN TREATMENT ATTENTION SCORES AND IN-CLASS ATTENTION SCORES FOR SUBJECTS IN THE E CONDITION[1] (n = 17)

Observation Day	r	p(ρ=0)
1	-.0014	n.s.
2	.3550	n.s.
3	-.0275	n.s.
4	-.0679	n.s.

[1]As tested in Hypothesis 2c.

TABLE 9

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN TREATMENT ATTENTION SCORES AND SAME-DAY IN-CLASS ATTENTION SCORES FOR SUBJECTS IN EACH GRADE-LEVEL GROUP OF THE E CONDITION[1]

Grade	Observation Day	r	p(ρ=0)
1 n = 6	1	-.2872	n.s.
	2	.1206	n.s.
	3	-.4823	n.s.
	4	.2376	n.s.
2 n = 6	1	.2575	n.s.
	2	.1971	n.s.
	3	-.0950	n.s.
	4	.0437	n.s.
3 n = 6	1	-.1245	n.s.
	2	.8419	<.05
	3	.1812	n.s.
	4	-.8124	<.05

[1]As tested in Hypothesis 2d.

TABLE 10

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN VIGILANCE SCORES AND SAME-DAY IN-CLASS ATTENTION SCORES FOR SUBJECTS IN EACH GRADE LEVEL OF THE E CONDITION[1]

Grade	Observation Day	r	p(ρ=0)
$n_1 = 6$	1	.9420	.005
	2	.4078	n.s.
	3	.3706	n.s.
	4	-.1795	n.s.
$n_2 = 6$	1	.2670	n.s.
	2	.4300	n.s.
	3	.3543	n.s.
	4	.8744	.025
$n_3 = 5$	1	-.8798	.05
	2	-.4191	n.s.
	3	.5874	n.s.
	4	.1022	n.s.

[1]As tested in Hypothesis 2e.

positive relationship was found on observation day 4 ($r = .8744$, $p < .025$). For grade three, a negative relationship was found on day 1 ($r = -.8798$, $p < .05$).

Operational Hypothesis 3a

Hypothesis 3a predicted significantly higher mean in-class attention scores for subjects in the E condition when compared with subjects in either the OC or SC control groups. This prediction was made for the follow-up period scores. A multiple classification conditions by grades analysis of variance revealed no significant differences among the E, OC, or SC conditions on the post-treatment trial. Table 11 presents the analysis of these data.

Operational Hypothesis 4a

This hypothesis predicts that, during the treatment period, the mean in-class attention score of subjects whose teachers received in-service training will be significantly higher than the mean score of subjects whose teachers received no training. Results of an analysis of variance comparing the teacher-trained versus teacher-untrained subjects revealed no significant differences

TABLE 11

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF SUBJECTS IN THE E, OC, AND SC CONDITIONS BY GRADE ON THE POSTTREATMENT TRIAL[1]

Source	Mean Square	d.f.	F-Ratio	p
Total	8.019	26		
Between	8.063	8		
Conditions	1.810	2	.2262	.8017
Grades	18.508	2	2.3134	.1262
Conditions x Grades	5.966	4	.7457	.5754
Within	8.000	18		

[1]As tested in Hypothesis 3a.

between mean in-class attention scores of the two groups on either treatment period trial. Table 12 illustrates these results.

Operational Hypothesis 4b

The prediction of a significantly higher mean in-class attention score during the posttreatment period for subjects whose teachers had received training as compared with subjects whose teachers received no training was not supported. Table 13 presents the results on an analysis of variance test of this hypothesis.

Operational Hypothesis 4c

Considering each condition separately during the treatment period, a significantly higher mean in-class attention score for subjects whose teachers had received training was predicted. Results of an analysis of variance indicated no support for this prediction. No significant differences were found on the in-class attention scores of teacher-trained subjects when their mean scores were compared with the mean scores of nonteacher-trained subjects. As indicated by Table 14, this was true for each of the conditions on both treatment period trials and for the

TABLE 12

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED TRAINING WITH SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED NO TRAINING--TREATMENT PERIOD TRIALS[1]

Source	Mean Square	d.f.	F-Ratio	p
Initial Treatment Period Trial				
Total	4.3000	26		
Groups	.3034	1	.068	.7920
Error (Groups)	4.4599	25		
Final Treatment Period Trial				
Total	5.9444	26		
Groups	3.5689	1	.591	.4553
Error (Groups)	6.0394	25		

[1]As tested in Hypothesis 4a.

TABLE 13

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED TRAINING WITH SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED NO TRAINING--POSTTREATMENT PERIOD[1]

Source	Mean Square	d.f.	F-Ratio	p
Total	8.0195	26		
Groups	10.5002	1	1.326	.2595
Error (Groups)	7.9203	25		

[1]As tested in Hypothesis 4b.

TABLE 14

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED TRAINING WITH SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED NO TRAINING, SEPARATELY BY CONDITIONS--PRETREATMENT AND TREATMENT PERIOD TRIALS[1]

Source	Mean Square	d.f.	F-Ratio	p
E Condition Pretreatment Trial				
Total	2.5600	8		
Groups	6.3845	1	3.171	.1161
Error (Groups)	2.0136	7		
E Condition Initial Treatment Period Trial				
Total	5.8825	8		
Groups	2.1125	1	.329	.5887
Error (Groups)	6.4211	7		
E Condition Final Treatment Period Trial				
Total	8.1600	8		
Groups	4.7045	1	.544	.4900
Error (Groups)	8.6536			
OC Condition Pretreatment Trial				
Total	2.6128	8		
Groups	1.9427	1	.717	.4292
Error (Groups)	2.7085	7		

TABLE 14--Continued

Source	Mean Square	d.f.	F-Ratio	p
OC Condition Initial Treatment Period Trial				
Total	1.8025	8		
Groups	.0500	1	.024	.8746
Error (Groups)	2.0529	7		
OC Condition Final Treatment Period Trial				
Total	5.3511	8		
Groups	.4109	1	.068	.7965
Error (Groups)	6.0569	7		
SC Condition Pretreatment Trial				
Total	1.5050	8		
Groups	3.0420	1	2.367	.1660
Error (Groups)	5.4140	7		
SC Condition Initial Treatment Period Trial				
Total	5.3411	8		
Groups	4.7694	1	.880	.3823
Error (Groups)	5.4228	7		

TABLE 14--Continued

Source	Mean Square	d.f.	F-Ratio	p
SC Condition Final Treatment Period Trial				
Total	5.1175	8		
Groups	3.0420	1	.562	.4830
Error (Groups)	5.4140	7		

[1]As tested in Hypothesis 4c.

pretreatment trial. There was, however, a trend for the subjects in the E and SC conditions whose teachers had received training to have lower in-class attention scores before treatment began (E condition, $F = 3.171$, $p < .1161$; SC condition, $F = 2.367$, $p < .1660$).

Operational Hypothesis 4d

This hypothesis predicted significantly higher mean in-class attention scores during the posttreatment period for teacher-trained subjects in each condition when compared with nonteacher trained subjects in the comparable condition. As indicated by Table 15, no significant differences were found between teacher-trained and nonteacher-trained subjects in any of the three conditions.

Summary

All hypotheses (1a, 1b, 1c) relating to the superiority of E condition subjects during the actual treatment lesson were confirmed. Differences among the conditions on in-class attention scores, however, were not found (Hypotheses 2a, 3a). Some relationships were identified between vigilance scores and same day in-class attention scores and between treatment attention scores and same-day

TABLE 15

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED TRAINING WITH SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED NO TRAINING, ALL CONDITIONS SEPARATELY-- POSTTREATMENT TRIAL[1]

Source	Mean Square	d.f.	F-Ratio	p
E Condition				
Total	9.0853	8		
Groups	.7347	1	.071	.7916
Error (Groups)	10.2782	7		
OC Condition				
Total	12.4494	8		
Groups	25.2376	1	2.376	.1652
Error (Groups)	10.6226	7		
SC Condition				
Total	4.0761	8		
Groups	2.0909	1	.480	.5160
Error (Groups)	4.3597	7		

[1]As tested in Hypothesis 4d.

in-class attention scores for the E condition (Hypotheses 2b, 2c, 2d, 2e). No effects were found for teacher training (Hypotheses 4a, 4b, 4c, 4d).

Exploratory Hypotheses

Hypothesis 5

The predicted relationship between school achievement scores and pretreatment in-class attention scores was not confirmed. Table 16 presents Pearson product-moment correlations describing the relationship between these two scores for each grade level.

Hypothesis 6

This hypothesis predicted a relationship between vigilance scores and same-day treatment attention scores for subjects in the E condition considered by grade-level group. On observation day 4 a positive relationship between vigilance and treatment scores was found for the first grade group ($r = .8784$, $p < .025$). Table 17 presents these results.

TABLE 16

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN IN-CLASS ATTENTION SCORES DURING THE PRETREATMENT TRIAL AND ACHIEVEMENT TEST SCORES[1]

Grade	r	p(ρ=0)
1	.0917	n.s.
2	.1930	n.s.
3	-.0912	n.s.

[1]As tested in Hypothesis 5. Tests include the Metropolitan Readiness Test--Grade 1; Metropolitan Achievement Test, Primary Level II, Word Knowledge--Grade 2; Metropolitan Achievement Test, Elementary Level, Work Knowledge--Grade 3.

TABLE 17

PEARSON PRODUCT-MOMENT CORRELATIONS DESCRIBING THE RELATIONSHIP BETWEEN VIGILANCE SCORES AND SAME-DAY TREATMENT ATTENTION SCORES IN THE E CONDITION, FOR EACH GRADE[1]

Grade	Observation Day	r	p(ρ=0)
1 n = 6	1	-.4735	n.s.
	2	.0954	n.s.
	3	.0209	n.s.
	4	.8784	.025
2 n = 6	1	.6511	n.s.
	2	-.0553	n.s.
	3	.5564	n.s.
	4	.1712	n.s.
3 n = 5	1	.5319	n.s.
	2	-.7743	n.s.
	3	-.3766	n.s.
	4	.0074	n.s.

[1]As tested in Hypothesis 6.

Further Analyses

The first additional data analysis was performed pertaining to Question 1. An inspection of Figure 4 indicates that the mean treatment attention scores of the third-grade OC control group were higher than the scores of the first- and second-grade OC groups. A significant conditions by grades interaction ($p < .0004$) was found, as shown in Table 3. Results of a t-test comparing the third grade OC mean treatment attention score with the mean score of the first and second grade OC groups reveals that the third-grade mean is significantly higher ($t = 3.63$, $p < .01$). Table 18 presents these results.

A second additional analysis was performed relating to Questions 2 and 3. The hypotheses evolved from the questions predicting higher mean in-class attention scores for subjects in the E condition when compared with subjects in either the OC or SC conditions. The prediction was made for both the treatment and posttreatment trials. For the purposes of testing the hypotheses, the treatment period and posttreatment trials were considered separately. No significant differences were found. The additional analysis considered the pretreatment, treatment period, and posttreatment trials together. This conditions by trials

TABLE 18

t-TEST COMPARING MEAN TREATMENT ATTENTION SCORE OF THE THIRD-GRADE OC CONTROL GROUP WITH THE MEAN SCORE OF FIRST AND SECOND GRADE OC CONTROL GROUPS

Group	Mean	t	p
First and second grade OC group (n = 12)	9.0875	3.63	.01
Third grade OC group (n = 4)	14.7500		

analysis of variance revealed a significant effect for trials ($F = 6.122$, $p < .0012$), as shown by Table 19. As indicated in Figures 7 and 8, the mean in-class attention score of each condition increased during the treatment period, then decreased during the posttreatment period. When the scores of all subjects were considered together, there was a significant difference between the pretreatment mean in-class attention score and the two treatment period in-class attention scores. As shown in Table 20, both treatment period trial scores were significantly higher than the pretreatment trial score ($t = 2.96$, $p < .01$, $t = 3.98$, $p < .001$). No significant difference was found between the pretreatment trial and the posttreatment trial.

A final analysis focused upon the Attention Rating Instrument. In order to determine the stability of this assessment, the in-class attention scores of a randomly selected sample of 50 of the 226 students in the 9 participating classrooms were examined. As described in Chapter III, all 226 students were observed on three separate days before the project began. The average in-class attention score earned by each student during this period was considered his pretreatment in-class attention score. Using the scores of the sample of 50 students, an intraclass correlation of .4636 was found for the average

TABLE 19

ANALYSIS OF VARIANCE COMPARING MEAN IN-CLASS ATTENTION SCORES OF E, OC, AND SC CONDITIONS ACROSS ALL TRIALS

Source	Mean Square	d.f.	F-Ratio	p
Total	5.6674	107		
Between	10.0552	26		
Conditions	9.9026	2	.984	.3905
Error (Between)	10.0679	24		
Within	4.2590	81		
Trials	22.9507	3	6.122	.0012
Conditions x Trials	1.0347	6	.276	.9457
Error (Within)	3.7489	72		

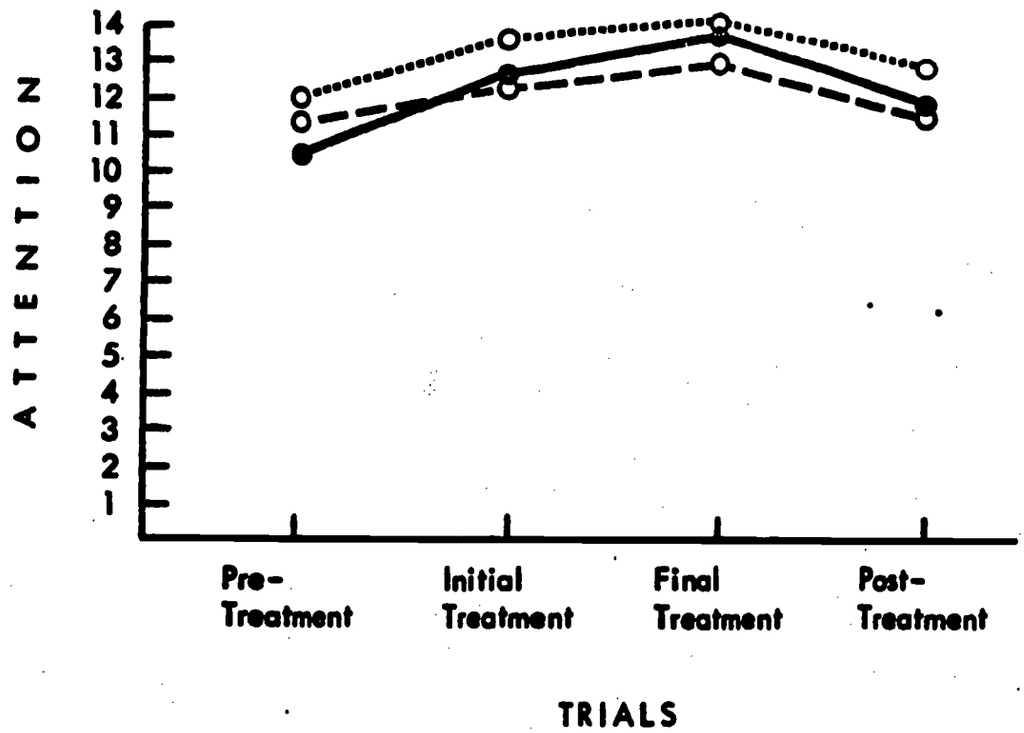

Fig. 7. Mean In-class Attention of E, OC, and SC Conditions Across all Trials.

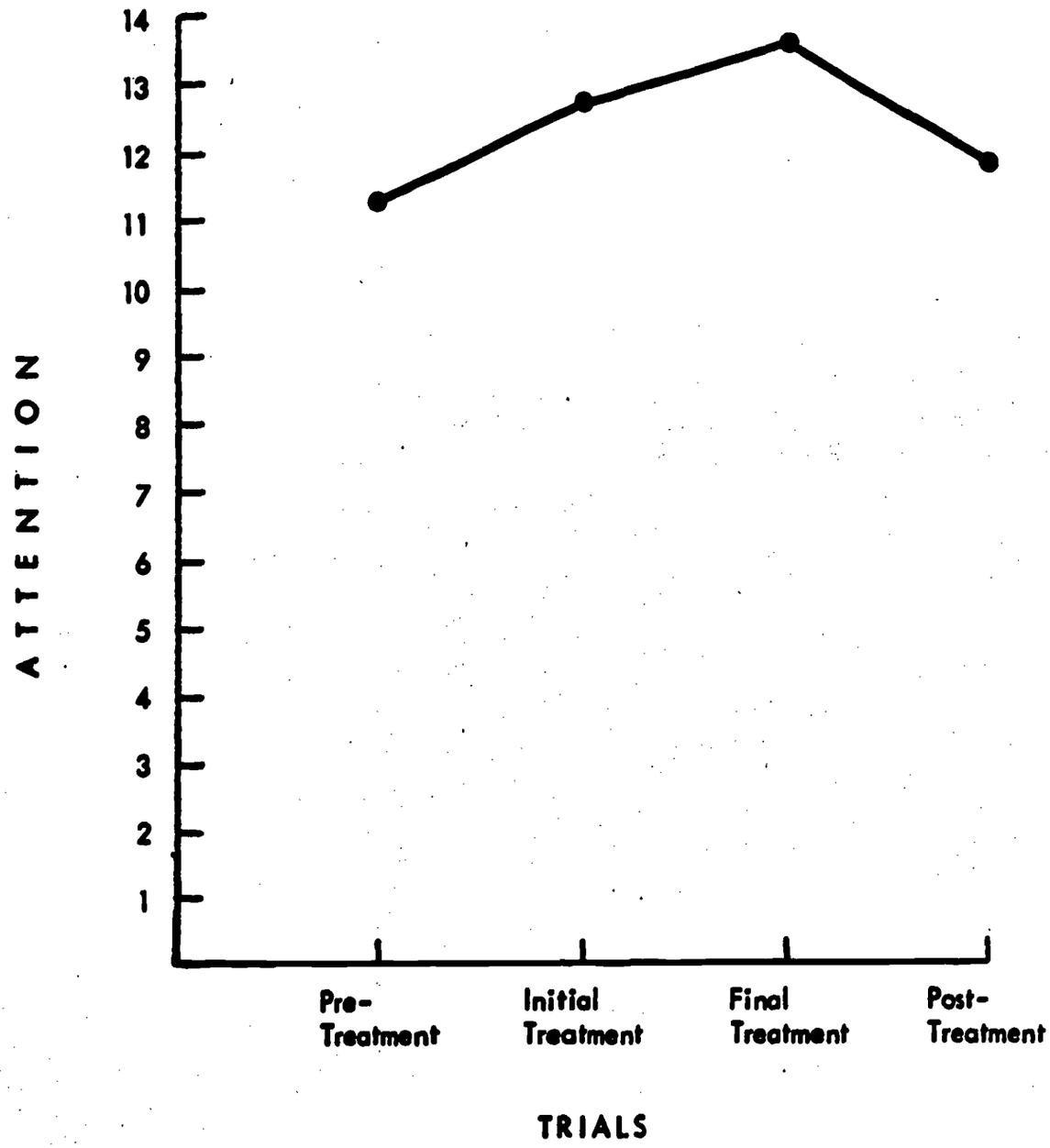

Fig. 8. Mean In-class Attention Scores of all Conditions Across all Trials.

TABLE 20

t-TEST COMPARISON OF MEAN IN-CLASS ATTENTION SCORES OF INITIAL TREATMENT PERIOD TRIAL, FINAL TREATMENT PERIOD TRIAL, AND POSTTREATMENT PERIOD TRIAL WITH PRETREATMENT PERIOD TRIAL (n = 27)

Trial	Mean	t	p
Pretreatment trial	11.3074		
Initial treatment trial	12.8815	2.96	< .01
Final treatment trial	13.4148	3.96	< .001
Posttreatment trial	12.0889	1.47	n.s.

score of three observation days. Although interrater reliability using the Attention Rating Instrument was found to be consistently high, it appears that the behavior sampled tends to fluctuate from day to day. Observers agree on the behaviors which constitute attention, but the subjects' emission of these behaviors is not consistent from day to day.

Other Results--Teacher Training

As mentioned earlier in Cahpter III, a separate study was made of the effects and persistence of the in-service training given to four of the classroom teachers (Malloy, 1972). A special observational instrument was developed to assess teacher positive and negative, verbal and nonverbal reinforcement of student attention. The instrument developed was a frequency-count technique. Observers counted the number of times that a teacher verbally or nonverbally reinforced the attention of a student, either negatively or positively. Criteria were established to define the statements and actions of the teacher which constituted positive or negative reinforcement of attention. (See Appendix F for the definitions and examples of reinforcement of attention.)

All students participating in the project (E, OC, and SC subjects) were observed individually and teacher-interactions with these students were coded separately for each child. A fourth classification of students was also observed as a group. This was the "Other" classification. Every time the teacher reinforced the attention of any other child in the classroom not participating in the study, a tally mark was recorded for the appropriate category (positive or negative verbal, positive or negative non-verbal) under the "Other" classification. Using this instrument, the behavior of both trained and untrained teachers was coded before and after training. Analysis of data gathered during four different observational trials led Malloy to state the following four conclusions:

1. There was a difference, significant at the .05 level, between the trained and untrained teacher conditions prior to in-service training in the amounts of dispensed negative reinforcement: the teachers in the trained condition emitted more negative reinforcements than did the untrained group. With regard to positive reinforcement, differences were nonsignificant.

2. There was no significant difference between the trained and the untrained teacher conditions in the amount of dispensed positive and negative reinforcements [of attention, considering all trials together].

3. The change over time in the amount of positive reinforcement [of attention] dispensed by the

trained as opposed to the untrained condition was significant ($p < .01$). The trained teachers evidenced a greater increase over time in the amount of emitted positive reinforcements than did the untrained group. The differences demonstrated over the four observations in dispensed negative reinforcement were not significant. The apparent trend was downward for the trained teachers and upward for the untrained teachers.

4. The change in differential reinforcement of attentive behavior of the four student classifications [E, OC, SC, All Others] by teacher conditions during the observational period was not at a level of significance. The data indicated a drop in positive reinforcement [of attention] for the untrained teachers in the third trial. Exactly the opposite was indicated for the trained teachers. Both trained and untrained teacher groups decreased in dispensed negative reinforcement [of attention] to the student classifications, but the time of the decline varied between the second and third trials. (Malloy, 1972, pp. 36-37)

Figure 9 illustrates the dispensement of positive reinforcement of attention by the trained and untrained teachers across the four observational trials. The first trial was before training. The increase in dispensement of positive reinforcement by the trained teacher group as opposed to the untrained teacher group is significant at the .01 level, as noted in conclusion number three above. Even so, no significant differences between the trained and untrained group on positive reinforcement of student attention were found. As shown in Figure 9, on all but the third trial, the untrained group dispensed more positive reinforcement than the negative group.

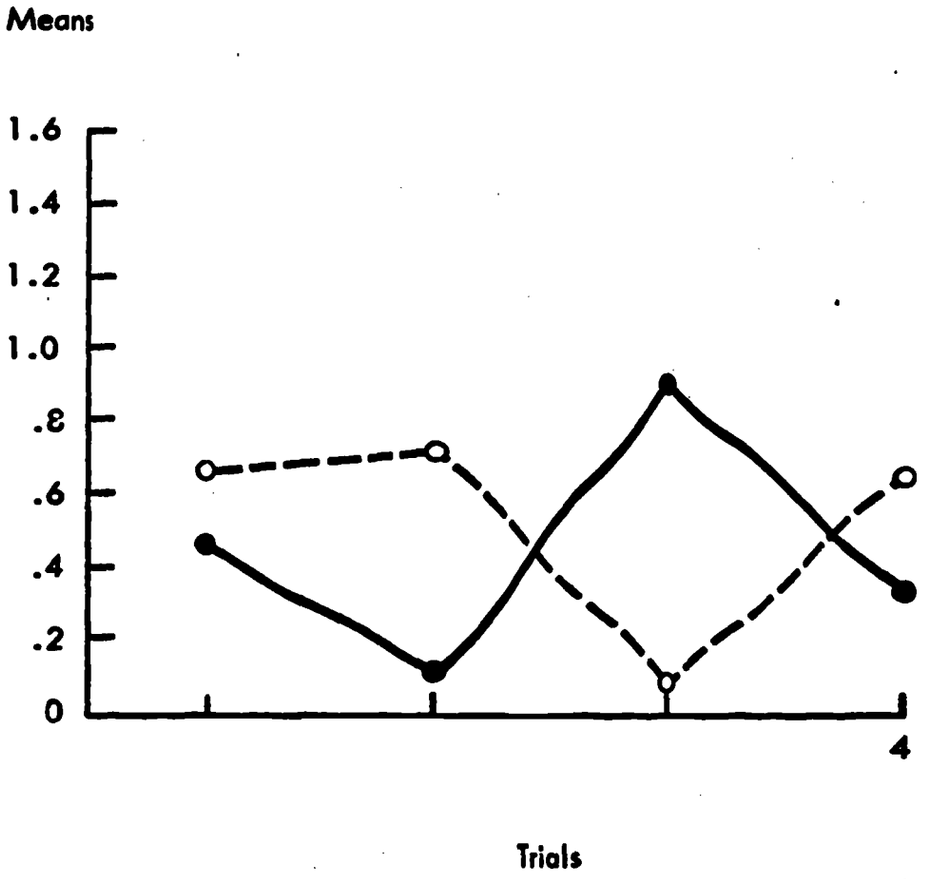

Fig. 9. Dispensement of Positive Reinforcement by Time and Teacher Condition.

As shown in Figure 10, before training the trained teacher group dispensed more negative reinforcement of attention than the untrained group. This difference was significant ($p < .05$). Over the four observational trials, the difference between the two groups on dispensed negative reinforcement was not significant, though the trend was downward for the trained teachers.

Although the differences between the trained and untrained teacher groups in their differential reinforcement of the four student classifications (E, OC, SC, and Other) were not significant, there are some interesting nonsignificant differences. As shown in Table 21, trained and untrained teachers dispensed more positive and more negative reinforcement to the subjects participating in the study than to the subjects in the "Other" classification.

Given the fact that the stated purpose of the in-service training was to cause the teachers to increase their dispensement of positive reinforcement of student attention and decrease their dispensement of negative reinforcement of (ignore) inattention, the results of the Malloy study are important. Trained teachers did increase their positive reinforcement of attention significantly, and they evidenced a trend toward a decrease in negative

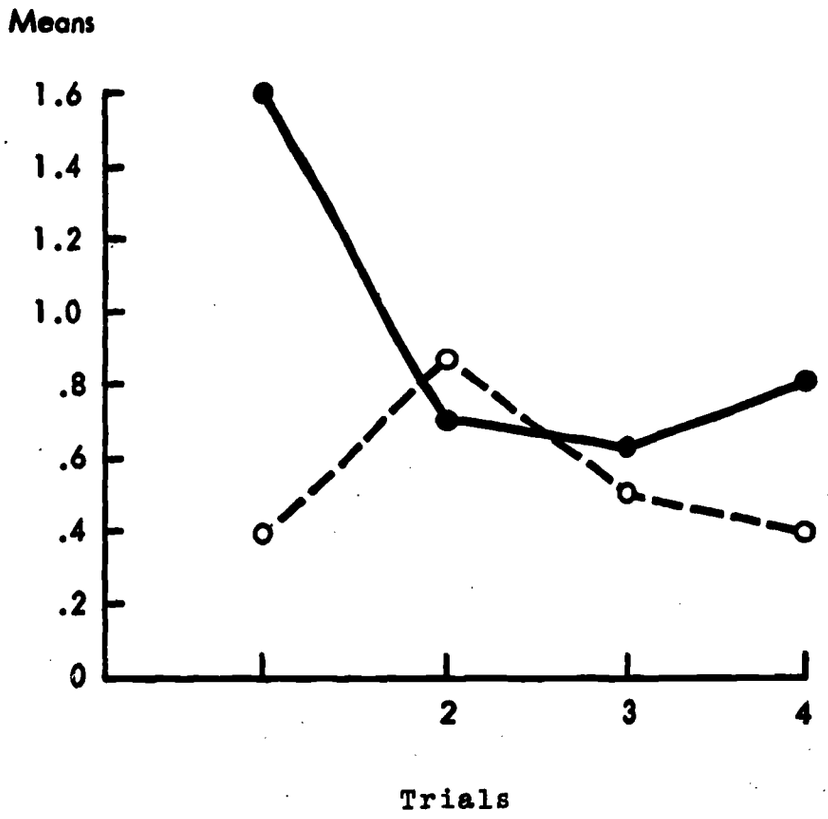

Fig. 10. Dispensement of Negative Reinforcement by Time and Teacher Condition.

TABLE 21

MEAN SCORES OF REINFORCEMENT BY STUDENT CLASSIFICATION AND TEACHER CONDITION

Reinforcement	Experimental 1	Out-of-Class 2	In-Class 3	Other 4
Positive Reinforcement				
Trained Teacher Condition	.44	.75	.50	.26
Untrained Teachers	.55	.50	.45	.15
Negative Reinforcement				
Trained Teacher Condition	.81	.94	1.25	.78
Untrained Teachers	.40	.90	.35	.35

reinforcement. Differences between trained and untrained teachers were not significant, however, considering all four trials together.

C H A P T E R V

LIMITATIONS, DISCUSSION, IMPLICATIONS, AND SUMMARY

In this chapter the limitations of the study are stated and the major questions are discussed in light of these limitations and the results presented in Chapter III. Some implications for educational practice are also presented. Finally, the major results of the study are summarized.

Limitations

Because this study went into the classroom in an attempt to answer several questions, all the problems and limitations of field research were present. The project had to be fitted into the busy schedule of the school. The treatment itself had to remain within the limits of 30 minutes daily for 4 weeks. During these 30 minutes the children had to be removed from their classes, the treatment accomplished, the rewards given, and the children returned to their classroom. Time was also a factor in the teacher inservice training. Only two to three hours were available for the training.

A second factor which could have affected the results of the study was the fact that no control over the classroom environment of the subjects was possible. Although the children participated in carefully standardized treatments, they returned to different classrooms. Their experiences in these classrooms were much more extensive than their experiences in the treatment lessons.

The primary outcome instrument in this study, the Attention Rating Instrument, was developed for the project and thus has not been refined through long use and testing. As an observational instrument it is subject to the problems which plague such tools. Brown and Stoffel (1968) list two of these problems as being inconsistent recording practices of observers and lack of observer agreement as to what occurred. Because nine different observers participated in the study, the opportunities for the occurrence of these two problems were increased. Results of reliability spot checks indicated, however, that these problems were not present to any great degree in this study. Interrater reliability on these checks was found to be .97, .98, and .93.

The nature of the behavior observed is also a limiting factor. No control was possible over the nature of the activities demanding the child's attention in the

classroom. Although the same general subject matter was being taught in each classroom during observation periods, some daily variations did occur. Children were always observed at the same time of day. Even given these precautions the stability of this assessment of attention was found to be low. Comparing subjects' in-class attention scores on three separate days yielded an intraclass correlation of .4636, indicating that attention levels, as assessed by the Attention Rating Instrument, varied from day to day.

Two different special treatment teachers took part in the study. Although the treatment lessons and procedures were scripted and specific, some teacher-differences are possible. The teachers were randomly assigned to E groups, but the number of groups (3) made it necessary for one teacher to teach two E groups. Thus special teachers were not perfectly balanced across conditions. The one group which diverged from the pattern of high mean treatment attention scores for E groups and low scores for OC group was the third-grade OC control group. This was the only control group taught by the teacher who also taught the first and second grade E groups. It is impossible to determine whether the difference between the first and second OC groups and the

third grade OC group is due to teacher-effect, the age level of the children, or the smaller size (4) of the third-grade OC group. (In this group two subjects were absent more than 50 percent of the time.)

One factor which could affect the generalization of the results of this study is the fact that all participating students were in the lower achievement reading groups and could be characterized as lower socio-economic status. Conclusions of the present study may apply only to this group of students.

The inservice training for the classroom teachers was not only short, it was also compulsory. Teachers had no opportunity to influence the existence, extent, or direction of the training. Amidon and Hunter (1966) and Patterson (1971) have indicated that, without this involvement, teachers tend to change little as a consequence of inservice training. Yet the training provided for the classroom teacher is often on this basis. Furthermore, it is possible that trained teachers talked about the training with their fellow teachers, thus contaminating the effect of the training.

Finally, in a project such as this, it is always conceivable that the process of measuring a behavior changes the behavior--that teachers respond differently to children

and children respond differently to teachers when observers are present.

Discussion

In this section each of the major and secondary questions addressed by the study will be discussed in light of the results of the statistical analyses.

Question 1

Does the token reinforcement program improve attention during the treatment lesson?

Results of all the hypotheses tested concerning this question support the conclusion that the token reinforcement program improved attention during the treatment lesson. On both treatment trials the mean treatment attention scores of the E subjects were significantly higher than the mean scores of the OC subjects. E subjects performed significantly better on the vigilance task than OC subjects. Over the four week period the vigilance scores of the E subjects tended to remain at the same level whereas the scores of the OC subjects decreased sharply toward the last two weeks of the treatment period.

The significant grades by conditions interaction and the significant difference between the first and second grade OC groups and the third grade OC group suggest that the grades responded differently to the treatment. Several explanations are possible. One is that the token reinforcement program is not as appropriate for older children. This is not an entirely satisfactory explanation because the third grade E group mean treatment attention score is comparable to the first and second grade E group mean scores. The problem is in explaining the significantly higher score for the third grade OC control group. It is possible that this higher score reflects a teacher-effect, as discussed earlier. It is the subjective judgment of this investigator that no observable differences existed in the behavior of the two teachers. Still this possibility exists.

Perhaps a better explanation is found in the size of the third grade OC group. In this group, two subjects were absent more than 50 percent of the time and were absent for all the observation days. (Their scores were not used in any statistical analysis.) On these days only four students participated in the lesson, making it smaller than the other E or OC groups. It is possible that the small size of the group led to its increased attention level.

The subjective reports of the special treatment teachers are in keeping with the conclusion that the token reinforcement program improved attention. They felt that the OC subjects quickly grew tired of the lessons and lost interest after the first week. Discipline was a major problem in the OC condition. On two separate days the lesson could not be continued in two of the OC groups. On a third occasion, a lesson-tape was stolen by one of the OC subjects, presumably so that the lesson could not take place. No such problems existed in the E condition. The children came eagerly each day and participated enthusiastically. The teachers found the procedure simple and in their experience, effective.

Question 2

Is participation in the token reinforcement program associated with improved attention in the regular classroom?

No evidence was found to support the conclusion that participation in the token reinforcement program was associated with improved attention in the regular classroom. No significant differences among E, OC, or SC conditions were found on in-class attention scores during the treatment period. Furthermore, although on a few days a

positive relationship between treatment attention scores and in-class attention scores or vigilance scores and in-class attention scores was found, on as many days a negative relationship was observed between the two sets of scores.

The classroom teachers reported informally that they perceived some improvement in the children's attention level during the treatment period. The in-class attention scores of subjects in all three conditions tended to increase during the treatment time, perhaps reflecting this perception of the teachers. It is also possible that a teacher-expectation effect is responsible for the increase in attention scores. This would not entirely explain the increase for the SC subjects, however, because the teachers were not aware of the participation of these subjects in the study. A second explanation is that this increase reflects a regression effect, the tendency for extreme scores to regress toward the mean over time.

Question 3

> If improvements in attention are identified in the regular classroom as a consequence of participation in the token reinforcement program, do these improvements in attention persist after the project has ended?

No differences were found among the groups' mean in-class attention scores during the posttreatment period. Although the mean in-class attention score of all subjects considered together had increased significantly during the treatment period, this advantage was lost during the posttreatment period. No significant differences existed between the pretreatment and posttreatment mean in-class attention score for all subjects.

One possible speculative explanation for this increase and subsequent decrease in attention for all subjects was offered by a teacher. Her observation was that during the treatment period the four children who left the room to participate in the lessons were somewhat more attentive in the classroom. The improved behavior of four of the six least attentive children tended to improve the behavior of other children by decreasing the number of potential disrupters and distractors. When the treatment ended, the four children resumed their inattentive behavior and encouraged it in their fellow students. Though this is a speculative explanation, it could be examined more carefully if results of other research seemed to warrant such an examination.

Question 4

Does inservice training for participating classroom teachers lead to increased transfer and endurance of attentional skills acquired in the treatment program?

No conclusive evidence was found to support the hypothesis that inservice training for teachers led to increased transfer and endurance of attentional skills. In spite of the fact that trained teachers increased their positive reinforcement of attention and tended to decrease their negative reinforcement of attention, on three of the four observational trials, trained teachers dispensed less positive reinforcement of attention and more negative reinforcement, though the differences between the two groups were not significant. There was a trend before the treatment period and inservice training began for the subjects in the E and SC conditions whose teachers later received training to have lower mean in-class attention scores than subjects in the same conditions whose teachers received no such training. After the treatment period began and inservice training was completed no such trend was found. No significant interaction was found between the mean in-class attention scores of teacher-trained and teacher-untrained subjects over time, however.

Although trained teachers did increase their dispensement of positive reinforcement of attention, they were not as successful in ignoring inattention, as evidenced by the nonsignificant change in dispensement of negative reinforcement. This inconsistent behavior may have been a factor in the failure of the trained teachers to increase student attention significantly. Also, the changes in teacher behavior, though great enough to be statistically significant, may not have been adequate to effect changes in student behavior.

Hypothesis 5

In this study, no relationship was found between in-class attention scores and school achievement scores. This runs counter to the research cited in Chapter II, especially the Lahaderne (1968) study which related an observer-assigned attention score to scores attained on standardized tests of achievement. Three differences between that study and the present one may explain these incongruent findings. The subjects in the Lahaderne study were sixth-grade students from a predominantly white working class suburb. Data were gathered during the fall school term. It is possible that attention and achievement as

measured in this study are not related for younger children. A second possibility is that attention and achievement are not related for minority group children, the predominant group in this study, or that the kind of attention assessed by the Attention Rating Instrument is not related to achievement for minority group children. The latter possibility was suggested to this investigator by Galloway (1972). His opinion will be presented more fully in the following discussion of Hypothesis 6.

The third difference between the Lahaderne study and the present one is the time factor. In this study attention scores were gathered in late spring but achievement tests had been given in early fall. Over the course of the school year children could have changed in both the areas of achievement and attention.

Perhaps the best explanation, however, for the fact that no correlation was found between attention and achievement is the instability of the assessment of attention. Research on achievement has assumed that this variable is a stable trait. If this assumption is well founded, it is not surprising that no correlation was found between the stable trait of achievement and the variable of attention, which was found in this study to fluctuate from day to day.

Implications for Educational Practice and Research

The results of this study are in keeping with the research cited by Maccoby (1968) which concluded that attention is, for the most part, situationally determined. Maccoby's earlier investigation (1966) had also found only moderate intrapersonal consistency in attention levels. One important aspect of education must, therefore, be to structure the environment in such a way that it will elicit attention from those students who are capable of it. This study has demonstrated that an important aspect of such a structured environment could be systematic reinforcement of attentive behaviors. It is possible that teaching a child to "pay attention" may be less important in our educational system than insuring that the child's attention leads to a rewarding experience. Reinforcement may be intrinsic in the task itself and also systematically provided by the teacher. Both are important factors.

A major emphasis of this study was the transfer of attentional skills to the regular classroom. Even though an attempt was made to systematically program this transfer of attentional skills, no such transfer was found. This finding is in agreement with the report of O'Leary and Drabman (1971) that no investigation has yet

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demonstrated generalization of newly acquired behaviors on return to the regular classroom. It is important to note that generalization was not even found during the treatment period, when children were observed in their regular classrooms immediately after they returned from the special treatment setting. Furthermore, brief teacher in-service training did not facilitate transfer.

In view of the findings of this study and those cited by O'Leary and Drabman (1971), it seems safe to conclude that brief special treatment placements should not be expected to change the behavior of children in their regular classroom unless more extensive changes are also made in the regular classroom environment. Also, studies which assess the efficacy of special treatment placement should include adequate follow-up investigation. The assumption should not be made that significant and substantial changes in behavior during special treatment placements will necessarily persist on return to the regular classroom.

The children in the project seemed capable of exhibiting a high level of attention from the first day of the treatment program, when they were rewarded for this attention. When they left the reinforcement system, their

attention scores decreased. It is possible that a treatment such as the one used in this study would be helpful in actually improving the attentional skills of children who initially were truly unable to maintain their attention at a high level, even when rewarded. This is a question that could be answered by researchers with access to this population of children.

The finding in this study of no relationship between attention and achievement for this sample raises some interesting questions. Is it possible that minority group children have a different style of attending, one which is frequently mistaken for inattention by a white middle-class teacher? This question could be answered by further research.

Whether attention and achievement are related or unrelated, the fact that attention is related to the interaction between pupil and teacher has been demonstrated. Jackson and Belford (1965) have shown that teachers gauge the success of their teaching by the involvement pupils demonstrate during class activities. Murdock and Phillips (1971) stated that the behavior of inattentive children is aversive to adults, especially teachers. One target for psychologists seeking to help teachers deal with inattentive children might be the teachers themselves. The classroom

teacher could be taught to ignore inattention and could also be systematically desensitized to the aversive behaviors of her students. Dollar (1971) presents one possible approach using systematic relaxation training.

The fact that some change in behavior was demonstrated by the teachers after only one training session is promising. It is possible that the role-playing technique was useful in effecting these changes. More emphasis should have been placed upon training teachers to stop correcting children for inattention. This may be a hard pattern for the teachers to break and additional practice might have been necessary.

Summary

Fifty-four elementary school children who had been identified as consistently inattentive to classroom activities were involved in a four-week treatment program. A specially developed Attention Rating Schedule was used to select the six least attentive students in each of three first, second, and third grade classrooms. From each of these nine classrooms, subjects were assigned randomly to an experimental (E), out-of-class (OC) control, or stay-in-class (SC) control condition. Subjects in the

first two conditions left their regular classrooms each day for 30 minutes to meet with a specially trained teacher in a small group lesson.

In the E condition attention to a standard lesson series was reinforced by making the earning of token points contingent upon appropriate responses to a signal-detection task embedded in the lessons. Token points were exchanged for reward on an increasingly delayed schedule. OC control groups participated in the same standard lesson series as the E groups, but without the token reinforcement program. SC groups remained in their regular classrooms throughout the project.

In order to determine whether brief inservice training for the regular classroom teacher would facilitate transfer of attentional skills from the special treatment lesson to the regular classroom, four of the teachers participating in the study received two and one-half hours of inservice training.

Observers assessed the attention of the subjects in the special lessons and in their regular classrooms both during and after the treatment period. Data collected were analyzed using analysis of variance and Pearson product-moment correlations techniques. The following conclusions are supported by the results of these statistical analyses.

1. The token reinforcement system was an effective technique for increasing student attention during the small group lesson in which this system was utilized.

2. The increase in attentional skills did not transfer to the regular classroom.

3. The brief inservice training given some of the participating classroom teachers did not facilitate the students' transfer of attentional skills from the special lesson to the regular classroom.

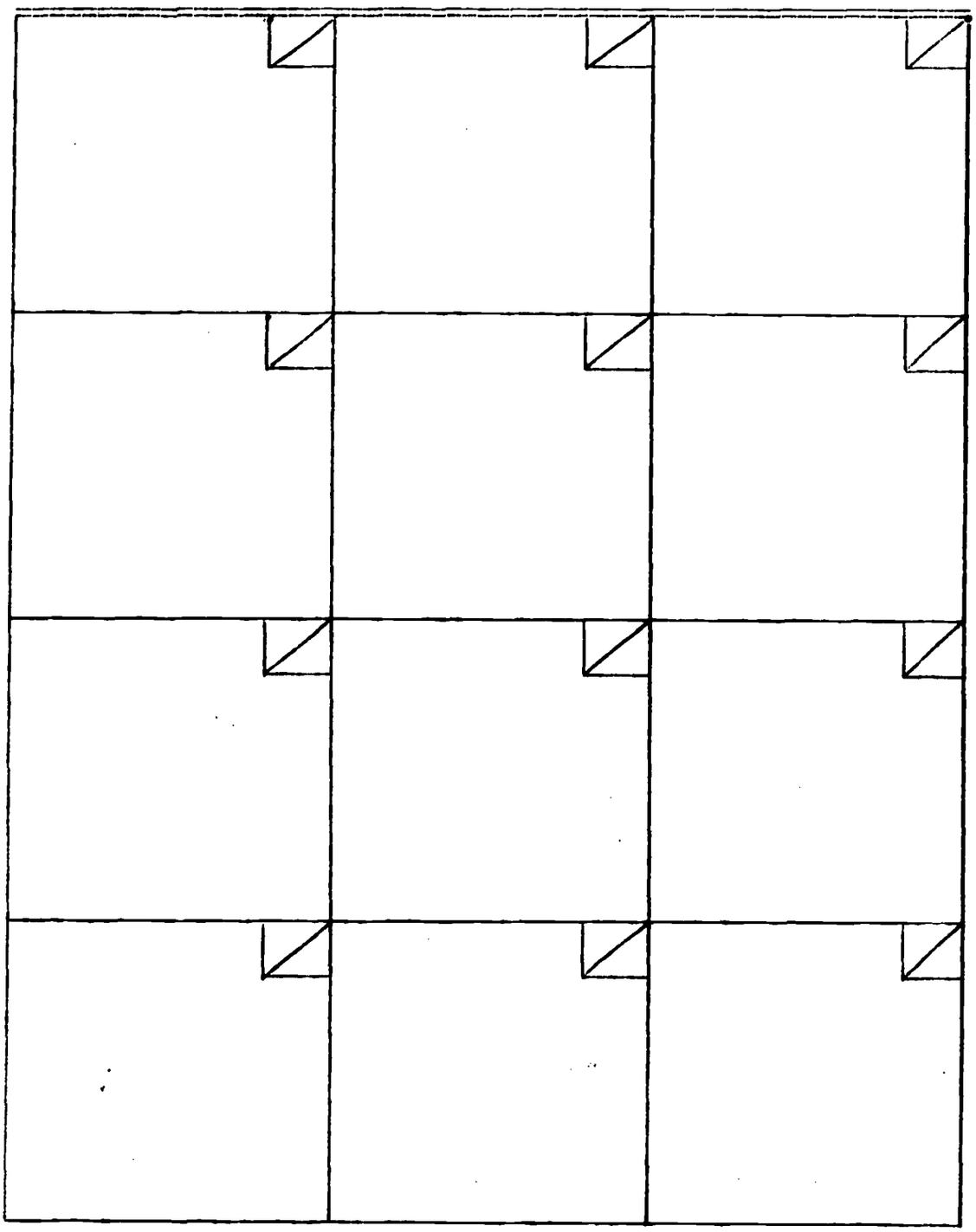
APPENDIX A

ATTENTION RATING INSTRUMENT
MANUAL FOR CODING ATTENTION IN THE SCHOOL SETTING
TASK ATTENTION CRITERIA

ATTENTION RATING INSTRUMENT

Child's name_____ Date_____

Observer_____ Class_____ Time_____



MANUAL FOR CODING ATTENTION IN THE SCHOOL SETTING

I. Instructions for Using the Attention Rating Instrument

A. Picking-up and returning your cards

When you arrive at the school you will receive the attention tally cards to be used that day. At the end of the observation period you should return all these cards to the Project Director. Be very careful with the pictures that will be attached to the cards. These pictures must be returned to the student's permanent file after the project and are the only copies that the school has.

B. Your class assignment

You will be observing in the same classroom each coding period. You will receive a copy of the teacher's schedule. When you arrive to begin coding, enter the classroom between lessons whenever possible. This will give you a chance to check with the teacher about possible changes in the children's seating assignment and to determine which students are absent that day. You may move around in order to see the children better, but try to be as unobtrusive as possible. If the children try to interact with you, tell them that you are here to watch the class but cannot talk to anyone, then ignore their questions and do not respond to them. Try to watch the children so that they don't know that you are observing them. Observe from a reasonable distance and perhaps slightly to the side. If a child has left the room when his card comes up to be coded, put it aside until he returns to the room.

C. Observing the children

When you receive your cards the children's names and pictures will already be on the cards. (In 2 classes pictures were not available--these children will wear name tags.) Go through the cards in order, first the front of the card, then the back. Move quietly to get a better view of the child if necessary. Before you begin coding each day, go through the cards and locate each child you will be coding that day. You may want

to make a note on the card about what the child is wearing that day so that you will be able to find him quickly as you code. On the 3 days when you are coding the entire class you may get the teacher's help in finding a child by checking with her when she is not busy with the class. DON'T INTERRUPT HER TEACHING, HOWEVER. Ask for the teacher's help only on the days when you are coding the entire class. When you are observing only the 8 children who have been selected from the class to particpate in the project, do not seek the teacher's help in locating students. THE TEACHER SHOULD NOT KNOW WHICH CHILDREN YOU ARE OBSERVING. Try not to indicate the identify of the project participants by the way you observe them. Finally, you will be given seating charts to help in your location of the children.

When you have identified all the children that you will be coding that day, begin your observation.

1. Watch the first child for 20 seconds. Using the criteria we have established, give the child a / for each second that he is attentive and a - for each second that he is not attentive. Count to yourself in the rhythm that we have practiced. After 20 seconds, stop and count your marks. If you have fewer than 20, observe the child again until you have the extra marks that you need to make 20. If you have more than 20 marks, erase or mark out the extra marks.

2. In the next 10 seconds count the number of /'s that you assigned to the child and record this number below the diagonal line in the box. Also:

3. Above the diagonal line code the type of activity in which the child was involved during the 20 seconds that you observed him. If he changed activities during the 20 seconds, use the code for the activity that occupied most of his time. If you are unsure about which code to use for the activity, leave the space blank. Use the following code to designate type of activity.

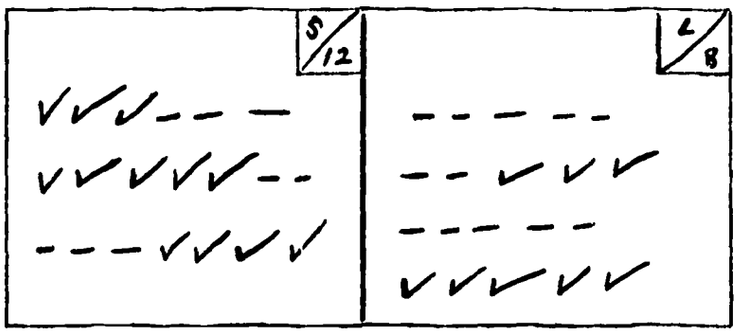
   L = Large group: The child is working, listening, etc. in a group of more than 8 children. This would include when the whole class is being taught together.

S = Small group: The child is working, listening, etc. in a group of 8 or fewer children.

I = Individual: The child is working by himself. Code "I" even if the child has asked for and/or received help from teacher or peers.

T = Transitional: The class is moving from one activity to another and the teacher is talking or giving instructions. (Do not code if this is a break without a clear focus or designated activity.)

Examples of completed squares could be:



D. Activities appropriate for coding

Do not code a child's attention if you are not sure what he should be doing, if no clear task has been defined, if the class is in between activities and the teacher is not talking or giving instructions. You should code a child's attention only when you know what the child should be attending to. If a child has been instructed to do an errand in the room you may code his attention. Give him credit for attending if he follows the instructions of the teacher and is not distracted, does not talk to other children or touch other objects on the way to do the errand. Do not code when the children are resting, taking a break (take one yourself), cleaning up the room, or other unstructured activity. If you are not sure than an activity is appropriate for coding, don't code. Move to the next child if he is engaged in a codable activity or wait for the next appropriate activity.

II. Summary of the steps in coding attention

1. Pick up your cards from the Project Director.
2. Go to your assigned classroom and enter between lessons.
3. Locate the children that you will be coding that day.
4. Go through the cards in order.
5. Before observing each child, decide whether he is involved in a codable activity. If so, code.
6. Observe the child for 20 seconds, assigning a / for each second of attention and a - for each second of inattention.
7. In the next 10 seconds:
   a. Count the number of marks to make sure that you have 20.
   b. Record the number of /'s below the diagonal line.
   c. Code the type of activity above the diagonal line.
   d. Locate the next child to be observed.
8. Continue observing each child until you have observed all your assigned children the designated number of times.
9. Return your cards to the Project Director.

III. Remember

1. Be on time for the observation periods.
2. Be as unobtrusive as possible in the classroom.
3. Don't respond to the children.
4. Be careful with the children's pictures. They cannot be replaced.
5. Don't let the teacher know which children you are observing.
6. Notify the Project Director at least 24 hours before an observation period if you are sick.

TASK ATTENTION CRITERIA

Eye attention and eye contact are the primary criteria, but head and body attention and orientation are also considered.

I. Eye Attention

A. Child's eyes must be on task or teacher when:

1. Teacher is talking to class.
2. Teacher is talking with child or helping him.
3. Child is doing an assignment at his desk.

Note: Eyes should not shift to folders, books, materials on or around the desk unless these are being employed in the task.

II. Head Attention

A. Child's head must be facing task.

III. Body Attention

A. Body position must be appropriate to the assigned task and directed toward the teacher or task. Child should be fully seated in assigned desk unless the teacher has given him permission to move.

IV. General

A. A child is not credited when he calls out to the teacher, talks to classmate during work period, or sits and plays with objects at desk. (If a child plays with object, but keeps his eyes, head and body turned toward the teacher or task, count as attention.)

B. If a child leaves the room or his seat without permission do not time until he returns.

C. If sent on an errand in the room credit for attention if the child is not distracted, does not talk to others or touch other objects.

D. Do not time a child when he is sent out of the room.

E. Any time an observer sees or hears an assignment being disobeyed by the child, count as inattention (e.g., if it can be seen that the child has not completed his assigned work, but is playing or doing other work)

F. Child is not docked for looking at date on blackboard or any other words, etc. which teacher wrote there as a part of the assigned task.

G. Count as inattention:

1. Restless shifting around in chair, kicking desk, etc. with eyes and head not facing toward task. (If eyes and head are toward task, count as inattention.)
2. Leaving seat for inappropriate reason.
3. Talking inappropriately.
4. Looking at observer, around room, out windows.
5. Disrupting other pupils.
6. Not complying with teacher request or instructions.
7. Daydreaming (staring into space) or sleeping.
8. Playing with objects, hair, clothes, and looking at the objects as he plays.
9. Turning around more than 90° in chair, unless as a part of appropriate activity.
10. Doing unauthorized work (writing during group discussion).
11. Not participating--reading, writing, drawing.
12. Not working on assigned task.

APPENDIX B

TREATMENT LESSON INSTRUCTIONS

TREATMENT

Lesson Introduction

Listen carefully while I tell you about what you will be doing in these special lessons. You learn many things in school. Sometimes all children need help to learn. Some things are hard to learn and some things are easy. It is hard for some children to pay attention in class. It is hard to listen carefully.

Every day you will come to these special lessons to learn how to listen carefully and how to follow directions. You will work every day with me to learn to pay attention. You will have fun while you are learning. When you go back to your classrooms, you can practice being a good listener.

Now I will tell you what we will be doing in these lessons. Every day you will have a different lesson. There will be songs and stories and games. You must listen to me and to this tape recorder each day. Whenever I tell you to do something, you must do it quickly. I may tell you to touch your nose or to pick up your pencil, or anything. You must do whatever I say quickly. You must do whatever the tape recorder says too. Remember, listen and follow directions. Do not copy other children. Listen and do what you are told.

End for Control Group. Continue for Experimental

To help you learn to follow directions, I will use a Special Score Board. If you do what you are told quickly, you will get a point. I will keep your points on this Score Board. Every time you get a point, I will move one bead over. The beads beside your name will be your score keeping beads. (Demonstrate)

At the end of the lesson you will get candy for your points. Today you will get one piece of candy for each point. If you earn five points you will get five pieces of candy. Every day at the end of the lesson I will write down how many points you earn on your card. Later it will take more than one day to earn your candy. We will add new prizes when you learn to be a better listener.

Remember, do what you are told quickly. If you copy someone else, you won't earn a point. Sit quietly and listen. If you get too loud, you will have to leave the lesson and you won't be able to earn points. Now get ready to listen and to earn points.

APPENDIX C

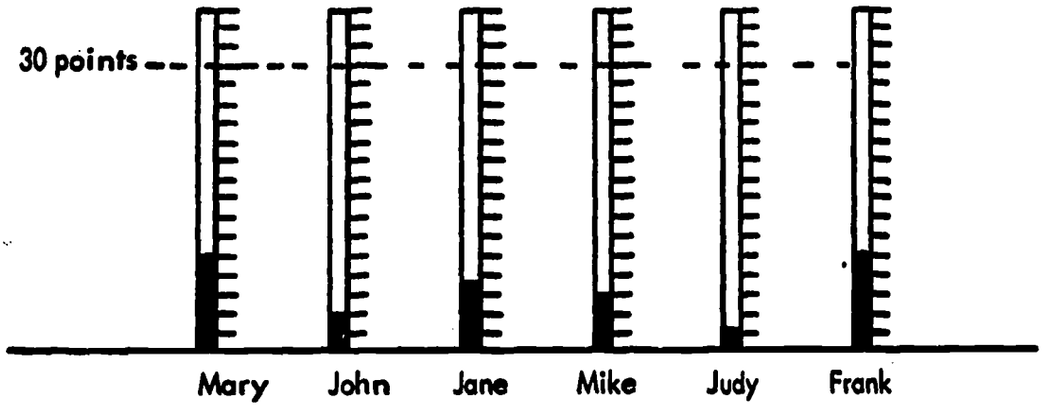
VIGILANCE SCORE CARD
VIGILANCE SCORE TALLY CHART

VIGILANCE SCORE CARD

Name Mike Grade 2

Date	1	2	3	4	5	6	7	8	9	10	bonus	Date	1	2	3	4	5	6	7	8	9	10	bonus
5/6	X	X	X	X	X						1												
5/7	X	X	X								2												

VIGILANCE SCORE TALLY CHART



APPENDIX D

TOYS USED AS BACK-UP REINFORCERS

TOYS USED AS BACK-UP REINFORCERS

View-masters with an assortment of slides

Silly-putty

Jig-saw puzzles

Dot-to-dot book

Coloring book

Yo-yos

Slinkys

Clay

APPENDIX E

INSERVICE TRAINING SESSION PRESENTATION
INSERVICE TRAINING HANDOUT I
INSERVICE TRAINING HANDOUT II

INSERVICE TRAINING SESSION

Presentation

The children that we have been working with were chosen because they have a difficult time maintaining attention. They are very distractable and have difficulty focusing on most school tasks. The purpose of this meeting is to discuss a few techniques of dealing with these children that will help them pay attention in your classroom. The techniques--usually called differential attention--have been used by teachers in schools all over the country. They may seem simplistic on the surface, but to use them appropriately requires patience and perserverence.

Attention is only one category of behavior that has been improved using differential attention of the teacher, but this is the category on which we will focus. The approach we will take to learning about differential attention techniques is called the Behavioral Skills Lab approach. This means that we will practice some of the techniques instead of just alking about them. Dr. Barry Dollar and Paul Scott have used this system in inservice training in both Austin and Houston.

The idea of the whole project is that the children are getting special small group training and practice in paying attention. Hopefully they will improve their skills in this area. In order for the children to transfer these new skills back to the classroom, they need to discover that paying attention in your classes will lead to positive consequences. For many children, paying attention leads to learning, participation, and "being a good student." This is enough reward for many students. For the children in the project, however, more immediate rewards are often necessary to show them that paying attention can lead to positive consequences. They need your immediate recognition and praise that they are doing well. They may have been encouraged in the past by the attention of other children to be disruptive or act out. They may have learned that other people, including classmates and teachers, pay more attention to them when they are not paying attention themselves to their school tasks.

In helping these children we need to consider what is maintaining their inattention. What are they getting out of it?

How can we show them that it is rewarding to pay attention? Most children respond to the teacher's praise and attention, even though they may seem untouched by it. Very often the comments to students which are meant to inhibit his misbehavior only serve to reinforce it. This has been demonstrated in classrooms over and over again. Children know what they should be doing; they seldom misbehave because "they have forgotten and need to be reminded."

Let's read over these handouts and then we can discuss some of the techniques. Remember, the handouts discuss behavior other than attention as well as attention. We will focus only on the rewarding of attention and the ignoring of inattention.

Procedures

1. Read handouts.
2. Questions about handouts?
3. Discuss specific children as examples of behavior to be rewarded or ignored.
4. Role play rewarding attentive children verbally and nonverbally, while ignoring inattentive children.

INSERVICE TRAINING HANDOUT I

Behavior Skill Lab 2--To the Student

The purpose of this lab is to learn and practice appropriate techniques of social reinforcement and punishment. The most powerful source of a teacher's classroom control is his own social responses to his students. This is true regardless of whether or not the teacher is aware of this influence, and effective classroom management is greatly enhanced by the teacher's skill in thoughtfully applying the techniques of social reinforcement and his awareness of how these techniques work.

In the typical classroom, when a teacher attempts to control discipline problems using punishment the teacher is drawn around his room by inappropriate student behavior. The teacher attends to disruptive behavior, intending to punish and, hopefully, eliminate it. He attempts to punish disruption by comments like: "I've told you, stay in your seat," "What are you doing?", "No talking, John," etc. Unfortunately, when an observer in the class records the frequency of disruptive behaviors in such a class it is commonly noted that the number of disruptions increase with the frequency of these comments. Here the teacher's intended punishment actually increases the frequency or reinforces the disruptive behaviors.

For effective classroom control your goal should be to be drawn around the room by appropriate student behavior. Since attention serves as a positive reinforcer for most (not all) of your students, you will want to attend to them only when they are behaving appropriately. Most inappropriate behavior can and should be ignored. By ignoring disruptive behavior you are removing part of the reinforcement (teacher attention) which is probably maintaining it. Important: When you withhold your attention from disruptive students the frequency of their disruption will increase before it decreases. They will emit more inappropriate responses, seeking the attention these responses used to earn. It is important that you know this will happen, for you may feel at first that your strategy is not working. Secondly, it is important that you are consistent in ignoring

inappropriate behavior. If you previously attended to disruption four out of five times it occurred and, upon deciding to ignore it, succeed in ignoring it completely the unwanted responses will extinguish (drop to a frequency of zero) because you have removed the reinforcement (your attention) that maintained them. However, if you are going along doing a good job ignoring most disruption when suddenly a student really "gets to you" and you attend to that response, you will probably increase the frequency of disruption above its previous level; the student has "learned" he needs to emit many more disruptions (or stronger ones) to get your attention. In summary, it is clear that for withholding reinforcement (attention) to work, you must be able consistently to ignore inappropriate student responses.

Remember that as you are ignoring disruption your attention is being constantly directed toward appropriate student behaviors. Sometimes behaviors occur which cannot continue. They need to be suppressed before you can continue teaching. In such cases you will need to punish these responses. Recall that even effective punishment only temporarily suppresses a response. Only by removing the reinforcer that maintains the inappropriate behavior can it be eliminated. In this lab you will learn acceptable techniques of social punishment and distinguish them from unacceptable ones. Suppressing an inappropriate response is only half the battle. A new response must be learned in its place. Hence, you can see the importance of communicating to your students what you expect of them in a positively stated manner. Your attention and approval are earned by a student when he emits the appropriate expected behaviors you have communicated to him.

The techniques described above, ignoring (withholding reinforcement or attention for) disruptive responses, and attending to or reinforcing appropriate expected behaviors is called differential attention. In order for you to use it effectively, you need to develop skills of social reinforcement and punishment.

In this lab, your instructor will assign three of your class members to role-play students of the grade-level you plan to teach. One or two will behave disruptively while the other(s) will behave appropriately. You will be asked to role-play the teacher in this situation and to appropriately punish and reinforce these students both verbally

and nonverbally. Some examples of acceptable verbal and nonverbal social reinforcers and punishers are listed below.

Acceptable Teacher Responses

Reinforcers

A. Verbal--Any praise of work, effort or appropriate behavior which tells the student what he has done

1. Your work is improving.
2. You did a fine job on that, (Name).
3. I'm pleased with your project.
4. I appreciate your help.
5. I feel great when you try like that.

B. Nonverbal

1. Smiling, arms relaxed, hands open.
2. Touching arm or back of chair.
3. Physical nearness.
4. Eye-level contact.
5. Head nod.

Punishers

A. Verbal--Any statement which expresses your negative feelings about a specific inappropriate behavior and not the person or which points to the disruption the student's behavior is causing.

1. I feel upset when you disrupt the class.
2. It bugs me when you continually talk.
3. Your talking is disturbing Joan's work.
4. The class cannot concentrate when you behave that way.

B. Nonverbal

1. Superior posture, looking down.
2. Arms on hips or folded.
3. Stern look, not mean or hateful.
4. Physically distant from student.

Unacceptable Teacher Responses

Inappropriate Reinforcers

A. Verbal--Any statement which evaluates the person rather than his behavior.

   1. You are a good boy.

B. Nonverbal--Any ambiguous response which may have "extra" meaning.

   1. Touching an opposite sex high school student.
   2. Double-meaning winks (possibly sarcastic).

Inappropriate Punishers

A. Verbal--Any statement which evaluates the person rather than his behavior. Any question-type response.

   1. You're stupid.
   2. Why are you doing that?
   3. Why aren't you working?
   4. Any yelling or raising of the voice.

B. Nonverbal

   1. Touching of any kind.

Each of you will have an opportunity to demonstrate an appropriate verbal and nonverbal punisher and reinforcer and to combine appropriate punishment and reinforcement.

INSERVICE TRAINING HANDOUT II

Reinforcers

As you have learned, a POSITIVE REINFORCER is any event or change in the environment which strengthens or increases the frequency of a behavior it follows. A PUNISHER, on the other hand, weakens or temporarily suppresses the frequency it follows.

If you decide to manage the classroom behaviors of your students using positive controls (reinforcers) rather than punishers, it is important for you to have some idea of the variety of events you as the teacher can use to strengthen the appropriate behavior of your students. We can think of reinforcers as falling into three categories: concrete, activity, and social. Concrete reinforcers are the most basic; these include physical objects and symbolic objects you can give directly to your students. Candy, money, and grades are examples of concrete reinforcers. Activity reinforcers, as the name implies, are those child activities which you can control in the classroom such as games, privileges, and field trips. Finally, social reinforcers are the interpersonal responses, both verbal and nonverbal, which you make in response to desired student behavior. Smiles and verbal praise are included in this category.

Remember that what is reinforcing to one student may not be, or may even be punishing, to another. You have to evaluate the effectiveness of any reinforcer you try by watching its effect on the pupil's behavior. In general, you can generate ideas about what is likely to be reinforcing to a pupil by (1) asking him what he likes (concrete), (2) watching what he does in free play situations (activity), and (3) observing his responses to you and other children's behavior (social). Finally, many reinforcers acquire their reinforcing value by being paired with other events which are previously reinforcing to a child. Adult praise is an acquired or "secondary" reinforcer in this sense; its reinforcing value was built by constant pairing with the giving of more primary or basic reinforcers such as food during early childhood.

APPENDIX F

CODING TEACHER REINFORCEMENT OF STUDENT BEHAVIOR
EXAMPLES OF REMARKS CONCERNING ATTENTION

CODING TEACHER REINFORCEMENT OF STUDENT BEHAVIOR

I. Definitions

A. Attention
(Consult separate sheets)

B. Positive Reinforcement
A stimuli which acts to strengthen the behavior that it follows

C. Negative Reinforcement
A stimuli which acts to weaken or inhibit the behavior that it follows

D. Verbal Behavior
The action of emitting sounds in a speech pattern

E. Nonverbal Behavior
Sounds or movements not accompanied by a speech pattern

II. Examples of Codable Behavior

Note: Codable behavior must be directed specifically to attention

A. Verbal Positive Reinforcement (VP)

1. "He knows right where we are."
2. "That's the way to listen."
3. "I called on her because she was paying attention."

B. Verbal Negative Reinforcement (VN)

1. "You aren't looking at me (the board, the book)."
2. "Turn around and listen."
3. Any repeated command: "Get in line!"

C. Nonverbal Positive Reinforcement (NP)

1. Pat head, shoulders
2. Nod
3. Smile

D. Nonverbal Negative Reinforcement (NN)

1. Snap fingers
2. Point to board, book, or child
3. Frown

III. Guidelines

A. Instrument

1. Observe for thirty minutes exactly and note the time period on the sheet.
2. When in doubt as to the classification of a reinforcement, write down the comment or action in question carefully in the applicable square on the sheet.
3. Before coding, be sure to have the six students identified.

B. Teachers

1. Always be courteous and respectful to the teachers--it is their classroom.
2. The teachers think that you are coding the behavior of the students; act accordingly.
3. Never discuss the behavior of the teachers or the students.

EXAMPLES OF REMARKS CONCERNING ATTENTION

I. Positive Reinforcement of Attention

A. Verbal

1. "You're paying attention well."
2. "Good listening!"
3. "He knows right where we are."
4. "I called on her because she was paying attention."
5. "He is really watching me today."
6. "That's the way to listen."
7. "She knows which problem we're on."
8. "He is looking right at his book (me, the board)."
9. "That's good! You did what I told you to do right away!"
10. "You may come to the board because you have been watching and listening all morning."

B. Nonverbal

1. Smile; wink
2. Touch; hug
3. Shake hand; stroke arm
4. Nod approvingly
5. Pat head, shoulders

II. Negative Reinforcement of Attention

A. Verbal

1. "Don't you ever pay attention to what is going on?"
2. "I told you to listen (look, watch, read, etc.)."
3. "This is work time."
4. "That was the wrong answer because you didn't hear the question."
5. "Why aren't you doing your work?"
6. "Eyes up here."
7. "You aren't counting (writing, reading)."
8. "Stop daydreaming."
9. "Are you on page ten?"
10. "She was good yesterday but isn't paying attention today."

B. Nonverbal

1. Frown; stare
2. Shake head, finger
3. Point at board, book, child
4. Snap fingers; clap hands
5. Stand over child

APPENDIX G

MEAN SCORES FOR ANALYSIS OF VARIANCE COMPARISONS

MEAN SCORES FOR ANALYSIS OF VARIANCE COMPARISONS

TABLE 2

IN-CLASS ATTENTION SCORES--PRETREATMENT PERIOD

Condition	Grade 1	Grade 2	Grade 3
E	11.1000*	11.2000	9.4000
OC	11.733	10.8667	11.4667
SC	12.2000	12.5333	11.2667

*On in-class attention and treatment attention measures, scores can range from 0 to 20.

TABLE 3

TREATMENT ATTENTION SCORES--TREATMENT PERIOD

Condition and Grade	Initial Treatment Trial	Final Treatment Trial
E Grade 1	15.6833*	16.0167
E Grade 2	16.6500	17.8833
E Grade 3	16.0400	16.1400
OC Grade 1	12.9000	7.8500
OC Grade 2	10.9833	4.6167
OC Grade 3	14.2500	15.2500

*On in-class attention and treatment attention measures, scores can range from 0 to 20.

TABLE 4

VIGILANCE SCORES ACROSS SEVEN TRIALS

Trials	Condition E	Condition OC
1	8.4941*	3.0937
2	8.0471	3.7750
3	7.1941	4.8125
4	5.7294	2.9375
5	6.8294	.2500
6	8.0588	.4063
7	6.8941	.8750

*Vigilance scores may range from 0 to 10.

TABLE 5

IN-CLASS ATTENTION SCORES OF SUBJECTS WHOSE TEACHERS RECEIVED NO TRAINING

Teachers	E	OC	SC
	Pretreatment Trial		
1	12.2500	13.0500	13.1000
2	11.5500	9.9000	10.7500
3	11.7000	8.8500	8.0500
4	10.8500	13.5000	12.1500
5	10.0500	9.5000	12.8500
	Initial Treatment Trial		
1	12.5000	14.1500	12.8000
2	12.7000	12.2000	10.7500
3	12.1000	11.0000	11.5000
4	15.2500	13.0000	12.1500
5	12.6000	11.3000	16.5000

TABLE 5--Continued

Teachers	E	OC	SC
	Final Treatment Trial		
1	15.6000	15.5000	13.3000
2	16.0500	14.0500	13.4500
3	9.6000	8.5500	11.9500
4	15.5500	14.8000	17.4000
5	13.9500	12.3000	16.1500
	Posttreatment Trial		
1	15.0500	13.3500	14.7500
2	6.8500	13.4500	11.7500
3	2.8500	9.7000	9.2000
4	15.8000	16.9000	16.2500
5	5.0500	11.3000	13.3000

TABLE 6

IN-CLASS ATTENTION SCORES DURING THE TREATMENT PERIOD

Condition	Grade 1	Grade 2	Grade 3
	Initial Treatment Period Trial		
E	11.0667	14.0667	12.8667
OC	12.9667	11.7000	12.4333
SC	12.4333	14.7667	13.6333

TABLE 6--Continued

Condition	Grade 1	Grade 2	Grade 3
	Final Treatment Period Trial		
E	14.9667	13.0667	12.5667
OC	14.7667	10.4667	13.2000
SC	13.1000	14.0333	14.5667

TABLE 11

IN-CLASS ATTENTION SCORES DURING THE POSTTREATMENT PERIOD

Condition	Grade 1	Grade 2	Grade 3
E	12.3333	11.9333	11.6000
OC	13.4333	8.6000	13.1333
SC	13.0667	10.7667	13.9333

TABLE 12

TEACHER-TRAINED VERSUS TEACHER UNTRAINED SUBJECTS' IN-CLASS ATTENTION SCORES--TREATMENT PERIOD

Subjects	Initial Treatment Period Trial	Final Treatment Period Trial
Teacher-trained	13.000	13.0083
Teacher-untrained	12.7867	13.7400

TABLE 13

TEACHER-TRAINED VERSUS TEACHER-UNTRAINED SUBJECTS' IN-CLASS ATTENTION SCORES--POSTTREATMENT TRIAL

Subjects	Score
Teacher-trained	11.3917
Teacher-untrained	12.6467

TABLE 14

TEACHER-TRAINED VERSUS TEACHER-UNTRAINED SUBJECTS' IN-CLASS ATTENTION SCORES BY CONDITION

Period Trial	E Condition	OC Condition	SC Condition
Teacher-Trained Subjects			
Pretreatment	9.6250	11.8750	11.3500
Initial Treatment	12.1250	12.4500	14.4250
Final Treatment	12.7250	13.0500	13.2500
Teacher-Untrained Subjects			
Pretreatment	11.3200	10.9400	12.5200
Initial Treatment	13.1000	12.3000	12.9600
Final Treatment	14.1800	12.6200	14.4200

TABLE 15

TEACHER-TRAINED VERSUS TEACHER-UNTRAINED SUBJECTS' IN-CLASS ATTENTION SCORES--POSTTREATMENT

Subjects	E	OC	SC
Teacher-trained	12.2750	9.8500	12.0500
Teacher-untrained	11.7000	13.2200	13.0200

TABLE 19

IN-CLASS ATTENTION SCORES ACORSS ALL TRIALS

Period Trial	E	OC	SC
Pretreatment	10.5667	11.3556	12.0000
Initial treatment	12.6667	12.3667	13.6111
Final treatment	13.5333	12.8111	13.9000
Posttreatment	11.9556	11.7222	12.5889

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