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COGNITIVE BEHAVIOR MODIFICATION:
"MOTIVATED LEARNING" READING
TREATMENT WITH PARENTS AS
THERAPY-TECHNICIANS.**

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COGNITIVE BEHAVIOR MODIFICATION:
"MOTIVATED LEARNING" READING TREATMENT WITH
PARENTS AS THERAPY-TECHNICIANS

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE
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ABSTRACT

The present experiment was an attempt to discover whether parents of children with reading deficits could act successfully as therapy-technicians in helping their own children to overcome these deficits. Four children identified as reading problems were reinforced for appropriate reading behaviors with tokens backed up by monetary value. All four children showed a positively accelerated rate of reading and made from 36,389 to 64,448 single word reading responses during the 30 to 45 hours of training. Pre- and post-test comparisons indicated a significant increase (at the .01 level) in ability to read the training materials. Results add to confidence in learning conceptions of human behavior.

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In the past few years there has been a definite increase in the number of studies illustrating the utility of the application of behavioral learning principles to behavior problems and learning deficiencies. In addition a number of books have been published recently in which the authors concern themselves with the integration of these studies (Honig, 1966; Krasner & Ullmann, 1965; Staats, 1964; Ullmann & Krasner, 1965; 1969) as well as with the theoretical principles of behavior modification (Staats, 1968; Staats & Staats, 1963) and the application of these principles to human problems (Eysenck, 1960; 1965; Wolpe, 1958; Wolpe & Lazarus, 1966). In the decade following Greenspoon's (1955) demonstration of verbal operant conditioning, behavior modification became a significant innovation in psychotherapy (Grossberg, 1964) and is now considered by many to be a noteworthy social movement (Ullmann, 1968).

One aspect of this movement is the opportunity to communicate the wherewithall of behavior modification to non-professionals and to use these individuals in the modification of target behaviors. What makes this possible is the relative precision of the operations employed in behavior modification, and this facilitates operational description of the techniques to sub-professionals.

Sub-professional psychotherapy, as an adjunct to the current trend toward community mental health services, has become a viable solution to the dilemma of the need to treat increasingly more individuals by an insufficient number of

practicing therapists. One of the first studies to employ sub-professional therapy-technicians in a manner consonant with behavioral principles made use of aides, psychiatric nurses, and registered nurses (Ayllon & Michael, 1959). (Although some of these individuals were "professional" nurses, they were "sub-professionals" as therapy-technicians.) These nurses and aides were instructed by Ayllon in specific programs which involved the giving and withholding of social reinforcement contingent upon a desired class of behaviors. The experimental subjects were 19 patients (diagnosed as schizophrenic or mentally defective) in a Canadian psychiatric hospital. All but one of the patients had been hospitalized for several years at the time the experiment began. The therapeutic techniques used included extinction procedures, reciprocal inhibition, strengthening weak behaviors by escape and avoidance conditioning, and stimulus satiation. The operations were in force for 24 hours a day, seven days a week. In general, the time required to change a specific behavior ranged from 6 to 11 weeks.

In their discussion, Ayllon & Michael point to two problematic reactions that many have to the successful results of behavior modification techniques. The first is the "symptom-substitution" or medical model mentality--the attitude that it is essentially an underlying process rather than the apparent symptoms that make up the "mental illness." Ayllon & Michael found that the nurses " . . . tended to be somewhat dissatisfied with any change less than total

'cure,'" and made remarks such as "'We've changed her behavior. So what? She's still a psychotic'" (P. 334).

The second skepticism is the belief that behavioral modifications are merely temporary and hence superficial--an attitude which bespeaks naivete regarding the principles underlying the behavior modification approach. Ayllon & Michael explain it neatly: ". . . permanent elimination of ward behavior problems requires a permanent elimination of the environmental variables that shape them up and maintain them" (P. 334).

In the past decade since Ayllon & Michael's study, there have been a number of investigations into the use of undergraduates (Davison, 1965), graduate students (Lovaas, Berberich, Perloff & Schaeffer, 1966) and teachers (Allen, Hart, Buell, Harris, & Wolf, 1964; Brown & Elliot, 1965; Harris, Johnston, Kelley, & Wolf, 1964; Hart, Allen, Buell, Harris, & Wolf, 1964) as sub-professional therapy-technicians.

One of the first to use parents as sub-professional therapy-technicians was Phillips (1956) who calls his approach "assertion-structured therapy," an approach somewhat similar to that of Ellis (1962). Phillips (1960) gives parents common sense explanations of the behavioral contingencies operating in the parent-child relationship, e.g., "If you become more definite and consistent, this will help the child know where he stands with you." Phillips stresses structuring the relationship so as to set limits on behavior

and specific aims for achievement. A very similar approach is used by Henderson & Batchelor (1962).

The behavior modification approach maintains that a child's undesirable behavior is engendered and maintained by natural contingencies operating in the child's environment (Bijou & Sloane, 1966). "If this is true," write Zeilberger, Sampen, & Sloane, "the most efficient way to modify deviant behavior may be to change the reactions of the natural milieu to that behavior" (1968, p. 47).

Wahler, Winkel, Peterson, & Morrison (1965) worked with mothers in the clinic and taught them to discriminate target behaviors of their children and to respond according to certain contingencies. In a subsequent step the mothers discriminated without cues from the experimenter but received feedback on their accuracy.

In their work with parent-child relationships, therapists have moved out of the clinic and into the home setting. Russo (1964) demonstrated that parents can serve as therapy-technicians in both home and clinical settings, while Straughan (1964) conducted the therapy sessions at home. Straughan worked with the child in a playroom and served as a model while the parent observed. In a similar fashion Rickard & Mundy (1965) served as models in shaping non-stuttering in a nine-year-old while the mother observed. Subsequent to this, the mother acted as a model while the father observed. Similar modeling techniques were used by Ryback (1966) in training parents in the shaping of speech

behaviors in mute schizophrenic and autistic children.

A classical study in the treatment of childhood autism was executed by Wolf, Risley, & Mees (1964). Dicky, the central character of this experiment, had many undesirable behaviors the eradication of which Wolf et al. set for themselves as a goal. Dicky's temper tantrums were treated by extinction procedures, as were his bedtime problems which consisted of not sleeping at night and forcing his parents to remain by his bed. Appropriate verbal behaviors and the wearing of his glasses were treated by shaping procedures while the throwing of his glasses was treated by time out from positive reinforcement which was also used to treat his eating problem. Following treatment, Dicky's parents were instructed in the methods to maintain the behavior changes. Six months after termination of treatment, Dicky's mother reported that he continued to wear his glasses, did not have tantrums, had no sleeping problems, was becoming increasingly verbal and was a new source of joy to the members of his family.

Walder (1966) and Wetzel, Baker, Roney, & Martin (1966) have also used parents to treat their autistic children. Other behavioral problems which have been treated by parents as sub-professionals include emotional disturbances (Andronico & Guernsey, 1967), destructive behaviors (O'Leary, O'Leary, & Becker, 1967), aggressive behavior (Zeilberger et al., 1968), hyperactivity in the classroom (Patterson, 1965a) and at home (Hawkins, Peterson, Schweid, & Bijou, 1966), school

phobia (Patterson, 1965b) and excessive scratching (Allen & Harris, 1966).

It is interesting to note that in all the studies dealing with sub-professional psychotherapy with children only two deal with behaviors as complex as speech or reading acquisition, but of these Lovaas et al. (1966) did not work with parents and Ryback (1966), who did work with parents, did not have precise measures for degree of behavior change. In the present experiment the procedures for measuring the degree of behavior change, i.e., reading acquisition, as developed by Staats & Butterfield (1965) were clearly specified.

As Ullmann & Krasner (1969, p. 524) point out, the same behavioral principles and techniques can be used on both adults and children, whether applied by parent or professional therapist. Speech and reading deficits are more often a focus in children than in adults, and the techniques most often used to overcome these deficits are shaping procedures using verbal responses, desirable items or some form of token as positively reinforcing stimuli.

Although social and verbal reinforcers have been used successfully with normal children (S. Allen, 1966; Harris, Johnston, Kelley, & Wolf, 1964; Hartup, 1964; Zigler & Kanzer, 1961), hyperactive children (K. E. Allen, Henke, Harris, Baer, & Reynolds, 1967; James, 1963), and emotionally disturbed children (Zimmerman & Zimmerman, 1962), these often do not have lasting effectiveness. Staats, Staats,

Schutz, & Wolf (1962), for example, found that for emotionally disturbed children the use of social (verbal) reinforcers (E saying "all right," "good" or "fine") alone when used with systematic presentation of verbal stimulus cards did not have lasting effectiveness.

Patterson & Hinsey (1964) used tangible reinforcers (candy) in a series of 15 trials to shape attending behavior in a hyperactive boy. This experiment was carried out in a classroom setting and an increase in the desired behavior was obtained. Patterson, Jones, Whittier, & Wright (1965) later ran conditioning trials in a classroom with two hyperactive children, using one as a control. The experimental S wore earphones and during each time interval (ten min.) when one of the high rate responses (various types of hyperactive behavior) did not occur the S received an auditory stimulus (secondary reinforcer) which had previously been paired with the delivery of candy and pennies. At the end of each conditioning trial, the S received whatever candy or pennies he had earned. Results indicated that the control S exhibited no significant change in the frequency of occurrence of the non-attending behavior during the three month period, while the experimental S showed a significant decrease in non-attending behavior. This reduction in rate was maintained over a four week extinction period.

The first formal token-reinforcer system was developed by Staats in 1959 while working with childhood learning

problems. In his system, children were given plastic discs contingent upon reading responses. These tokens could then be exchanged for articles which the children chose. Each child's accumulation of tokens was charted to provide him with visual evidence of his reading progress. In the procedure that Staats developed, individual words were first presented with prompting and the children were reinforced for looking at the word and labeling it according to the prompt. When the children could read all the individual words, they were then presented in paragraph form after which these paragraphs were presented together in story form. These more complex reading responses were reinforced with higher valued plastic discs. Three types of tokens, distinguished by color, were used as reinforcers, and these tokens could be used to purchase a variety of items, such as toys and other desirable small articles. The important result was the immediate change in the children's behavior. They became vigorous, attentive workers and learned well (Staats, 1969).

Following this work, the use of token-reinforcement procedures began to appear in various places. Michael and Meyerson began to work with mentally retarded children employing a similar version of the Staats Token-Reinforcement System (STRS). In addition, Patricia Cooke and Sam Toombs, students of Michael, set up a remedial classroom which was also based on a version of the STRS. Versions of the STRS have since been widely employed in various educational and

behavioral studies (e.g., see Wolf, Giles, & Hall, 1968; Ullmann & Krasner, 1965).

Several additional studies using the STRS have been completed by Staats and his associates. In these studies an attempt was made to pinpoint the specific behaviors to be reinforced in order to shape reading behavior. According to Staats (1968), reading acquisition is dependent upon the development of a number of discrete repertoires: discrimination of letters (alphabet training), reading of grapheme-phoneme units, sounding out, whole word reading, phrase reading and so on. Equally important is the availability of an attentional repertoire, a well developed repertoire of word associations as well as other aspects of the basic behavioral repertoire. Of utmost importance is the child's motivational repertoire for maintaining attentional and working behaviors. For most children, this motivation is not sufficient to discount the necessity for extrinsic reinforcers.

Although for some children learning itself may have become rewarding and this source of reinforcement may help attentional and studying behaviors, for the most part it is necessary that some source of extrinsic reinforcement be employed (Staats, 1968, p. 539).

The significance of a deficient motivational system lies in the fact that it can lead to a behavioral deficiency which in turn can lead to greater motivational deficiencies. Staats has suggested that

. . . behavioral problems can arise, because (1)

there is a deficit of behavior necessary for adjustment in our society, (2) because behaviors considered undesirable by the society are present in the individual's repertoire, or (3) because the individual's motivational (reinforcement) system is inappropriate in some respect.

Actually, it should be indicated that there may be interactions between these classes of behavioral defects. Thus, the individual who has deficits in behavior may not as a consequence gain positive reinforcement--the receipt of which in contiguity with other stimuli could produce an additional development of his motivational (reinforcement) system . . .

On the other hand, a defective motivational system can lead to behavior deficits (Staats, 1968, pp. 349-350).

Children with deficits in reading behavior may have initially been deficient in their motivational repertoires. And this may have come about because of poor learning conditions, e.g., insufficient reinforcement or poor contingency schedules. Staats et al. (1962; 1964a; 1964b) have demonstrated how a cognitive deficit, which it is suggested frequently arises from motivational deficits (see Staats & Butterfield, 1965; Staats, 1968), may be treated by introducing a functional reinforcing system. Then the procedures developed were adapted for work with actual behavior problems (Staats & Butterfield, 1965). This study was a case involving a 14 year old, culturally-deprived, juvenile delinquent. He had a long history of delinquency and maladjustment. Part of his difficulty in adjusting to school involved his inappropriate reinforcer system, and part involved his previously acquired cognitive deficits.

The method of treatment was based upon an extrinsic

token-reinforcement system that had been developed in the basic studies. These methods achieved considerable success in the 40 hours of training given over a 4½ month period. The child, who was a severe behavior problem in a traditional classroom situation, worked and attended well in the experimental treatment program. He made over 65,000 single word reading responses; he received special training on 761 words he did not know; he retained 430 of these words (57 per cent) on a long-term retention measure; and he passed all his courses in school (the first time he had ever passed a course in his entire history). His misbehavior in school fell off markedly, and his general attitudes towards school and school work appeared to improve.

Since the study of Staats and Butterfield was based upon the results of a single subject, the next step in this program of research was a more general test of the procedure. This involved using sub-professionals as behavior technicians supervised by a professional psychologist. Staats et al. (1967) used literate high school seniors and adult volunteers with high school educations as therapy-technicians. The experimental subjects included under-achieving, junior high school-aged children with no special characteristics except their learning problem, children considered to be mentally retarded and in special classes, and several children with emotional or behavioral problems.

The 18 subjects were given 38.2 hours of training in daily half-hour sessions, during which period the average

value of the back-up items received was \$22.29. The mean number of single word reading responses was 94,425. The rate of reading accelerated over the period of training even though the reading material became more difficult. This occurred during a period when progressively less (about one-fourth as much) reinforcement was given per reading response. A mean of 593.5 new words were learned and 70.9% of these were retained in a long-term test. The attention, attendance, cooperation and diligent work behaviors of the various children were maintained in good strength throughout the duration of the study.

The results suggested that research be conducted to develop methods for treatment of behavioral deficits that can be widely applied by sub-professional therapy-technicians supervised by professional psychologists. The use of those individuals having natural relationships to the S as sub-professional therapy-technicians might be highly effective. According to Thorne, Tharp, and Wetzel,

. . . the use of natural relationships (e.g., parents, friends, relatives, teachers) for bringing about changes in a youngster can be efficient and powerful. Parents have the primary responsibility for their children, and if they even display a modicum of cooperation there is a potential for bringing about behavior changes of a meaningful and durable nature (Thorne et al., 1967, p. 2).

Antagonistic to this approach are some who consider the possibility of parental involvement detrimental or inappropriate. Some investigators feel that parental reaction to filial behavioral deficits is sufficiently incapacitating to

make them ineffective as teachers or helpers of their own children. Mandelbaum (1967), for instance, writes that when parents are confronted with their child's retardation they often enter a period of mourning and grief accompanied by emotional isolation and loneliness.

Moreover, there are a number of investigators who feel that the home environment of the child constitutes the context for the development of the problem. According to Hohlmann (1966), mothers of children with dyslexia have the surprising characteristic of voices that are somewhat sharp to severe in tone, precisely articulated, and lacking in maternal warmth. Hohlmann concludes that children do not have the feeling of protection and cannot withstand stresses. DeVault & Stewart (1967) examined etiological factors in four reading retardates and emphasized the environmental patterns despite the fact that two of the children had probable organic brain damage.

In two texts on childhood reading difficulties, Bond & Tinker (1957, pp. 108-109) and Harris (1961, pp. 266-267) point to the parental factors that go into causing and maintaining poor reading behaviors. Bloom, Davis, & Hess (1965, p. 81) are less specific. They blame the kind of home environment in low socio-economic family groups. Joyce Edward (1967) maintains that parents are often the main block in the recovery of an emotionally disturbed child. Hence, there is a body of investigators that would blame parents for much of the etiology in reading disabilities. If the

parent constitutes a major cause of the child's difficulty it would not seem that without far-reaching changes the parent could provide therapeutic experiences for the child.

Perhaps it is because of this that many are reluctant to employ parents as psychotherapeutic agents. Schools often look upon the families of low socio-economic students or minority students as bureaucratized dependents rather than egalitarian participants in the education of their children. In many instances, according to Crow, Murray, & Smythe (1966, p. 119), winning confidence of parents presents a real challenge since the school has knowingly or unknowingly discriminated against the poor and particularly those who belong to minority groups.

Furthermore, there is often a general possessiveness on the part of the educational institution regarding the instruction of children that implicitly discourages parents from helping their children gain cognitive skills. Wilson & Pfau discuss this in an article entitled "Parents can help!":

'Hands off! This is our problem,' is no longer a justifiable response from the educator. Educators are aware that parents rightfully want to assist at home when their child has reading problems. Yet concern mounts when educators realize that the efforts of parents may be more harmful than helpful, and that many parents are unsuited to work with their child in an institutional setting (1968, p. 758).

These authors administered a questionnaire to parents regarding their responses to their children's requests for help and found that nearly 100% of the parents offered help to their child when he requested it. Also, it was

discovered that parents of slow readers were most likely to be asked. Yet parents reported conducting much of their work without information or cooperation from school personnel. If appropriate programs could be instituted, these authors write,

. . . effective potential cooperation can be achieved without excessive expenditures of time, and the teacher could feel more certain about the educational value of the reading techniques being used at home (1968, p. 760).

Furthermore, the educator's sometime esoteric approach must give way to open sharing and communication of techniques and rationales. According to Wilson & Pfau,

Working with parents of troubled readers appears to be an area of concern for educators. If acceptable remedial maneuvers are shrouded in secrecy, it is hardly likely that much good is attained by asking parents to cooperate Assisting children at home can no longer be considered "off limits" Regardless of the difficulties, this type of cooperative venture is possible, profitable and necessary if children are to receive the best possible help when reading difficulties occur (1968, p. 761).

Although there have been some sound attempts at parental involvement in remedial reading (Lloyd, 1965; McManus, 1964), none have involved the precise administrative methodology, reinforcement procedures and knowledge of results that the Staats "Motivation-Activating" Reading Technique does. It is exactly this precision in teaching technique that is so valuable since general instructions regarding the right attitude and approach are usually ineffective, if not detrimental, in changing specific complex behaviors. With added conviction but no more effective means a parent can

more probably effect change but not necessarily the appropriate kind. As Staats & Staats put it, "Within the pattern of a loving mother widely different training practices leading to widely different behaviors of the children could occur" (1963, p. 412).

Whatever the intent, however, the parent is definitely an influential factor in the child's behavioral development. What is important is to control this influence, if such is desirable, but in a precise way rather than in a foot-loose, over-generalized manner.

Some success has been achieved in training mothers to work with their own children on speech acquisition (Ryback, 1966), but precise measures for degree of success were lacking. In the present experiment the procedures for knowledge of results, as developed by Staats & Butterfield (1965), were clearly specified. The present experiment was an attempt to discover whether parents of children with deficits in reading behavior can act successfully as therapy-technicians in helping their own children to overcome these behavioral deficits.

Although previous experiments have dealt with parents as behavior modifiers, none have dealt with parents administering tokens as reinforcement in modifying behavior as complex as speech or reading acquisition. The purpose of the present experiment is to determine whether parents can successfully enhance complex behavior acquisitions of their own children by use of systematic reinforcement techniques.

If this can be proven, then learning principles can be used for enhancing complex behavior acquisitions not only in the conventional teaching environment but also by parents in their own homes.

Furthermore, as parents gain control over more complex behaviors in their offspring, they can avoid behavioral deficiencies before inception.

The use of the parent as therapist cannot only free the professional for other duties, but the parent, in learning to use techniques of behavioral control, may become generally more skillful in dealing with the responses of the developing child and more capable in handling any future difficulties that may occur (Hawkins et al., 1966, p. 106).

METHOD

Training Materials

The training materials and procedures are described in detail in a Manual of Administration by Staats, Van Mondfrans & Minke (1967). Much of the material in this section is taken directly from the manual and is included here because of the possible unavailability of the Manual, which was published by a University press.

The materials used for training in this experiment were adapted from the Science Research Associates Reading Laboratory with considerable modification by Staats (see Staats & Butterfield, 1965). The training procedures which have been developed have been demonstrated by Staats and his associates to be successful in activating attentional, work, and learning behaviors through reinforcement contingencies. This ensures the continuous motivation of the child throughout the training program despite the increasing difficulty of the words and the decreasing ratio of reinforcement. The Staats "Motivation-Activating" Reading Technique (or SMART as it will be called herein) consists of a series of stories developed for different grade levels. Each story is considered to be a separate reading lesson.

The stories of the SMART have several features which make them particularly amenable for research purposes. First, there exists a somewhat controlled introduction of new words in each lesson. Second, a set of comprehension

questions is available for each story. In addition, as grade level increases, the stories become more difficult, they are longer overall, and paragraph length increases. As will be indicated, this results in gradually decreasing the average amount of reward delivered for each response.

The first step in adapting materials for this reading training program consisted of making a running list of the new words that appear in the stories. Each word, or form of a word (past tense, plural, etc.), that had not occurred in a previous story was added to the list. From this list the new words that occurred in a given lesson were selected and were each typed on a separate card, and the entire story was typed on a regular $8\frac{1}{2}$ by 11 inch sheet of paper. This comprises the materials which are presented to the student during the training. In addition, data sheets developed in the second study (Staats, Minke, Goodwin, and Landeen, 1967) are to be used by the parent and are not shown to the student during the training.

In addition to the individual lessons, each parent was furnished with a packet of materials which included pencils; Vocabulary Review data sheets; 100 each of white, red, and blue tokens; and charts for plotting the monetary or point value of the tokens delivered each day. The uses to which these materials were to be put will be illustrated and discussed at the appropriate time in the following sections.

Procedures

Each lesson consists of four phases: the Individual

Word Phase, Oral Reading Phase, and the Comprehension Phase. These phases will be individually discussed in detail below.

Individual Word Phase. The first phase consists of the individual presentation of each word that occurs in the lesson being covered and that has never been presented to the reading student (S) in the program. Each word is presented on a separate 3 by 5 inch index card. The words are presented to S one at a time, and S is asked to read them.

On the first time through the stack of cards for a given lesson, every correct reading of a word is rewarded with a white token (worth $1/5$ of a cent or two points). Whenever a card is read correctly, it is removed from the stack. Whenever S reads a word incorrectly, or does not read it at all, the Parent tells S what word is typed on the card, and S is then to repeat the word while looking at it. It is particularly important that S repeat the word while looking at the card, and the Parent must be sure to watch S at this time. If he is not looking at the word when he responds, he must be instructed to look at the word and say it again. When S has properly responded to the card after being prompted, it is returned to the group of cards still to be presented. No token is delivered at this time.

After having gone through the original stack once using this procedure, the stack, with the words removed to which S has already responded correctly, is presented again to S, and the same procedure as above is used, i.e., words which S

reads correctly are removed from the stack, and words which S reads incorrectly are prompted but not rewarded and then returned to the stack for later presentation. However, a blue token (worth 1/10 of a cent or one point) is presented contingent upon a correct reading response made to a word missed the initial time it was presented. When there are no more cards in the stack, i.e., when S has read each word correctly, without prompting, once, the Individual Word Phase is ended, and the Oral Reading Phase is begun.

Among the materials contained in the packet of materials given to each parent are to be found a group of data sheets (Appendix B). There are three data sheets for each lesson in the program; each data sheet is labeled according to the lesson to which it belongs. Below is an example of the Individual Word Phase of a sample data sheet as illustrated in Staats, Van Mondfrans, and Minke, (1967):

Individual Word Phase

| | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>/</u> | <u>. . .</u> | <u>/20</u> |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|--------------|------------|
| monkey | 0 | + | | | | | | | | | / | | / |
| roof | + | | | | | | | | | | / | | / |
| kangaroo | 0 | + | | | | | | | | | / | | / |
| pocket | 0 | 0 | + | | | | | | | | / | | / |
| had | + | | | | | | | | | | / | | / |
| fell | 0 | 0 | 0 | 0 | + | | | | | | / | | / |
| from | + | | | | | | | | | | / | | / |

The numbered columns refer to the number of times the stack has been presented. For example, the first time through the

stack, Column 1 is to be used; the second time through, Column 2 is to be used; the eighth time through, Column 8 is to be used; and so on. The parent is to keep track of S's performance in this phase of the lesson by placing the appropriate symbol in the appropriate square on each trial. A plus (+) is to be placed in the square when S reads the word correctly, and a zero (0) is to be placed in the square when S reads the word incorrectly. After the first time through the stack, the square is to be left blank if the word has already been removed from the stack.

A sample performance has been recorded in the above example. As can be seen, on the first time through the stack, S read the words roof, had, and from correctly (and thus received three white tokens), but did not read the words monkey, kangaroo, pocket, or fell. The Parent prompted S on each of the latter four words. On the second time through the stack, after the words which had been read correctly the first time through had been removed, the only words left were monkey, kangaroo, pocket, and fell. On this time through the stack, S read monkey and kangaroo correctly, thus receiving two blue tokens, but still made errors on pocket and fell, at which time he was prompted again. These latter two words comprised the stack on the third time through, and this time S read pocket correctly (receiving a blue token), but still misread fell, and was again prompted. On the fourth time through the stack, the stack consisted of only one word--fell. Nevertheless, S

still made an error, was prompted again, and the word presented a fifth time. At this point S read the word correctly, received a blue token, and the Individual Word Phase for this lesson was completed.

Oral Reading Phase. The materials for the Oral Reading Phase consist of each paragraph of the story being presented typed on a 5 by 8 inch index card. These cards are presented in the order they appear in the story. S reads the card, and when he reads the entire paragraph without an error, he receives a red token (worth 1/2 cent or 5 points) when he finishes. When S reads a word incorrectly on the card, the parent points to the word, and S must repeat the word while looking at it. It is again important to monitor S's performance carefully while he is actually reading. After he has finished the card upon which the error(s) occurred, the card is put aside (with no token delivered) and then presented again after the remainder of the cards has been presented. If errors occurred on two or more cards, all these cards would be presented again before a third trial on any card. The paragraph is repeated until S has read it through in its entirety without error, at which time a white token is presented. When all the paragraphs in a story have been completed correctly, the next phase of the training is commenced.

The data for this phase of the lesson are recorded on a portion of the data sheet consisting of the paragraphs being presented to S typed one beneath the other in

sequential order. Whenever S makes an error on a word, a line should be drawn through that word. If an error is made a second time the paragraph is presented, the word should be underlined. Errors on the third presentation of the card are denoted by an underline below the word, located halfway between the typed line containing the word and the following line. If an error occurs on a given word several times, this should be noted by the use of multiple lines drawn in the appropriate place on the data sheet. Below is a sample of the Oral Reading Phase portion of a data sheet:

Oral Reading Phase

1. One bright spring day some baby ducks are hatched in a nest by a pond. ~~High~~ in a tree by the pond is a nest of baby robins. How different the lives of these birds will be!
2. When little ducks come from their shells, they are covered with a thick coat of soft feathers. Soon they are running along after their mother. Only a day or two later, they are swimming and playing together in the pond.

In the first paragraph, S made an error on the words bright, high, pond, and lives the first time the paragraph was presented (i.e., after all the paragraphs in the lesson had been presented once), he missed the words bright and lives again, but he also made errors on the words nest and baby, words which he had read correctly the first time around. On the third time the card was presented, S made

an error once more on the word bright, made another error on the word nest, and made an error on the word pond, which he had read correctly the second time the card was presented. He also made an error on the word some, a word he had read correctly on the two previous presentations of the card. On the fourth trial S finally read the entire paragraph correctly, and thereby received a white token. On the second paragraph no errors were made. A red token was delivered at this time.

Silent Reading Phase. Following the Oral Reading Phase, S is given the sheet containing the story appropriate to the particular lesson upon which he has been working. These materials are typed on regular 8½ by 11 inch sheets of paper. S is instructed to read the story silently and is told that it is important to read to understand the story so that he can answer questions on it later.

It is important that the parent watch S closely to ensure that he is actually reading the story. If it is apparent that S is not doing so, the parent should require him to read aloud during this phase on subsequent lessons.

The subject is given four white tokens upon completion of the story, at which time the next phase is begun. No data are kept by the parent during this phase.

Comprehension Phase. The comprehension questions take one of two forms: some of the questions require a written answer, and some of them are of the multiple choice type. In the latter case, S is to write his answers (or circle

his answers) to the comprehension questions and then hand them to his parent. For each correct answer, a red token is presented. If a spelling error has been made when a written answer is required, S must correct his answer, and then a white token is presented. For incorrect answers S must re-read the appropriate paragraph and correct his answer, at which time a blue token is delivered. In order to facilitate the selection of the appropriate paragraph card, the number of the paragraph from which the question was drawn is indicated on the data sheet in parentheses alongside the question.

By attaching to the data sheet the sheet containing the questions, a record of S's correct responses and errors is retained. The end of this phase marks the completion of this lesson. At this point the whole procedure is repeated with the next lesson in the series.

Vocabulary Review. Some of the words presented in the Individual Word Phase of the procedure will be words that S can already read. Many others, however, are words that the procedure is set up to teach. Short-term retention of these words can be assessed through the analysis of the Oral Reading Phase. It is the purpose of the Vocabulary Review to assess more long-term retention of these words. The Vocabulary Review is to be presented following every 20 lessons. It is important to note that the Vocabulary Review deals only with the words which were presented in the immediately preceding 20 lessons--not in all the lessons presented to date.

The materials necessary for the Vocabulary Review are taken from the materials used in the Individual Word Phase of each lesson. Each day, after the session is over, the parent sets aside the individual word cards on which errors had been made during that session. These cards are then stored in a separate envelope, to be used at the appropriate time.

At the end of the 20 sessions, E takes the cards which had been set aside from each lesson and combines them into a single stack. This stack is then presented in the same manner as the Individual Word Phase of the individual lessons. That is, words which S reads correctly are removed from the stack and a white token is administered for each correct reading. Words upon which errors occur are to be re-presented and then a blue token is administered upon correct reading of the word. The procedure is repeated until S has read each word correctly without prompting once.

The Token System. An important aspect of this procedure is the use of a motivational system consisting of tokens which are made contingent upon correct responding and which are exchangeable for various rewards. Three colors of tokens are used in the procedure, each color representing a different value. A blue token is worth $1/10$ of a cent, or one point; a white token is worth $1/5$ of a cent, or 2 points, and a red token is worth $1/2$ cent, or 5 points. The monetary or point value is plotted on a special chart so that visual evidence of the tokens earned is available to S.

The manner in which the tokens are to be exchanged for material rewards is to allow S to purchase a variety of items with his tokens. The student reports to E some object for which he would like to work and the item's exact price. When he has earned sufficient tokens he is given the money and allowed to buy it.

At the end of each session the value of the tokens earned is computed and added to the amount which had been earned in previous sessions. This amount is then plotted on the chart. A bar graph is used for best visual effect. Each time S earns his payoff a new progress chart is started. If on the day that S reaches his criterion he earns more money than the object for which he is working costs, the additional amount is entered immediately on the new chart.

The proper use of this chart involves entering S's progress in his presence, with substantial positive comment and approval on the part of the parent. Regardless of S's progress during the session, he should be made to feel that he has performed well.

The Session. Usually, more than one lesson can be covered in any one half-hour session. There are two permissible stopping places within a lesson: after the Individual Word Phase or after the Oral Reading Phase. Stopping after the Silent Reading Phase would result in an inflated error rate in the Comprehension Phase.

Testing Materials

The 100-word recognition test consists of 100 words

randomly selected from the reading materials used in the experimental sessions; 20 words were selected from each of the five grade levels (1.2, 1.7, 2.3, 3.0, 4.0). The words were presented individually on 3 by 5 inch cards and had to be correctly pronounced for receipt of credit. Two alternate forms of the test were developed the words of which were matched for word count according to the Thorndike-Lorge word count (Thorndike & Lorge, 1944). The words were matched across reading grade levels. One form of the test was used as a pre-test and the other as a post-test.

Evidence was presented by Staats et al. (1967) that the 100-word test was a valid indicator of Ss' performance on the Staats "Motivation-Activating" Reading Technique (SMART). Additional evidence to this effect was provided by Staats et al. (1969) in that the 100-word pre-test score correlated .90 with the proportion of words correct when first presented in the Individual Word Phase, .78 with the percentage of paragraphs read without error the first time presented in the Oral Reading Phase, .71 with the proportion of words initially correct in the Oral Reading Phase, and .57 with the reading rate of the subjects as indexed by the total number of reading responses during a fixed period of time.

The Wide Range Achievement Test (WRAT) (Jastak, Bijou, & Jastak) was first standardized in 1936 as a convenient tool for the study of reading (word recognition and pronunciation), written spelling and arithmetic computation, and revised in 1965.

Test norms for the WRAT were obtained by administering it to school children and adults in a number of states: Delaware, Pennsylvania, New Jersey, Maryland, Florida, Washington, and California. No attempt was made to obtain a representative national sampling. In each age bracket, probability samplings based on IQ's were studied to develop WRAT norms that would correspond to the achievement of mentally average groups with representative dispersions of scores above and below the mean. Adult norms, percentiles and standard scores were derived from 222 20-24-year-olds, 369 25-65-year-olds and, in addition, 272 college students.

Three types of scores are used in reporting the WRAT results: grade ratings, percentiles and standard scores. Whereas the grade score is comparable to the mental age, the standard score is comparable to the IQ of standard tests. Persons of different ages may receive an identical grade score; whether the grade rating is average, below or above average for any particular age level, is shown by the standard score. The WRAT standard score has a mean of 100 and a standard deviation of 15. It is statistically comparable to IQ's obtained from the Wechsler scales (WAIS and WISC) and partly, also, to IQ's from the New Stanford-Binet (Form L-M) which has a standard deviation of 16. The results from the WRAT can thus be directly compared with the major individual intelligence tests.

The reliability of the WRAT was based on split-half measures determined on samples of 200 individuals. The

reliability coefficient for the age group over 20 was .987 for the reading test, .986 for the spelling test and .970 for the arithmetic test.

Subjects and Parents

One child was selected from the University of Hawaii Laboratory School. Three were chosen from the waiting list for the Reading Clinic at the University of Hawaii. These children were chosen from a population of students described as poor readers on the basis of standard achievement tests and teacher referrals. Final selection for participation in the experiment was on the basis of a 100-word test developed from the reading material. All children reading fewer than 80 out of the 100 words but no less than 20 were selected for the experiment.

Subject₁ was a 13-year-old boy of Japanese descent and an only child. He read 43 out of 100 words on the test. Subject₁ had been diagnosed as mentally retarded by the State Psychologist of the Department of Public Instruction as well as by a clinical psychologist in private practice. In addition, another clinical psychologist had diagnosed him as borderline mentally retarded. Subject₁ was in a non-graded class because of his learning difficulties.

At the onset of the program, Parent₁ had recently quit her job as librarian because of somatic manifestations of tension. She was unaware of the source of her tension since events in her life, including her marriage, were satisfactory. A 41-year-old woman, P₁ was below average in

arithmetic and spelling skills, but was very superior in reading skills according to the Wide Range Achievement Test (WRAT) by Jastak, Bijou & Jastak.

Subject₂ was an 11-year-old fifth grade girl of Caucasian descent. She was the oldest of four children, her siblings being 9½, 7 and 4 years old. Subject₂ had been diagnosed as an emotional problem by a clinical psychologist as well as by her teachers. Her reading problem was believed by those who diagnosed her to stem from her emotional problems. Most characteristic of S₂ was her verbal reticence and her difficulty in getting along with peers and siblings. She read 61 words on the 100-word test.

Parent₂, her mother, was a 31-year-old housewife. One of P₂'s chief concerns during the experimental period was an ailing mother who made sporadic demands on her and this was sometimes a drain on her energy. Parent₂ was well below average in arithmetic, spelling and reading skills.

Subject₃ was a 10½-year-old fifth grade boy of Hawaiian descent. He was the second of four children, his siblings being 11½, 8½ and 7 years old. He had been described by the Department of Education as a learning disability and he had been diagnosed by a pediatrician, on the basis of neurological tests, as a learning disability with minimal cerebral dysfunction. He read 50 words on the 100-word test.

Parent₃, his mother, was a 31-year-old clinic clerk at a hospital near her home. She was above average in arithmetic and spelling skills and was at a superior level in

reading skills.

Subject₄ was an 8½-year-old third grade boy of Hawaiian descent. He was the youngest of four children, his siblings being 12, 11 and 10 years old. He was an alert, active child but had to refrain from overexerting himself because of a heart ailment. He read 29 words on the 100-word test.

Parent₄, his mother, was a 41-year-old woman who worked as a cashier at the University cafeteria. Parent₄ was below average in her arithmetic, spelling and reading skills. See Table 1 for the specific scores that the parents obtained on the WRAT.

The combined income of each family ranged from \$11,000 to \$15,000 per annum. Each mother had completed a high school education while 2 fathers had completed high school, one had completed 8th grade and one had completed a year of college. The IQ's of the mothers ranged from 89 to 116 and were distributed as follows: P₁--114; P₂--90; P₃--116 and P₄--89. The IQ scores were derived from the WRAT scores by averaging the Reading, Arithmetic and Spelling Standard Scores. Hence, the IQ scores are merely rough estimates.

Parent Supervision

The training of parents involved approximately four hours. During this time they received a demonstration of the procedures by E and were given a basic outline of the procedures (see Appendix A). Then detailed instructions concerning the administration of the procedures and the collection of data were given. Questions were handled as

TABLE 1
Wide Range Achievement Test Scores of Parents

| Sub-test | Parent ₁ | Parent ₂ | Parent ₃ | Parent ₄ | Mean |
|-------------------|---------------------|---------------------|---------------------|---------------------|-------|
| Reading | | | | | |
| Raw Score | 80 | 48 | 73 | 47 | 62.0 |
| Grade Level | 16.5 | 7.9 | 14.4 | 7.7 | 11.62 |
| Standard Score | 142 | 94 | 127 | 95 | 114.5 |
| Percentile | 99.4 | 34 | 96 | 37 | 66.60 |
| Spelling | | | | | |
| Raw Score | 37 | 20 | 40 | 17 | 28.5 |
| Grade Level | 10.8 | 6.5 | 12.0 | 5.8 | 8.77 |
| Standard Score | 111 | 87 | 115 | 89 | 100.5 |
| Percentile | 77 | 19 | 84 | 23 | 50.75 |
| Arithmetic | | | | | |
| Raw Score | 22 | 24 | 31 | 17 | 23.5 |
| Grade Level | 6.7 | 7.1 | 10.1 | 5.3 | 7.30 |
| Standard Score | 89 | 90 | 105 | 82 | 91.5 |
| Percentile | 23 | 25 | 63 | 12 | 30.75 |
| Derived IQ | 114.0 | 90.3 | 115.7 | 88.7 | 102.2 |

they arose. Finally, the parents were given actual practice in administering the materials taking turns playing the role of the child.

During the first couple of weeks, direct supervision of parents' participation was maintained. Following this, E's supervision was phased out gradually until the parents were working on their own except for the review tests which were administered by E.

In previous studies, Staats and his associates developed a checklist for supervision of the therapy-technician's activities during administration of the procedures. During supervision (while watching the parent work with the child) the following questions were referred to on a checklist:

1. Is the parent (P) filling in the head of the data sheet?
2. Is the starting time recorded?
3. Is the second data sheet being used if the lesson is split?
4. Are the stimulus cards under P's control?
5. Is the child engaged in any rehearsal behaviors?
6. Is P pausing one or two seconds before prompting?
7. Is P watching to see if the child is looking at the word when repeating it?
8. Does P give social reinforcement even during errors?
9. Is P removing the stimulus card before recording the data?
10. Is P making sure that the child is not permitted

to emit a number of responses before prompting?

11. Is P presenting the missed words until the child responds correctly?

12. Are missed words being set aside for later inclusion in the Vocabulary Review?

13. Are the data being properly recorded?

14. Are the tokens being delivered?

15. Are the correct tokens being given?

16. Is P presenting the paragraphs until the child responds correctly?

17. Is pointing, if required, done correctly?

18. During the silent reading phase, is P checking occasionally to see if the child is attending to materials?

19. After the child has completed the comprehension phase, does P take the sheet from the child to correct?

20. Does P make sure that no erasures are allowed after the sheet is turned in?

21. In case of errors, does P hand the appropriate paragraphs to the child, keeping the questions from the child during the reading of the paragraphs?

22. Is P presenting the paragraphs one at a time?

At the end of the Session:

23. Is the stopping time recorded?

24. Does P write down the Vocabulary Review words?

25. Does P count the tokens?

26. Is the token count entered on the last data sheet?

27. Does P compute the value of the tokens (on Data

Sheet) correctly?

28. Are the data entered onto the graph correctly?

29. Are there any further comments regarding the session observed?

If the answers to any of these questions indicated that the parent was proceeding erroneously or inappropriately, corrective procedures were immediately pointed out to the parent.

Half-hour group meetings of the parents and E were held at the end of the first, third and eighth weeks of the program to discuss any problems which may have arisen, technical or otherwise, and to discuss the motivation of the children as well as the parents' own motivation.

RESULTS

Over a five-month period, four mothers administered the Staats "Motivation-Activating" Reading Technique (SMART) to their children. Despite the fact that all parent-child pairs worked over an equal period of time, some pairs completed more training sessions than others because of personal family considerations which sometimes interfered with consistently uniform scheduling.

During the five-month period Ss made many reading responses. They participated in the experiment with cooperation and diligence. The total number of words each child read during the training period was tabulated. This included the words read when singly presented on cards, the words read aloud in the Oral Reading Phase, the words read in the Silent Reading Phase, the words read in the Comprehension Phase, as well as the words read in the Vocabulary Review. In the present study, the 4 Ss made an average of 52,684.25 single word reading responses during an average of 40 hours of training. During 45 hours of training, S₁ made 45,468 single word responses; during 45 hours of training, S₂ made 64,432; during 40 hours of training, S₃ made 64,448; and during 30 hours of training, S₄ made 36,389 single word reading responses. Cumulative records of the words read over the period of training are depicted in Figures 1 through 4.

The reading rates of the 4 Ss tended to accelerate over most of the training sessions despite the increasing difficulty of the materials. The importance of the acceleration

Figure 1. Cumulative number of single word reading responses as a function of the time in experimental training for Subject₁.

Figure 2. Cumulative number of single word reading responses as a function of time in experimental training for Subject₂.

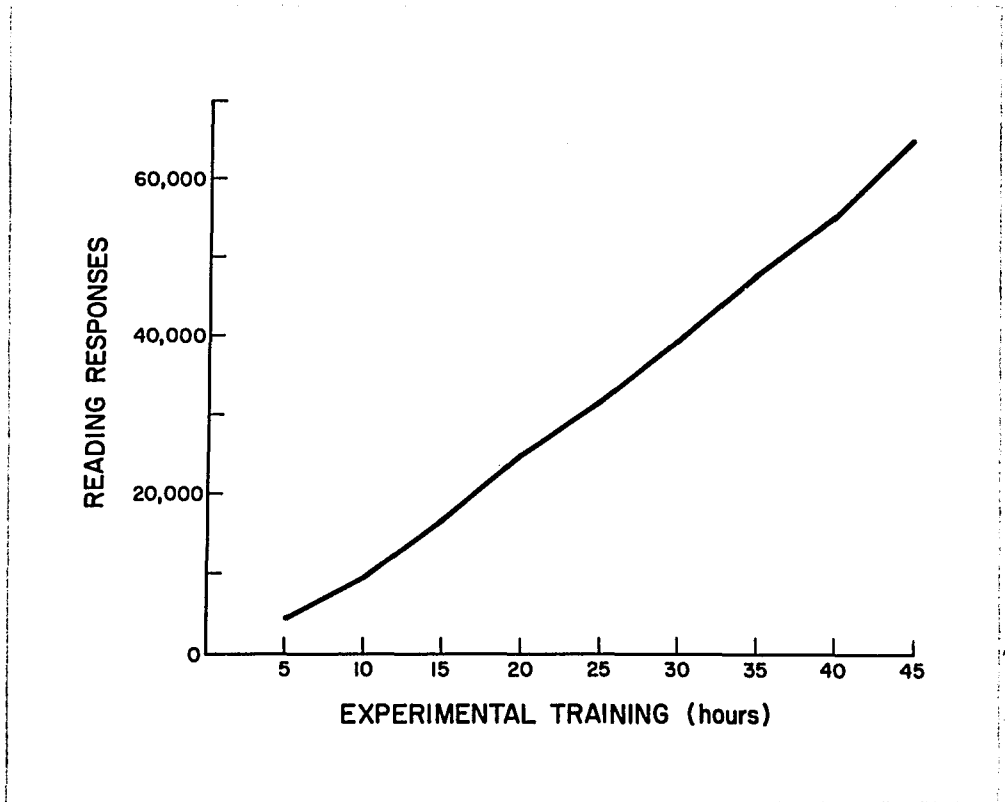
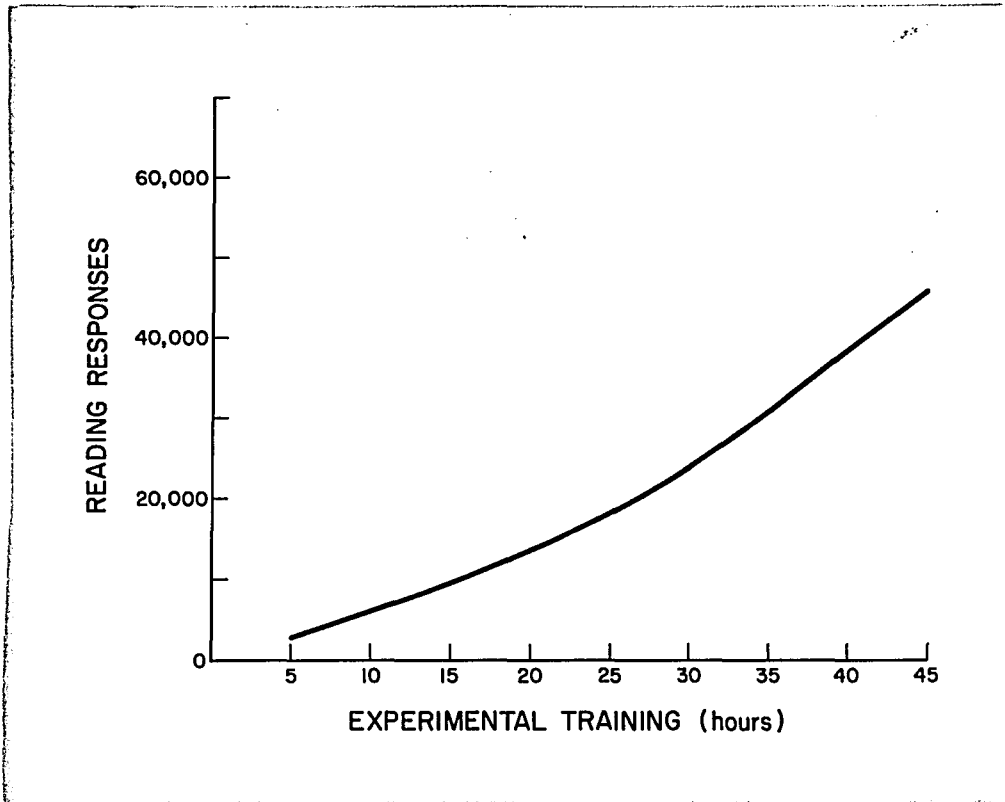
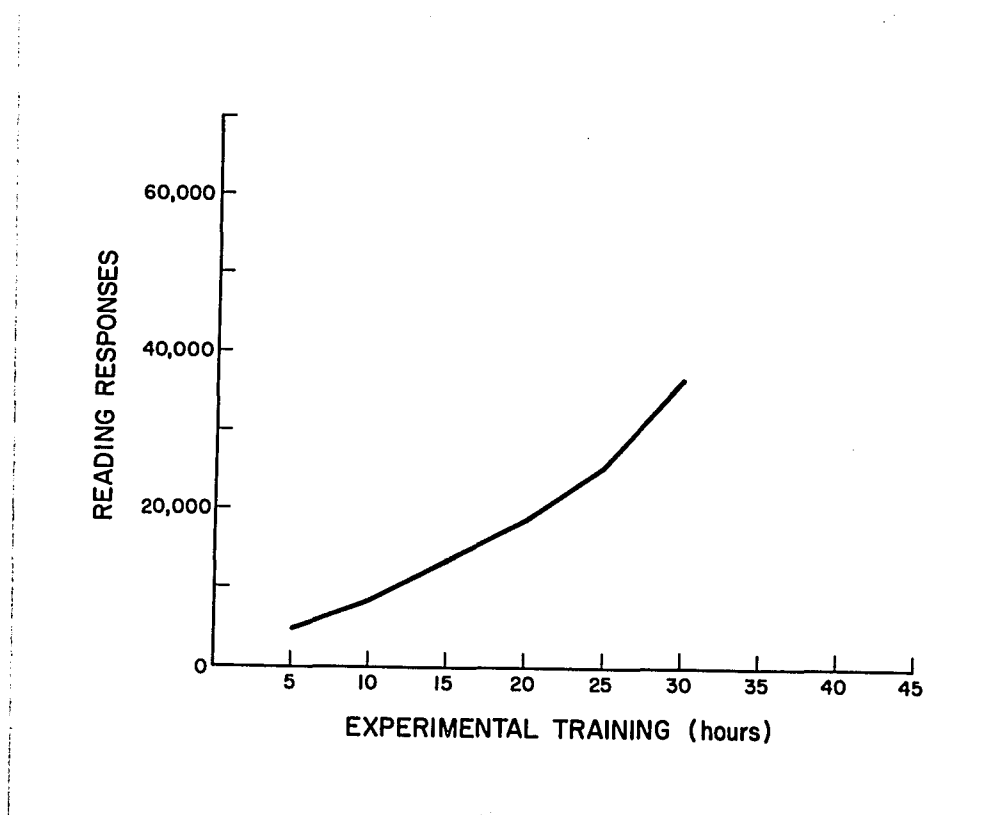
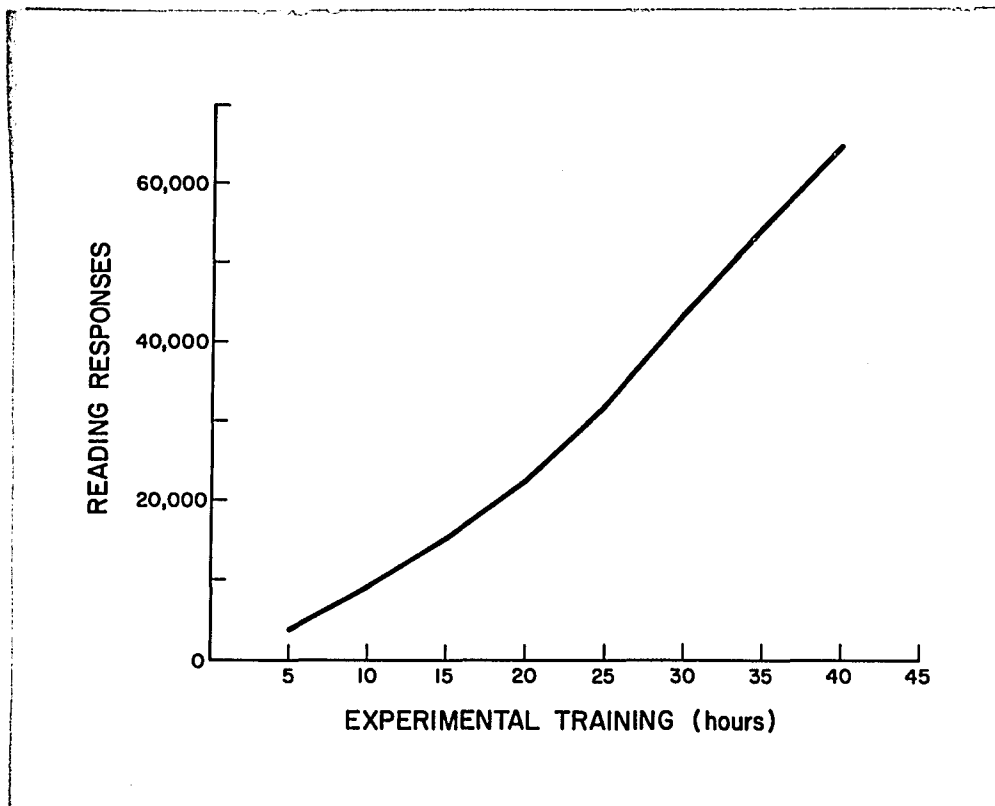


Figure 3. Cumulative number of single word reading responses as a function of the time in experimental training for Subject₃.

Figure 4. Cumulative number of single word reading responses as a function of the time in experimental training for Subject₄.



is to indicate that the children continued to attend and respond appropriately throughout the experiment. Thus, the reinforcement system employed was capable of maintaining the behavior for a long period of time. During this time, the attentional and cooperative behavior resulted in many, many learning trials--a requisite to acquisition of a complex skill.

Before reading each story, Ss were presented with individual cards for all the words in that story which had not been previously presented. When these words were presented, Ss read a certain proportion correctly, the other words being missed on the first presentation. The missed words were considered to be new words. Records were kept of the number of words the children missed on first presentation, the number of these words which were then later missed in the oral reading of the paragraphs, as well as the number of words originally missed that the Ss could not read on the review test presented at a later time.

The cumulative number of new words as a function of every 5 lessons is shown in Figures 5 through 8. As these curves indicate, S₁ learned 529 new words; S₂ learned 470; S₃ learned 819; and S₄ learned 421 during training.

Although the Ss missed these new words on initial presentation, they were given training trials on these words and then read them again in the oral reading of the paragraphs. The number of these words missed in this oral reading phase is plotted in the bottom curves of Figures 5, 6, 7

Figure 5. Cumulative number of words missed on first, second, and third presentation for the 120 lessons read by Subject₁.

Figure 6. Cumulative number of words missed on first, second, and third presentation for the 140 lessons read by Subject₂.

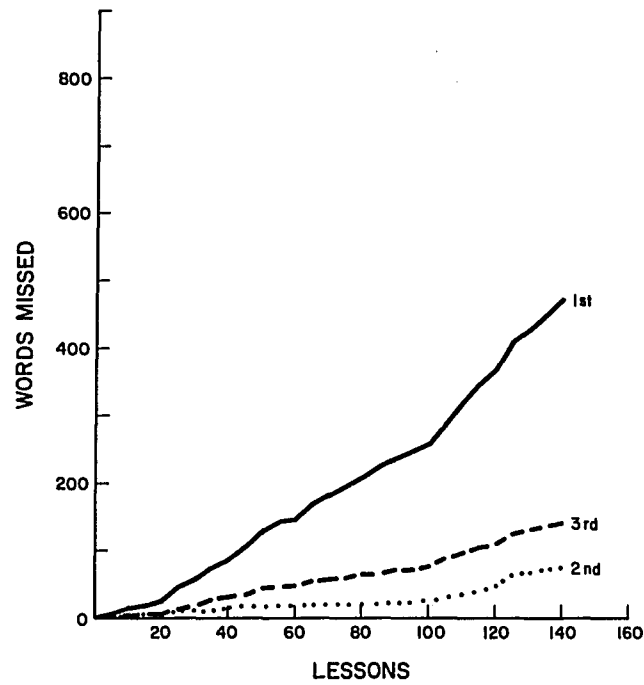
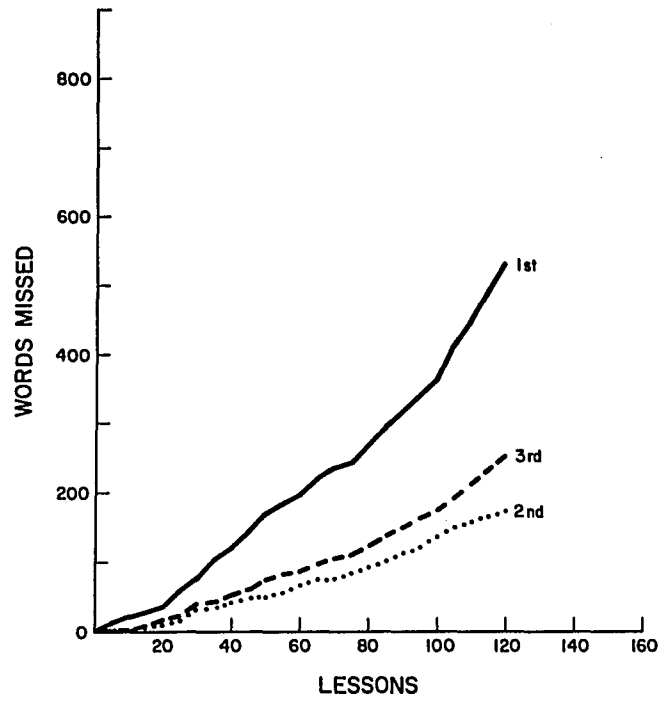
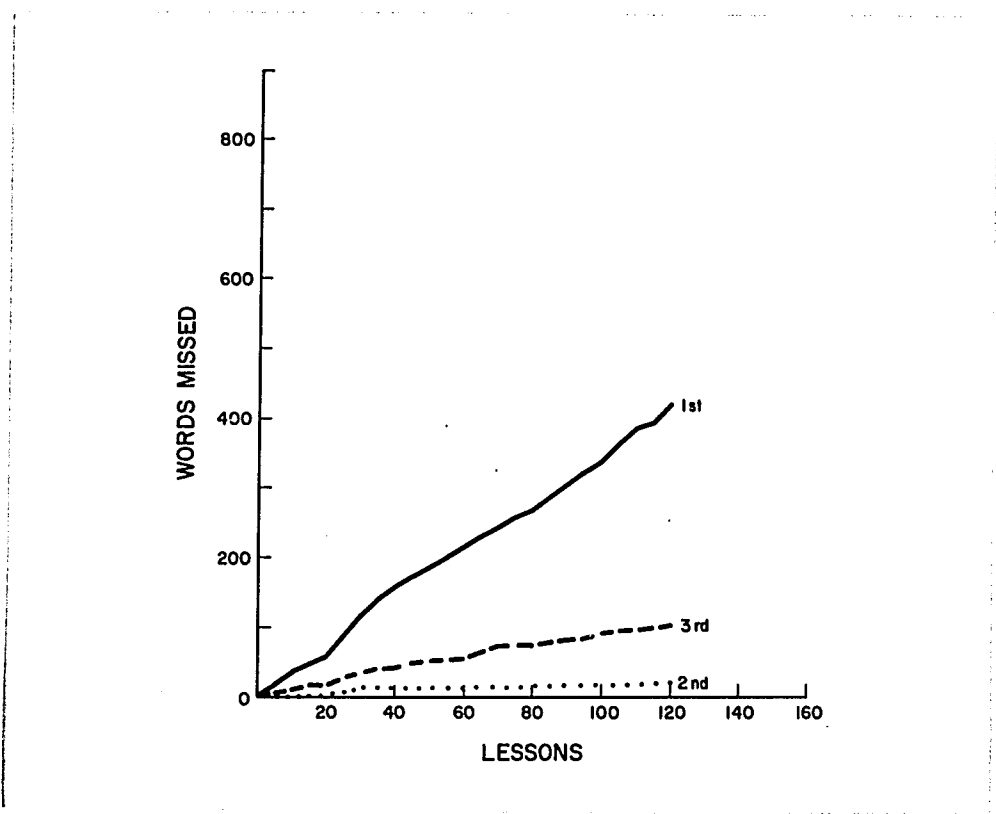
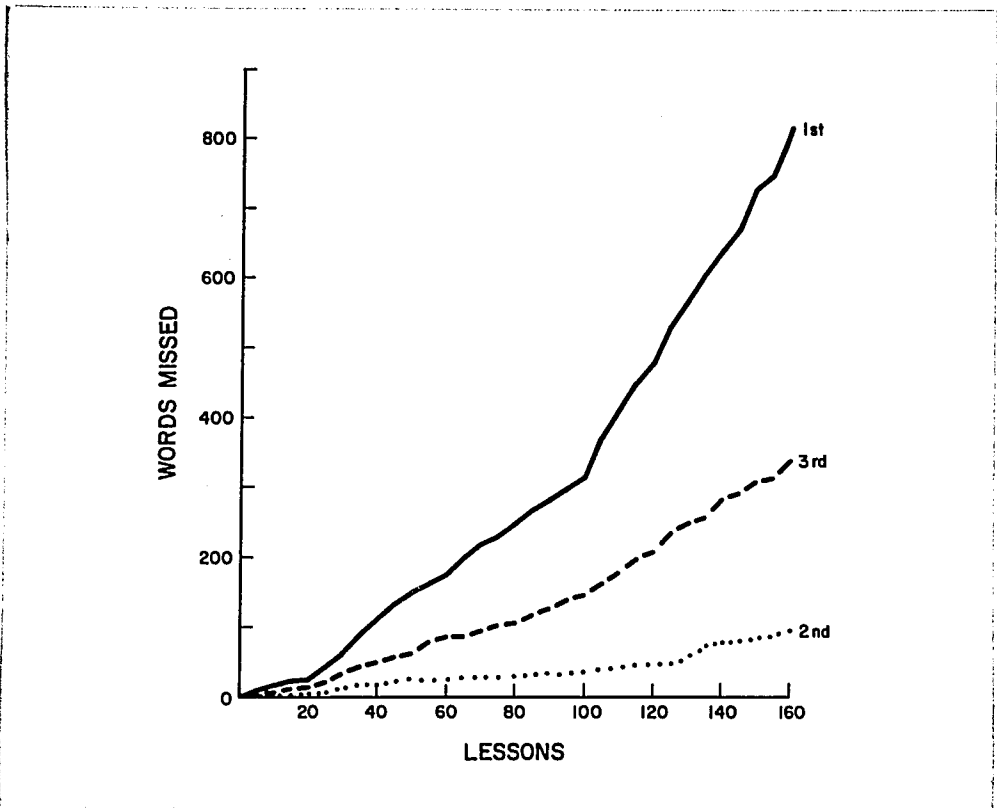


Figure 7. Cumulative number of words missed on first, second and third presentation for the 160 lessons read by Subject₃.

Figure 8. Cumulative number of words missed on first, second, and third presentation for the 120 lessons read by Subject₄.



and 8. These bottom curves then represent the number of errors made on the second reading test of the words that had been previously learned. Thus, S₁ retained 357 (about 67.4%) of these words during the oral reading phase; S₂ retained 394 (about 83.8%); S₃ retained 740 (about 90.3%); and S₄ retained 400 (about 95.0%). These results indicate that the criterion of one correct unprompted trial in the original vocabulary-learning phase produced considerable learning when the words were read in context.

The middle curves in Figures 5, 6, 7 and 8 involve a measure of long-term retention of the words that had been learned. This measure was obtained by individually presenting the words that had been first learned in the preceding 20 lessons. This test was given 10 to 15 days after training occurred. The training included the previous single word presentations of the words as well as the reading of the words in context both orally and silently. In addition, however, many new additional words had been learned in the interim. As the middle curves show, S₁ retained 278 of the 529 words (52.5%) on the long-term retention test; S₂ retained 330 of the 470 words (70.2%); S₃ retained 482 of the 819 words (58.8%); and S₄ retained 317 of the 421 words (75.2%). Thus, the procedure resulted in successful retention for over half the words when they were later presented out of context after a considerable intervening period.

The results appearing in Figures 5, 6, 7 and 8 indicate that the children covered a considerable amount of reading

material, that they learned to read a large number of new words whether presented individually or in context, and that they had retained a good proportion of what they had learned. The results also showed that the children improved in their ability to retain newly learned words. That is, their rate of missing the new words on the second and third presentations decreased, i.e., they retained more of the words they had learned. This improvement took place despite the increasing difficulty of the words in the succeeding lessons.

The 100-word reading test was administered to the Ss at the onset of the program. Five months later an alternate form of the test was administered. Subject₁ made an increase of 90.7% on the post-test over the pre-test, while S₂, S₃ and S₄ made increases of 49.2%, 66.0% and 227.6%, respectively. Pre- and post-scores are presented in Table 2.

Although the experimental design was based on single organism research with replications over 4 Ss, it was of interest to compare the pre- and post-test means of the 100-word test by means of a correlated t test. The pre-test mean was 45.75 while the post-test mean was 89.0. The standard error of the difference between the means ($S_{\bar{x}_1 - \bar{x}_2}$) was 7.845 and the t ratio was 5.513. Based on a one-tailed test and 3 df, p was less than .01.

In the original study there seemed to be some evidence that, as the training progressed, S missed fewer of the words on first presentation. This type of evidence would point to

TABLE 2

Results of 100-word Test Administered Prior to and Following Administration
of the Staats "Motivation-Activating" Reading Technique

| | Pre-test | Post-test | Net Difference (Gain) | Percentage Increase |
|----------------|----------|-----------|--------------------------|---------------------|
| S ₁ | 43 | 82 | 39 | 90.7% |
| S ₂ | 61 | 91 | 30 | 49.2% |
| S ₃ | 50 | 88 | 38 | 76.0% |
| S ₄ | 29 | 95 | 66 | 227.6% |
| \bar{x} | 45.75 | 89.00 | 43.25* | |

* $p < .01$ based on a one-tailed t test.

a process in which Ss were learning to sound out words, i.e., to shift from a look-see method to a phonetic approach. To test for this possibility, the ratio of words missed upon first presentation to total new words presented was calculated for each five lessons. The results for the 4 Ss are shown in Figure 9. A smaller ratio indicates that S missed fewer of the words when they were presented for the first time. As can be seen in Figure 9 there does not appear to be any evidence that the ratio decreased. Instead there was a slight increase during the initial 40 lessons for S₁, S₂ and S₃. Hence, the question of whether phonetic reading develops from this type of training remains unanswered.

A very important aspect of the Staats "Motivation-Activating" Reading Technique is the ratio of reinforcement to reading responses. The procedures were designed to progressively reduce the amount of reinforcement given per reading response as the training progresses or, conversely, to require more reading responses per unit of reinforcement. As was indicated in the earlier studies, the demonstration that this is possible in a long-term training program has a number of important implications. Such a demonstration "is in part an answer to the question whether the use of extrinsic reinforcers in training will produce a child who is dependent upon those reinforcers" (Staats & Butterfield, 1965, p. 941).

Figures 10 through 13 support the earlier demonstrations in that the ratio of reinforcement to reading responses

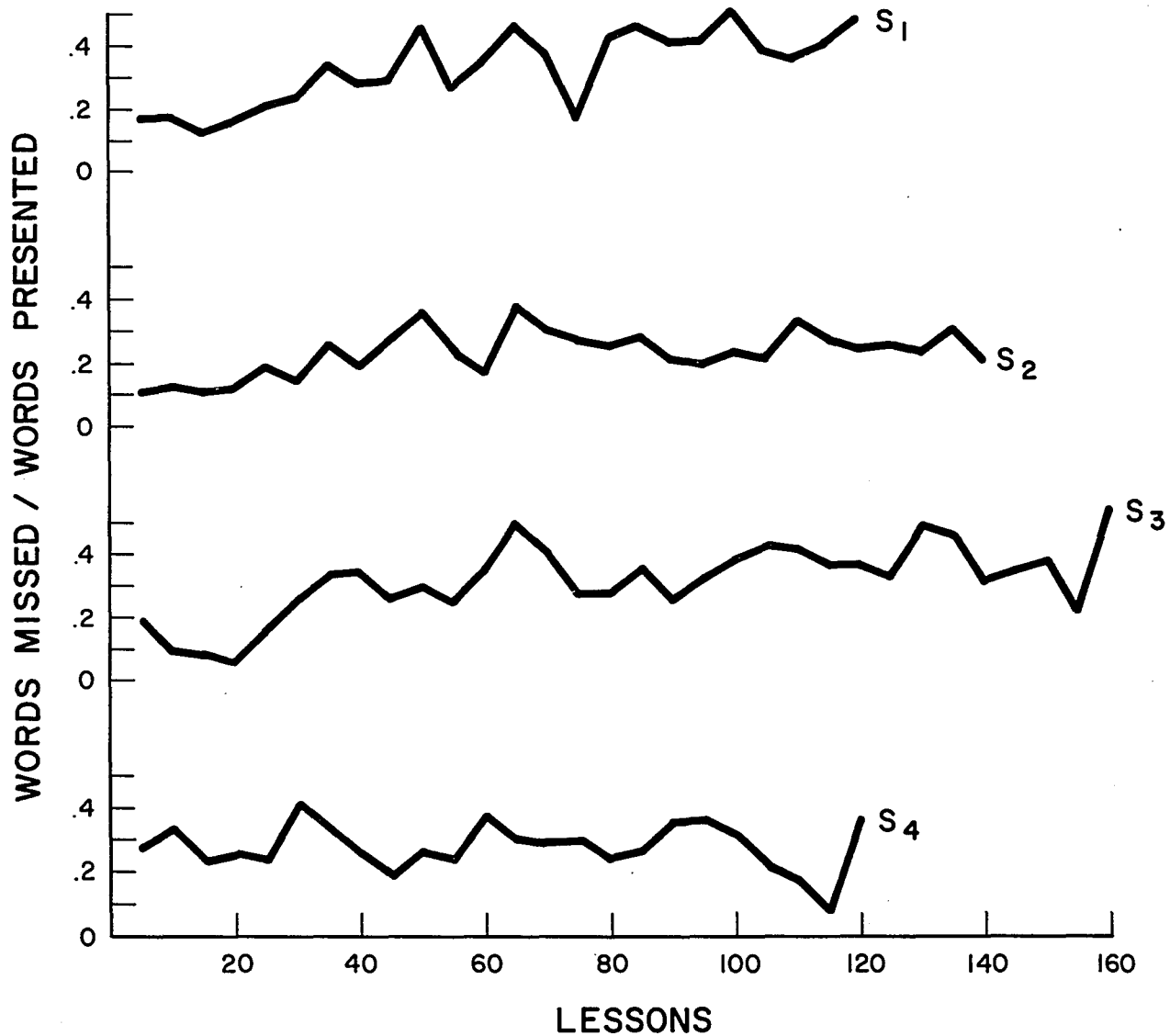


Figure 9. Ratio of words missed to those presented upon initial presentation.

Figure 10. Ratio of the monetary value of the tokens received to the number of reading responses made as a function of the number of lessons read by Subject₁.

Figure 11. Ratio of the monetary value of the tokens received to the number of reading responses made as a function of number of lessons read by Subject₂.

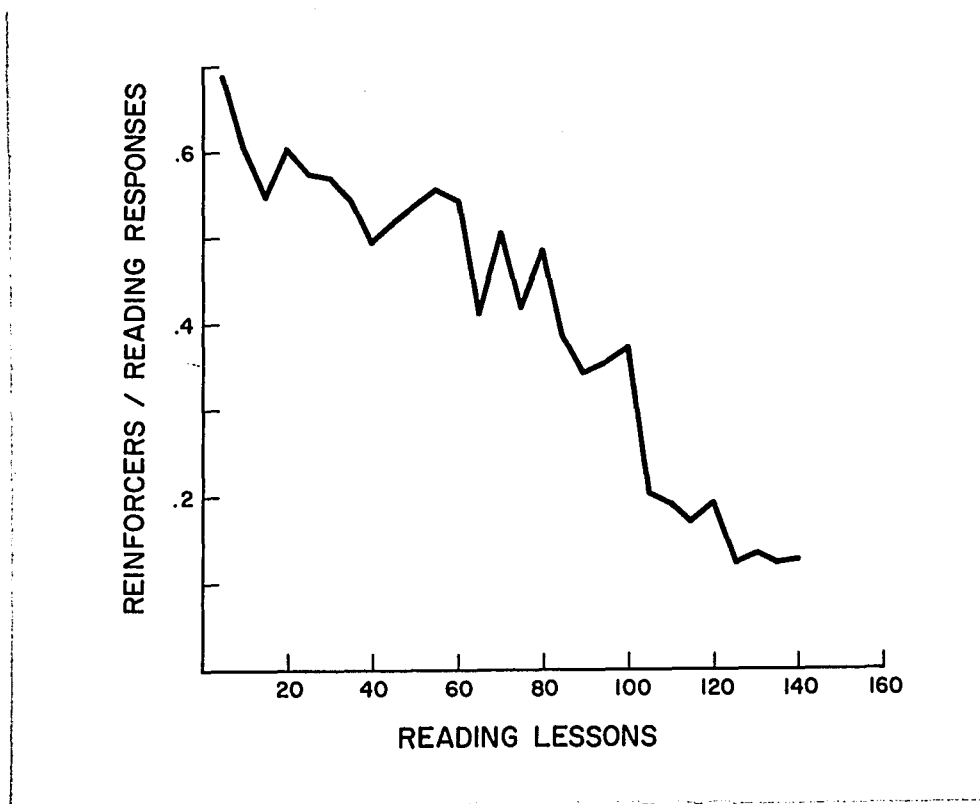
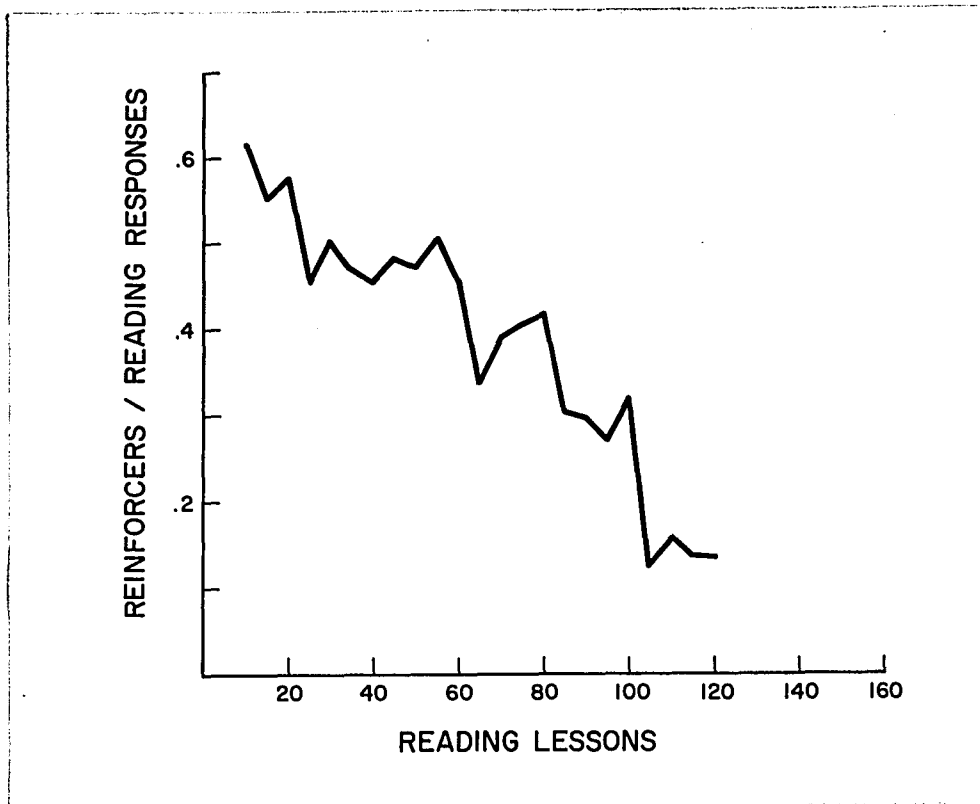
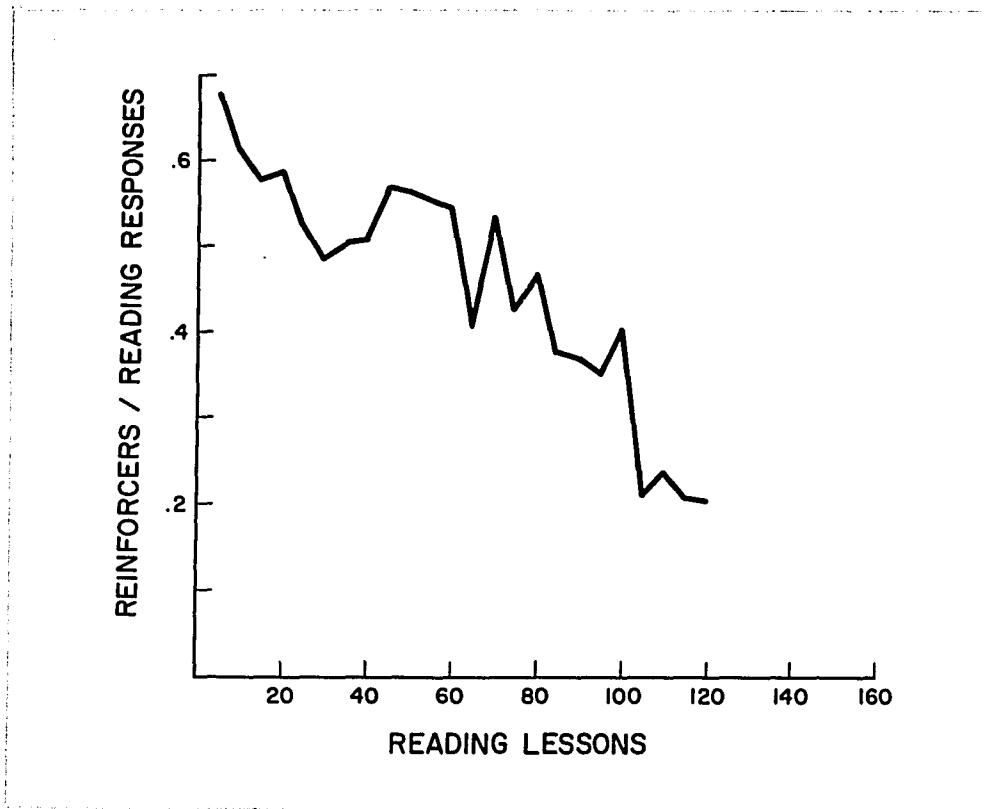
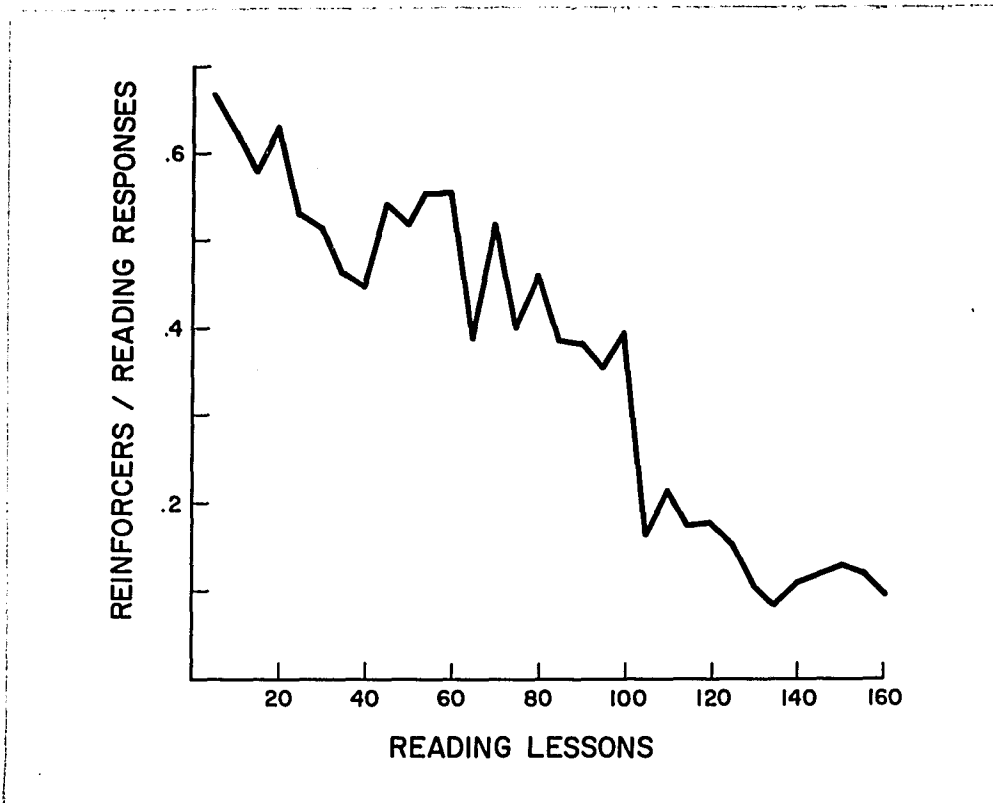


Figure 12. Ratio of the monetary value of the tokens received to the number of reading responses made as a function of the number of lessons read by Subject₃.

Figure 13. Ratio of the monetary value of the tokens received to the number of reading responses made as a function of the number of lessons read by Subject₄.



decreased as a function of number of training sessions. This is especially interesting in light of the acceleration of rate of reading responses as shown in Figures 1 through 4. In an earlier study, Staats et al. pointed to the relevance of this.

That is, in the period of time during which the reinforcement per reading response is cut in quarter, the rate of reading increases. Aside from its theoretical and practical implications for child learning, it is interesting to note that the result would be expected directly from the basic laboratory research with lower organisms, on the effects of reinforcement schedules. Thus, it is important to see that the basic principles hold even in the context of such a complex and uniquely human behavior as reading (Staats et al., 1967, p. 291).

DISCUSSION

This study is the fourth in a sequence of four experiments demonstrating the application of the Staats "Motivation-Activating" Reading Technique (SMART). The SMART was first described in the 1965 Staats & Butterfield article, although it was derived from work conducted in 1959 (Staats, 1969). The 1965 study involved administration of the SMART by a parole officer to a juvenile delinquent. The second study (Staats, Minke, Goodwin, & Landeen, 1967), extended the application of the SMART to 18 additional Ss. Here the SMART was successfully administered by volunteer housewives and high school students. In the third study (Staats, Minke, & Butts, 1969), the SMART was administered to 32 black, ghetto children in a remedial program by black, subprofessionals supervised by a teacher trained in the experimental methods.

In the 1965 study, the 14-year-old juvenile delinquent made about 65,000 single word responses in 40 hr. of training. In the 1967 study, 18 Ss made an average of 94,425 single word reading responses during an average of 38.2 hr. of training. In the 1969 study, 36 Ss made an average of 78,505 single word reading responses during an average of 40.2 hr. of participation. In the present study, the 4 Ss made an average of 52,684 single word reading responses during an average of 40 hr. of training. The relatively low figure in the present study can be accounted for by three factors any of which could have acted alone or in concert:

the relatively younger age of the children in the present study; the fact that the Ss in the present study worked in the absence of other children undergoing the same treatment and were working in their own homes; and the fact that the administrators of the SMART were the Ss' own mothers. A fourth possibility is the relative severity of the diagnoses of the Ss in the present study.

In the 1965 study, the juvenile delinquent who acted as a subject was 14 years and 3 months old. In the 1967 study, the average age of the Ss at the onset of the study was 14½ years. In the 1969 study, it was 14 years and 2 months. However, in the present study, the average age of the 4 Ss was 10.5 years. The fact that these younger children responded effectively to the SMART is a significant finding in itself.

In both the 1967 and 1969 studies, although the Ss were not together during administration of the SMART, they were going to the same schools and often to the same classes and so were able to give each other social reinforcement regarding their performance on the SMART. In the present study, however, the Ss came from different areas of the city and went to different schools and rarely, if ever, encountered one another. Hence, the potentially influential peer reinforcement was absent.

The treatment of children by their own parents is a very recent innovation in the mental health field. One of the reasons for which many if not most professionals are

unwilling to venture into the area of parent-child therapeutic interaction is that the previous reinforcement history of the dyadic interplay between child and parent may prevent the therapist's approach from being effective. In the present behavioral context, it would prevent the systematic reinforcement provided by the SMART from resulting in reading acquisition. In other words, a parent-child relationship may be too complex due to previous reinforcement history so that experimentally controlled social reinforcement backed up by tokens of value would be ineffective in the face of confounding social reinforcement too subtle to be accounted for by E.

The results of the present experiment are not in accord with this line of thinking, at least in the context of the SMART administration. Although previous parent-child interactions may have had the effect of diminishing slightly the Ss' rate of responding, it was not so strong as to impede the effectiveness of the systematic reinforcement, and the consequent acquisition of reading skills.

The question of relative severity of diagnosis is an important one. In the previous experiments, Ss were a juvenile delinquent, children obtained from "Special Classes" of junior high schools and from special classes for the educably mentally retarded as well as normal classes, with no further indication regarding diagnosis. In the present experiment, only one child was considered merely a reading problem. Of the remaining three, one had been diagnosed

as mentally retarded by at least two psychologists, one had been diagnosed as severely emotionally disturbed by a psychologist as well as by her teachers, and the third had a diagnosis of minimal cerebral dysfunction by a pediatrician on the basis of neurological tests. That this factor may have had an inhibiting effect on the Ss' responding to the SMART is worthy of consideration. What is of great interest here, however, is the fact that despite the severity of some of the diagnoses, the children responded well and the acquisition of reading skills did take place.

As in the previous experiments, the reading rates of the 4 Ss tended to accelerate over the training sessions despite the increasing difficulty of the materials. It does appear, however, that the increase in difficulty does dampen the rate of acceleration (found as well in the previous experiments) at or closely following the hundredth training session. In any event, the importance of the acceleration is to indicate that the children continued to respond and attend appropriately throughout the study.

The fact that there was no decrease in reading rate for any of the children, even at the end of the program, indicates that there was no decrease in effectiveness of the reinforcer system. This is quite important in view of the children's poor classroom performance. According to the procedure, an unprompted reading response on the first trial was reinforced more heavily than one that had been previously missed. This procedure appeared to produce learning that

was retained very well when the Ss later read the words orally in a paragraph, with considerable retention also occurring when the Ss were tested on the individual words 10-15 days later.

In the 1965 study S learned 761 new words. Seventy-seven per cent of these words were retained on a short-term retention test while 57 per cent were retained on a long-term basis. In the 1967 study the corresponding mean number of new words learned was 593.5 while 86 per cent were retained on a short-term basis and 68.4 per cent were retained on a long-term basis. In the 1969 study a mean of 726.7 new words were learned, 84.6 per cent were retained on a short-term basis and 60.5 per cent on a long-term basis. The number of new words learned by the 4 Ss in the present experiment ranged from 421 to 819, the mean being 559.75. When the figures are averaged over the 4 Ss, 84.12 per cent of the words were retained on a short-term basis and 64.17 per cent were retained on a long-term basis (10 to 15 days after initial presentation). Hence, the figures from the present experiment do not differ markedly from those of previous experiments in the series.

As part of the procedure, Ss were inforced for reading during the Silent Reading Phase. It may seem incongruous at first to attempt to reinforce silent reading since this behavior is not observable. However, it should be remembered that the subject actually has two types of behavior in the silent-reading act. He looks at the verbal stimuli--that is,

attends--and he makes "reading" verbal responses to the verbal stimuli. While the reading responses cannot be monitored when they are covert, the attending behavior can be. Of course, there is a danger involved in reinforcing the behavior of just looking at something. Perhaps the child will do nothing else. If he is heavily reinforced for sitting and looking at a page, and the actual reading responses. The present procedure was set up to eliminate this possibility by using a double contingency. The child was reinforced for simple attention, but the reinforcement was low in value. The opportunity for a greater amount of reinforcement came during the answering of the questions. Thus, although simple attention was reinforced lightly, attention and reading responses were reinforced much more heavily. In this way it was possible to use reinforcement in a procedure designed to maintain reading for "understanding", in addition to simple "word-naming." (These results could be generalized to other types of learning.) Furthermore, this procedure provided an opportunity to train the Ss to read silently.

The 100-word recognition test was administered to the Ss prior to and at the termination of the program. Subject₄ made the greatest gain--an increase of 227% over his pre-test score. In the experiment by Staats et al. (1967), " . . . the greatest improvement was shown by the Ss who were originally lowest in the oral reading ability" (P. 294). Similarly, in the present experiment, the S with the lowest score on the pre-test (S₄) made the greatest gain (66 words).

This could be at least in part due to the correlation of pre-test error with gain. However, it could very well be that this is due merely to a statistical artifact.

As a very informal control two of the siblings of the experimental Ss were given the pre- and post-tests (the matched versions of the 100-word test) at the same time that they were administered to the experimental Ss. Subject₂'s 9½-year-old sister received the same scores on both the pre- and post-test--80--despite the fact that she has had special tutoring in reading by a retired remedial reading specialist throughout the duration of the program. During this same time S₂ attained a 49% increase on the post- over the pre-test. Although S₂ was a year ahead of her sister in school, she was quite a bit behind her sister in reading level. But by the termination of the SMART administration, S₂ had caught up with her sister insofar as the 100-word test indicated.

It should be pointed out here that the 100-word test is a sample of the population of several thousands of words that are part of the SMART. The test is a valid indicator of achievement on the SMART (see section on testing materials), while it has only face validity as an indicant of general reading level.

Since this is so, other information besides scores on the 100-word test would be necessary to conclude that S₂ had really caught up with her sister in general reading ability. Some such information was provided by the parents' report

that S₂ underwent a change in behavior during the last few months of the program in that she was now reading around the house under her own initiative while no such behaviors were noticed in her sister. Furthermore, S₂ completed reading her first two story books, under her own initiative entirely, during the last few months of the program. Prior to this she never read a book to completion. Such evidence points to the effectiveness of the SMART in activating a motivational repertoire of reading in the absence of systematic extrinsic reinforcement.

In a similar fashion, S₃'s 8½-year-old brother, a third grader who has a severe reading disability, was given the pre- and post-test. Although S₃ attained a 66% increase on the post- over the pre-test, his younger brother, who received no help during this time, scored 7 on both pre- and post-tests, indicating no improvement at all. In addition, S₃ was noticed attempting to read newspaper headlines and photo captions in the latter months of the program, while no such effort was noted in his brother.

The personalities of the parents and children and the nature of their relationships varied widely. Subject₁, the mentally retarded boy, was an only child. Although his mother was very cooperative, S₁ had the habit of "muttering under his beard" whenever he erred during the experimental procedures and this annoyed his mother. When this was discovered during the initial stages, P₁ was advised to avoid any hint of disappointment in her tone of voice when

she prompted her son following an error and secondly to ignore her son's grumbling during the sessions. What was happening was that P₁ was punishing S₁ whenever he erred not by what she said (merely a prompt of the erred response) but rather by how she said it, i.e., with an annoyed, disappointed tone of voice. This was a case in which punishment was conveyed by the "medium" rather than the "message." By becoming aware of this mother-son interaction, and verbalizing it to the mother, E was able to control this process and prevent it from interfering with the effectiveness of the SMART.

Problems such as these would necessitate that a professional therapist spend at least sometime with the P-S pair (about a week initially and then once a week until it is felt that a stable pattern has evolved). Of course, sub-professionals in contact with professionals could do this as well. In the present experiment a graduate student initiated the subject contacts, selected the subjects and trained the parents while the professionals with whom he consulted had virtually no contact with either the parents or their children.

Subject₂ was severely emotionally disturbed, possibly due to parental conflict and the presence of a querulous grandmother who dominated the family during a crucial period of S₂'s development. According to her mother, S₂'s speech developed very slowly. During S₂'s contacts with E, she spoke to him minimally, usually answering conversational

questions with a "yes," "no" or other single word responses.

Parent₂ described her daughter as being closer to both parents and more outspoken with all members of the family toward the latter part of the program. Interestingly, it was sometimes the newly acquired reading behaviors that brought S₂ closer to her mother. For instance, S₂ would approach her mother while she was reading a newspaper or magazine and read words softly to herself as she reads over (or under) her mother's shoulder. This was never done prior to the onset of the program.

Parent₃ was a very efficient administrator of the SMART. Despite four children and a full-time job as well as being in the process of building and moving into a new house, P₃ was able to keep a tight schedule of working with her son on the SMART.

According to his mother, S₃ converses with her much more readily since the onset of the program. In the past, S₃ would allow himself to be drowned out by his siblings in conversations with the parents but recently he has been "holding his ground". Also, about 3 to 4 months after the onset of the program, S₃ began to make noticeable efforts to read newspaper headlines and photo captions.

Parent₄, also a working mother of four, was less able to maintain a tight schedule and soon fell behind the other Ps in number of sessions completed, but she did struggle valiantly to avoid getting too far behind. The only change in S₄'s behavior was the following. About 3 months after

the onset of the program, S₄ would attempt to read newspaper articles relating space exploration activities which were much discussed on the news media. If his mother, while reading the paper, mentioned one of these events to the family, he would run over to her and try to read the particular news item which, of course, was an almost impossible task for him. He usually read, and was helped with, a number of words before stopping.

The importance of the present research findings lies in the fact that the SMART can be used by parents to teach their own children who may be reading disabilities regardless of whether the children are diagnosed as mentally retarded, emotionally disturbed or neurologically handicapped. Moreover, it is not necessary that the parents have any special training nor that they be above average in intelligence, nor, for that matter, that they be educated beyond high school. For none of the four parents in the present experiment were characterized by special training, superior intelligence or academic achievement. All four parents had merely completed high school and had derived IQ scores ranging from 89 to 116.

Probably the most important aspect of the present experiment is the fact that parents with no special education or training (except for 4 hours of training for the SMART) were able to successfully administer the materials. And this training was administered in the everyday context of ongoing family demands on the mothers. No special considerations were made--it was up to each mother to find a time and a

place in her workaday world to administer the materials. Especially important is the fact that this was done in the homes of the respective families, not in austere laboratories or structured classroom settings.

In view of the fact that two of the mothers were holding full time jobs, the utility and practicality of the SMART is beyond doubt. Even the most harried parent can administer the SMART with success if she is motivated and able to read.

It should be pointed out that although the amount of reinforcement given decreases during the training, reading behavior is maintained in good strength throughout the duration of the study. Less and less reinforcement is needed to maintain the behavior even though the material increases in difficulty. As previously described, this occurs because a progressively greater number of reading responses was necessary per reinforcer. This is analogous to gradually raising the ratio of responses to the reinforcers as considered in terms of ratio schedules of reinforcement. Staats & Staats (1963) have suggested that this type of gradual increase must occur to produce good working habits in people.

This is in part an answer to the question of whether a child will become so dependent on the reinforcers as not to work in their absence. Extrinsic reinforcement can gradually be decreased until, as was happening with the experimental Ss, reading becomes a reinforcing activity in and of itself or is maintained by natural reinforcers in the child's

environment.

A comment should be made about the possibility of a Hawthorne effect or an experimenter bias effect (Rosenthal, 1961; 1968) in which social reinforcement by E and possible extra-experimental reinforcement contributed to the results in the present study. Firstly, it has been indicated by Staats (1964) and Staats et al. (1962) that in pre-school children social reinforcement is ineffective for long-term training, and the same would be expected for many individuals with behavior problems, especially when these are complex behaviors. Secondly, focus on the Hawthorne or experimenter bias effect is inappropriate here since social reinforcement by E and extra-experimental reinforcement may be regarded as integral to the independent variable. This is to say that the "in situ" nature of the experiment takes into account the fact that the parents worked with their children in everyday settings in their natural home environments. An integral part of this setting was E's influence on the parents to motivate them to participate. In addition, there was naturally contingent reinforcement for the children from various sources to participate in such a program. Just as a dean motivates his professors to motivate students, so must a professional or sub-professional motivate parents to their children. The fact that this experiment is the first demonstration of parental administration of the SMART does not detract from the necessity for professional or sub-professional involvement in future applications of the

parentally-administered SMART.

A good deal of consideration was given to the "single organism" nature of the study. Reference material on the subject was consulted to gain perspective on the question of "single organism" versus group statistical approaches. The comparison and contrast was made from the point of view that Staats maintained in his latest book (Staats, 1968). Accordingly, the following quote sets the tone for the subsequent discussion.

It may first be noted that it is understandable that the long-term study of complex human behavior has not been conducted, because of the great difficulty involved. From a very practical standpoint, group studies are precluded, since the experimental time involved would be exorbitant. Thus, one is forced to deal only with one subject, or at most a very few. In view of this, one may ask how it is possible to insure that the conditions we have manipulated have been the real determinant of the change in behavior--that is, how can reliability of the findings be obtained? In short-term experimental methods the behavior of the experimentally treated group is statistically compared to the behavior of a control group. In the single-subject research the behavior of the subject in the experimental period as compared to his behavior in the control period (without the experimental condition). Neither of these methods is available when working with one subject over an extended period of time on a behavior that is important to the subject's adjustments (Staats, 1968, p. 567).

It must be concluded that as useful and important as our standards of experimentation have been and are, we have to know when they require modification. Rigidity in techniques is an obstacle. This stems from being concerned with specifics rather than with general principles of methodology. What we must take from our experimental methods are principles, the general logic which has been developed in experimental psychology. We must be prepared to adapt the principles to the requirements of the problem area (Staats, 1968, p. 569).

The present study of systematic parental behavioral modification of complex behavior acquisitions is a twig-like extension of the branch of research involving sub-professional behavior modification of complex behavior acquisitions reaching from the bough of behavior modification research. This twig may bear a worthy blossom in making behavior modification principles available to parents of children with speech and reading deficits.

The methods and apparatus used in this study have been found to be useful in training children with learning deficiencies. According to Staats et al.: "The methods have been tested sufficiently with various types of children to indicate that children who are otherwise untrainable will respond appropriately to the present type of training situations" (Staats et al., 1967, p. 298). What the present study has shown is that parents can act as therapy technicians with their own children notwithstanding previous social reinforcement patterns between parent and child. Since in a portion of the cases this pattern may be causal to the learning deficiency, the method used in this study has been able to overcome the effect of these patterns. In any case, it is not the principles employed in this study nor the methodology itself that is being tested here--these are already proven and tested--it is the specific situation (an extension of previous demonstrations) in which parents treat their own offspring.

There were alternative possibilities in approaching the

data collected in this study. These were to consider the study either as single organism research with replications over four Ss or as an experimental study with the data being analyzed according to repeated measurements analysis of variance. The difficulty in using the latter approach is, of course, the small number of Ss.

Furthermore, the nature of the study (complex behavior acquisition in humans) lends itself more to single organism research than to statistical comparisons although the two are not mutually incompatible. Aside from the difficulty of finding more than a very few appropriate Ss, single organism research lends itself to more precise behavior descriptions in that individual response patterns are not sacrificed for statistical group means.

It has been said that an average is a fiction in that no one subject may have responded in the manner the average indicates. The same average may be obtained in a group all of whom are slightly affected by the experimental condition, as well as in a group of subjects part of whom are greatly affected in one direction and part of whom are affected to a lesser extent in the other direction (Staats, 1968, pp. 560-561).

A case for individual organism research has been made by Claude Bernard in his book An Introduction to the Study of Experimental Medicine written over a century ago.

For experimenting on organs or tissues whose properties are definite and easy to perceive, comparison of two animals of the same species will suffice; but, on the other hand, when we wish to compare delicate and fugitive qualities, we must make our comparison on the same animal (Bernard, 1961, p. 157).

When a learning curve is being described, individual

organism research is much more informative than group comparisons. In fact, single organism research can extirpate errors glossed over by less precise group comparison techniques.

According to Murray Sidman,

. . . where the factor which underlines the variability is itself distributed unevenly throughout the population, group data will even prevent recognition that the problem exists at all (Sidman, 1960, p. 150).

Here we have a case in which the replication of group means can only serve to perpetuate an error, while replication with individual subjects is inevitably self-corrective (Sidman, 1960, p. 151).

The student should not be deceived into concluding that the group type of experiment in any way provides a more adequately controlled or more generalizable substitute for individual data (Sidman, 1960, p. 53).

Generality of scientific findings can be gained more readily from replications of single organism research than from group comparisons:

. . . replication of an experiment with two subjects establishes greater generality for the data among the individuals of a population than does replication with two groups of subjects whose individual data have been combined.

In contrast to group-statistical experiments, in which intergroup replication seldom occurs, individual subject experiments that utilize more than one subject automatically contain intersubject replications (Sidman, 1960, p. 75).

The replication of four Ss in the present experiment is especially significant in light of the fact that counterproof (removing the independent variable with consequent manipulation of the dependent variable) is unavailable. To

prove beyond doubt, according to Claude Bernard (1961), counterproof is essential. If we are to separate the caused from the causal, the correlation from the determination, then it is necessary to manipulate not only by administering the independent variable but also by removing it:

. . . proof that a given condition always precedes or accompanies a phenomenon does not warrant concluding with certainty that a given condition is the immediate cause of that phenomenon. It must still be established that, when this condition is removed, the phenomenon will no longer appear (Bernard, 1961, p. 81).

Ideally, then, in the present study, manipulation of reading acquisition should have been demonstrated by reinforcing appropriate reading responses and then by withdrawing this reinforcement contingency to show that reading responses would extinguish in the absence of social reinforcement. Sidestepping the issue of reversibility and assuming momentarily that reading behavior acquisitions could be reversed, the ethical problem of willingly extinguishing a child's reading repertoires, even for a temporary period, remains critical. Our culture is unwilling to permit such manipulations. It is ethically unsuitable to teach a child to read and then to teach him not to read.

The issue of reversibility is also crucial. Aside from ethical problems, the reversibility of reading acquisition is a questionable process.

Initially, tokens and other social reinforcers can be used to enhance reading behaviors. The reading responses themselves then take on reinforcing properties by

association with contingent social reinforcement. Termination of contingent reinforcement may not lead to extinction of reading behaviors since the reading responses are apt to be reinforced outside of the experimental setting and this variable is beyond experimental control.

Hence counterproof was unavailable not only because of ethical considerations but also because of the complex learning processes beyond E's control. Nor is group statistics the answer.

An irreversible process must be accepted as such, and the techniques for studying it must take the property of irreversibility into account . . . Group statistics is certainly not the answer (Sidman, 1960, p. 52).

Since reading acquisition is virtually an irreversible process (see Sidman's discussion on transition states in Sidman, 1960, pp. 99-107) counterproof is inaccessible and intersubject reliability is demonstrated rather than intrasubject reliability.

Staats (1968, pp. 566-571) points out that the inaccessibility of counterproof in certain research designs must be accepted. Implicit control groups are often available for certain situations. General knowledge and common sense observation often give us certain information regarding the usual learning rates of certain behaviors in various organisms. In discussing repertoires such as number concept, writing and reading, Staats says, "Our previous evidence tells us that unless the child is given special training he will not develop these repertoires in his usual home life.

Again, there is informal or implicit control group" (Staats, 1968, p. 568).

Application of the SMART using parents or therapy-technicians seems an appropriate step for educators. The effectiveness of the SMART has been demonstrated in a number of situations with different types of childhood disabilities and over a wide range of childhood development (from $8\frac{1}{2}$ yr. to $14\frac{1}{2}$ yr.). In all cases the SMART was found to bring about a significant change in reading behaviors and sometimes in other pro-social behaviors as well.

It is suggested that an effective way to apply the present procedures is to have a child-clinical psychologist set up and supervise the program, having direct training and supervisory contact with the parents. Larger programs could also be conducted in which the child-clinical psychologist had adjunct professional personnel (such as social workers, probation officers, special education teachers, and so on) who supervised the parents. In any event, it would seem necessary to have the specialist in child learning and behavior problems in a position to handle the special problems of the children, or the parents, which could be expected to arise on occasion.

Finally, it may be suggested that this study adds additional support for the validity of laboratory derived principles on the human level, in the context of the acquisition of complex cognitive skills. In so doing generality of the basic principles is shown. Moreover, this adds to

one's confidence in the learning conception of human behavior. As has been suggested (Staats, 1968) psychology must begin the study of functional repertoires of human behavior, employing its basic principles and experimental procedures. Such investigations of functional repertoires have more widely commenced in clinical psychology. Educational, child, and social psychology are not as advanced in this respect. This is clear, for example, in educational psychology, where most studies still involve experimental tasks which are labeled as though they represented some universe of functional human behaviors--but the universe is never made explicit and the study remains academic in the pejorative sense of the word. How the findings of the majority of studies labeled problem solving, concept formation, verbal learning, and so on, extend to real samples of such cognitive skills is never made clear. It is time that representative samples of actual human behavior be systematically studied using the basic principles of learning. The present study demonstrates the possibilities for doing this. The project of which this study is a part more generally demonstrates that experimental methods and analyses of complex learning tasks may be employed in studying and treating ever more representative samples of human behavior in the continued extension and elaboration of the learning theory. In the extended project in the study of reading acquisition as a type of cognitive learning, the research has moved from basic research in the laboratory controlled situation to

this field study type of experiment. The present study may thus be valued as part of this strategy of psychological theory construction, as well as for contributing to the solution of an important problem of human behavior.

SUMMARY

A method of treating reading deficits based upon an extrinsic motivational system, administered by sub-professionals and previously proven effective was employed using parents as the sub-professionals. The present experiment was an attempt to discover whether parents of children with deficits in reading behavior could act successfully as therapy-technicians in helping their own children to overcome these deficits.

Four children identified as reading problems by their teachers selected from the waiting list of a reading clinic and from the University of Hawaii Laboratory School. The children's parents administered the learning material following a four-hour training period. They also recorded much of the data. Direct supervision of the parents' efforts was maintained for the first two weeks and was gradually phased out following this. Review tests were administered by the experimenter. The reading material was adapted from the Science Research Associates reading-kit materials. Three types of tokens, distinguished by color, were used as reinforcers for appropriate reading behaviors. The tokens could be used to purchase commercial items. Each child's acquisition of tokens was plotted so that visual evidence of the accumulation of reinforcers was available. Daily sessions were half an hour in length, and were run over a 5-month period. The design used was single organism research with replication over four subjects.

Dependent measures consisted of detailed recordings of the responses made by each child, the reinforcers received, the words learned and retained, and the like. All four children showed a positively accelerated rate of reading responses and made from 36,389 to 64,448 single word reading responses during the 30 to 45 hours of training. The importance of this result is to indicate that the children's behaviors of attending and making the appropriate reading responses did not diminish throughout the period of training. Thus, the reinforcement system employed was capable of maintaining the behavior for a long time. The number of new words learned by the children ranged from 421 to 819. At least two thirds of these words were retained on a short-term retention test and at least half were retained on a long-term retention test administered 10 to 15 days later. The ratio of reading responses to reinforcers increased markedly for all children in the experiment despite the increasing difficulty of the material.

The children's reading vocabulary was increased as shown by the various measures. A 100-word recognition test administered prior to and following the program indicated that there was a significant increase (at the .01 level of probability) in the children's ability to read the material. Results showed that it was not necessary to have a person highly trained in education to administer the training. In the present study the therapy-technicians were the children's parents. The present general procedures have been tested

sufficiently with various types of children to indicate that children who are otherwise untrainable will respond appropriately to the present type of training situation. When the procedures can be administered in a standard manner, parents can be used as therapy-technicians.

Results support the validity of laboratory-derived learning principles on the human level, in the context of the acquisition of complex cognitive skills. This adds to confidence in learning conceptions of human behavior.

APPENDIX A

I. Before Session

- A. Pick up needed materials.
- B. Check for memos.
- C. Set out materials.
- D. Fill out top portion of data sheet.
- E. Record starting time.

II. Individual Word Phase

- A. Present the cards, one at a time, to the student.
When the student doesn't know a word, point to the word and be certain he looks at the word as he repeats it after you.
- B. Score the data sheet as you go along; however, give the tokens at the end of the phase. A white token is presented for each + response in the first column of the data sheet, and a blue token for each 0.
- C. Data keeping
 1. Place appropriate symbol (+ or 0) in appropriate square each trial.
 2. Leave square blank after card has been removed from stack.
 3. Keep cards in order.

III. Oral Reading Phase

- A. Present the cards, one at a time, to the student, reading along silently with the student from his copy. When he doesn't know a word, point to it and

be certain that he looks at the word as he repeats after you.

- B. Score paragraph errors on the data sheet after each paragraph has been read. Tokens are given at the end of the phase. A red token is delivered for each paragraph that was completely correct the first time it was presented. A white token is delivered for any paragraph containing at least one error.
- C. Data keeping
 1. Errors on first reading of a paragraph are denoted by drawing a line through the word on the data sheet.
 2. Errors on the second reading of a paragraph are denoted by drawing a line directly under the word on the data sheet.
 3. Errors on the third reading of a paragraph are denoted by drawing a line half-way between the typed line containing the word and the following typed line.
 4. If an error occurs on the same word several times, this is noted by the use of multiple lines drawn in the appropriate places on the data sheet.

IV. Silent Reading Phase

- A. Four white tokens are given when the student finishes the story.

B. No data is necessary for this phase.

V. Comprehension Phase

A. For each misspelled answer (when written answer is required) S must correct his answer.

B. For each incorrect answer, S must re-read the appropriate paragraph and correct his answer.

C. In checking comprehension sheet, draw a line through incorrect written answers, and place a checkmark beside incorrect multiple-choice answers. Do not erase these marks.

D. At the end of the phase give a red token for each correct answer, a white token for each misspelled answer and a blue token for each incorrect answer.

VI. After session, before S leaves

A. Record finishing time.

B. Count up number of tokens of each color and enter this on data sheet.

C. Figure out points earned in appropriate place on graph.

D. Add these points to the number of points earned previously.

E. Draw line on token acquisition graph to appropriate height and shade in column under the line.

F. Enter session number under appropriate column.

VII. After session, after S leaves

A. Write words upon which errors have been made during Individual Word Phase in left-hand column of

Vocabulary Review Data Sheet.

- B. Add individual word cards, in the same order as they appear on the Vocabulary Review Data Sheet to bottom of stack of previously missed word and bind with rubber band.
- C. Store Vocabulary Review materials in envelope supplied for this purpose.
- D. Place all materials back in file until next day.

VIII. Vocabulary Review

- A. Present the cards, one at a time, to the student. When the student doesn't know a word, point to the word and be certain he looks at the word as he repeats it after you.
- B. Score the Data Sheet as you go along; however, give the tokens at the end of the phase. A white token is presented for each + recorded in the first column of the Data Sheet, and a blue token for each 0.
- C. Data keeping
 - 1. Place appropriate symbol in appropriate square each trial (+ or 0).
 - 2. Leave square blank after card has been removed from stack.
 - 3. Keep cards in order.

APPENDIX B

Lesson 4
Data Sheet

Student _____
Administrator _____
Session _____
Date _____

Individual Word Phase

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

from _____

kangaroo _____

had _____

roof _____

fell _____

pocket _____

monkey _____

Oral Reading Phase

1. A monkey sat on a roof.
2. The monkey saw a kangaroo.
3. The kangaroo had a pocket.
4. The monkey fell from the roof.
5. He fell into the pocket!
6. The kangaroo and the monkey laughed.

Comprehension Phase

How well did you read?

1. A monkey sat on a (roof). (parag. 1) pocket
2. The monkey saw a (kangaroo). (parag. 2) roof
3. The kangaroo had a (pocket). (parag. 3) laughed
4. The kangaroo and the monkey
(laughed). (parag. 6) kangaroo

Attach S's sheet with
comprehension questions
to Data Sheet

Number of tokens:

blue _____

white _____

red _____

Write comments on back of sheet.

REFERENCES

- Allen, K. E., & Harris, F. R. Elimination of a child's excessive scratching by training the mother in reinforcement procedures. Behaviour Research and Therapy, 1966, 4, 79-84.
- Allen, K. E., Hart, B. M., Buell, J. S., Harris, F. R., & Wolf, M. M. Effects of social reinforcement on isolate behavior of a nursery school child. Child Development, 1964, 35, 511-518.
- Allen, K. E., Henke, L. B., Harris, F. R., Baer, D. M., & Reynolds, N. J. Control of hyperactivity by social reinforcement of attending behavior. Journal of Education Psychology, 1967, 58, 231-237.
- Allen, S. The effect of verbal reinforcement on children's performance as a function of type of task. Journal of Experimental Child Psychology, 1966, 3, 57-73.
- Andronico, M. P., & Guernsey, B., Jr. The potential application of filial therapy to the school situation. Journal of School Psychology, 1967, 6(1), 2-7.
- Ayllon, T., & Michael, J. The psychiatric nurse as a behavioral engineer. Journal of Experimental Analysis of Behavior, 1959, 2, 323-334.
- Bernard, C. An Introduction to the Study of Experimental Medicine. New York: Collier Books, 1961.
- Bijou, S. W., & Sloane, H. N. Therapeutic techniques with children. In I. A. Berg and L. A. Pennington, (Eds.), An Introduction to Clinical Psychology (Third Edition).

- New York: Ronald Press, 1966.
- Bloom, B. S., Davis, A., & Hess, R. Compensatory education for cultural deprivation. New York: Holt, Rinehart & Winston, 1965.
- Bond, G. L., & Tinker, M. A. Reading difficulties, their diagnosis and correction. New York: Appleton-Century-Crofts, 1957.
- Brown, P., & Elliot, R. Control of aggression in a nursery school class. Journal of Experimental Child Psychology, 1965, 2, 103-107.
- Crow, W. D., Murray, W. I., & Smythe, H. H. Educating the culturally disadvantaged child. New York: McKay, 1966.
- Davison, G. C. The training of undergraduates as social reinforcers for autistic children. In L. P. Ullmann and L. Krasner (Eds.), Case studies in behavior modification. New York: Holt, 1965. Pp. 146-148.
- DeVault, S., & Stewart, L. G. Differentiation of neurological and social psychological etiology in reading retardation. American Journal of Orthopsychiatry, 1967, 37(2), 380-381.
- Edward, J. Extending a hand to parents of disturbed children. Children, 1967, 14(6), 238-243.
- Ellis, A. Reason and emotion in psychotherapy. New York: Lyle Stuart, 1962.
- Eysenck, H. J. Behavior Therapy and the Neuroses. New York: MacMillan, 1960.
- Eysenck, H. J., & Rachman, S. The causes and cures of

- neurosis. San Diego: Knapp, 1965.
- Greenspoon, J. The reinforcing effect of two spoken sounds on the frequency of two responses. American Journal of Psychology, 1955, 68, 409-416.
- Grossberg, J. M. Behavior therapy: a review. Psychological Bulletin, 1964, 62, 73-88.
- Harris, A. J. How to increase reading ability. New York: McKay, 1961.
- Harris, F. R., Johnston, M. K., Kelley, C. S., & Wolf, M. M. Effects of positive social reinforcement on regressed crawling of a nursery school child. Journal of Educational Psychology, 1964, 55, 35-41.
- Hart, B. M., Allen, K. E., Buell, J. S., Harris, F. R., & Wolf, M. M. Effects of social reinforcement on operant crying. Journal of Experimental Child Psychology, 1964, 1, 145-153.
- Hartup, W. W. Friendship status and the effectiveness of peers as reinforcing agents. Journal of Experimental Child Psychology, 1964, 1, 154-162.
- Hawkins, R. P., Peterson, R. F., Schweid, E., & Bijou, S. W. Behavior therapy in the home: amelioration of problem parent-child relations with the parent in a therapeutic role. Journal of Experimental Child Psychology, 1966, 4, 99-107.
- Henderson, D., & Batchelor, I. R. C. Henderson and Gillespie's textbook of psychiatry (9th ed.). London: Oxford University Press, 1962.

- Hohlmann, W. Untersuchung der Ursachen von Schreib-Lese-Schwachen. Praxis der Kinderpsychologie und Kinderpsychiatrie, 1966, 15(6), 216-218, (Psychological Abstracts, 1967, 41(1), 51.)
- Honig, W. K. Operant behavior: areas of research and application. New York: Appleton-Century-Crofts, 1966.
- James, C. E. Operant conditioning in the management of hyperactive children: five case studies. Unpublished manuscript, Orange State College, 1963.
- Krasner, L. Studies of the conditioning of verbal behavior. Psychological Bulletin, 1958, 55(3), 148-170.
- Krasner, L., & Ullmann, L. P. (Eds.) Research in behavior modification. New York: Holt, 1965.
- Lloyd, H. M. New York City's program for developing the role of parents in reading progress. The Reading Teacher, 1965, 18, 629-633.
- Lovaas, O. I., Berberich, J. P., Perloff, B. F., & Schaeffer, B. Acquisition of imitative speech by schizophrenic children. Science, 1966, 151, 705-707.
- Mandelbaum, A. The group process in helping parents of retarded children. Children, 1967, 14(6), 227-232.
- McManus, A. The Denver pre-reading project conducted by WENH-TV. The Reading Teacher, 1964, 18, 22-26.
- O'Leary, K. D., O'Leary, S., & Becker, W. C. Modification of deviant sibling interaction pattern in the home. Behavior Research and Therapy, 1967, 5, 113-120.
- Patterson, G. R. An application of conditioning techniques

to the control of a hyperactive child. In L. P. Ullmann and L. Krasner (Eds.), Case studies in behavior modification, New York: Holt, 1965, Pp. 370-375.

(a)

Patterson, G. R. A learning theory approach to the treatment of the school phobic child. In L. P. Ullmann and L. Krasner (Eds.), Case studies in behavior modification. New York: Holt, 1965, Pp. 279-285. (b)

Patterson, G. R., & Hinsey, W. C. Investigations of some assumptions and characteristics of a procedure for instrumental conditioning in children. Journal of Experimental Child Psychology, 1964, 1, 111-122.

Patterson, G. R., Jones, R., Whittier, J., & Wright, M. A. A behavior modification technique for the hyperactive child. Behaviour Research and Therapy, 1965, 2, 217-226.

Phillips, E. L. Psychotherapy: a modern theory and practice. Englewood Cliffs, N. J.: Prentice-Hall, 1956.

Phillips, E. L. Parent-child psychotherapy: a follow-up study comparing two techniques. Journal of Psychology, 1960, 49, 195-202.

Prince, G. S. A clinical approach to parent-child interaction. Journal of Child Psychology and Psychiatry, 1961, 2, 169-184.

Rickard, H. C., & Mundy, M. B. Direct manipulation of stuttering behavior: an experimental-clinical approach. In L. P. Ullmann and L. Krasner (Eds.), Case studies in

behavior modification. New York: Holt, 1965. Pp. 268-274.

Rosenthal, R. On the social psychology of the psychological experiment: the experimenter's hypothesis as unintended determinant of experimental results. Paper presented at the Symposium, On the social psychology of the psychological experiment, American Psychological Association, New York, 1961.

Rosenthal, R. Experimenter expectancy and the reassuring nature of the null hypothesis decision procedures. Psychological Bulletin, 1968, 70 (6, Pt. 2), 30-47.

Russo, S. Adaptations in behavioural therapy with children. Behaviour Research and Therapy, 1964, 2, 43-47.

Ryback, D. M&M's & behavior modification. Journal of the Council for Exceptional Children, 1966, 16(1), 3-7.

Sidman, M. Tactics of scientific research: evaluating experimental data in psychology, New York: Basic Books, 1960.

Staats, A. W. (Ed.) Human Learning. New York: Holt, Rinehart & Winston, 1964.

Staats, A. W. Learning, Language, and Cognition. New York: Holt, Rinehart & Winston, 1968.

Staats, A. W. Development, use and social extensions of token-reinforcement systems. Paper presented at the Conference on Progress in Behavior Modification, Honolulu, January, 1969.

Staats, A. W., & Butterfield, W. H. Treatment of nonreading

in a culturally deprived juvenile delinquent: an application of reinforcement principles. Child Development, 1965, 36, 925-942.

Staats, A. W., Finley, J. R., Minke, K. R., & Wolf, M. M. Reinforcement variables in control of unit reading responses. Journal of Experimental Analysis of Behavior, 1964, 7, 139-149. (a)

Staats, A. W., Minke, K. A., & Butts, P. A token-reinforcement remedial reading program administered by black instructional-technicians to backward black children. Honolulu: Educational Research and Development Center, 1969.

Staats, A. W., Minke, K. A., Finley, J. R., Wolf, M. M., & Brooks, L. O. A reinforcer system and experimental procedure for the laboratory study of reading acquisition. Child Development, 1964, 35, 209-231. (b)

Staats, A. W., Minke, K. A., Goodwin, W., & Landeen, J. Cognitive behavior modification: "motivated learning" reading treatment with subprofessional therapy technicians. Behaviour Research and Therapy, 1967, 5, 283-299.

Staats, A. W., & Staats, C. K. Complex human behavior. New York: Holt, Rinehart & Winston, 1963.

Staats, A. W., Staats, C. K., Schutz, R. E., & Wolf, M. M. The conditioning of reading responses utilizing "extrinsic" reinforcers. Journal of Experimental Analysis of Behavior, 1962, 5, 33-40.

- Staats, A. W., Van Mondfrans, A. P., & Minke, K. A. Manual of administration and recording methods for the Staats "Motivated Learning" Reading Procedure. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1967.
- Straughan, J. H. Treatment with child and mother in the playroom. Behaviour Research and Therapy, 1964, 2, 37-41.
- Thorndike, E. L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia University, 1944.
- Thorne, G. L., Tharp, R. G., & Wetzel, R. J. Behavior modification techniques: new tools for probation officers. Federal Probation, June, 1967.
- Ullmann, L. P. Behavior therapy as social movement. In C. M. Franks (Ed.), Assessment and status of the behavior therapies. New York: McGraw-Hill, 1968.
- Ullmann, L. P., & Krasner, L. (Eds.) Case studies in behavior modification. New York: Holt, Rinehart & Winston, 1965.
- Ullmann, L. P., & Krasner, L. A psychological approach to abnormal behavior. Englewoods Cliffs, N. J.: Prentice-Hall, 1969.
- Wahler, R. G., Winkel, G. H., Peterson, R. F., & Morrison, D. C. Mothers as behavior therapists for their own children. Behaviour Research and Therapy, 1965, 3, 113-124.
- Walder, L. O. Teaching parents to modify the behaviors of

- their autistic children. Paper presented at the meeting of the American Psychological Association, 1966.
- Wetzel, R. J., Baker, J., Roney, M., & Martin, M. Out-patient treatment of autistic behavior. Behaviour Research and Therapy, 1966, 4, 169-177.
- Wilson, R. M., & Pfau, D. W. Parents can help! The Reading Teacher, 1968, 21, 758-761.
- Wolf, M. M., Giles, D. K., & Hall, V. R. Experiments with token reinforcement in a remedial classroom. Behaviour Research and Therapy, 1968, 6, 51-64.
- Wolf, M. M., Risley, T. R., & Mees, H. L. Application of operant conditioning procedures to the behavior problems of an autistic child. Behaviour Research and Therapy, 1964, 1, 305-312.
- Wolpe, J. Psychotherapy by reciprocal inhibition. Stanford, Calif.: Stanford University Press, 1958.
- Wolpe, J., & Lazarus, A. A. Behavior therapy techniques: a guide to the treatment of neuroses. New York: Pergamon, 1966.
- Zeilberger, J., Sampen, S. E., & Sloane, H. N., Jr. Modification of a child's problem behaviors in the home with the mother as therapist. Journal of Applied Behavior Analysis, 1968, 1, 47-53.
- Zigler, E., & Kanzer, P. The effectiveness of two classes of verbal reinforcers on the performance of middle- and lower-class children. Journal of Personality, 1962, 30, 157-163.

Zimmerman, E. H., & Zimmerman, J. The alteration of behavior in a special classroom situation. Journal of the Experimental Analysis of Behavior, 1962, 5, 59-60.