

THE UNIVERSITY OF MANITOBA
TEACHING PARENTS TO REMEDY ACADEMIC
DEFICITS IN THEIR OWN CHILDREN

by

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ABSTRACT

In the past, remedial work with learning disabled children has been conducted almost solely by teachers and other professionals. Although more recent studies have demonstrated that nonprofessionals can be trained as remedial reading instructors, parents have rarely been included in such academic programs. The present study was an attempt to train parents to remedy reading and spelling deficits in their own children.

The mothers of three boys considered to have difficulties in reading were trained initially in group meetings and later supervised in home sessions with their child. The remedial programs were adapted from SMART (Camp & Staats, 1970). They included presentation of material in small steps, drill, and immediate reinforcement of correct responses.

Multiple baseline designs were employed to assess the effectiveness of the procedures. Results indicated that the parent program was effective in remediating the children's academic deficits. Inter-scorer reliability was high. A follow-up study conducted two months after the termination of the program indicated that Ss' improved performance was generally well maintained.

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CHAPTER I

INTRODUCTION

In recent years there has been an upsurge of interest in the area of learning disability in children. This interest is evidenced by a proliferation of written material relating to the topic. Common to most of the recent literature is the realization that learning disability is a very broad area which has yet to be defined satisfactorily, and that there exist numerous theories concerning the etiology of the various behaviors subsumed under the heading of learning disability, with as many approaches to remediation (Bateman, 1966).

Definitions and Classification Systems

The historical background of the learning disability concept is characterized by controversy regarding the role of neurological impairment as an underlying, causative factor (Ashlock, 1969; McCarthy and McCarthy, 1969). The term "dyslexia" was suggested in 1887 by a German neurologist to isolate a loss of ability to read as a result of known brain injury. Hinshelwood, around 1917, attributed reading difficulty to abnormality in the angular gyrus of the left side of the brain. However, in the 1920's, Apert and Potzl proposed that a developmental or maturational lag, not any anatomical abnormality, was responsible for dyslexia. Again in the 1930's, the integrity of the angular gyrus was deemed essential for normal reading skill by Samuel T. Orton, whose theory underlies current remedial techniques proposed by Gillingham and Stillman,

and Spalding. Yet by 1946, the idea that a multitude of factors could be responsible for the rather nonspecific condition of reading disability had gained support. In 1947, Strauss and Lehtinen described the behavior of a group of children as characterized by hyperactivity, emotional lability, perceptual disorder, impulsivity, distractibility, and perseveration. This behavior pattern came to be known as the "Strauss syndrome" or the "brain-injured syndrome". The term "brain-injured child" came to be used frequently and synonymously with "learning disabled child". Gradually the problems of using labels of brain injury or brain dysfunction to describe children exhibiting diverse learning and behavioral problems have been recognized. For one thing, evidence of neurological damage in these children is poor; for another, children with known brain damage do not always display these behavior problems.

Apart from the question of including brain damage in a definition of learning disability, there are other problems among professionals in agreeing upon a suitable definition. Proponents of various remedial approaches have tended to define learning disability in terms of their own biases. Kass (1971) cited five versions of definitions proposed between 1962 and 1968, and concluded that there is no other area of special education in which so much effort and controversy has gone into definition. As Martin and Gelfant (1970) pointed out, this overconcern for

definition is unwarranted. The definitions that have been proposed are very general and consequently can be of little value in dealing with the children themselves. As they offer few guides to remediation, definitions serve to perpetuate the role of the diagnostician rather than the therapist. The time and effort that has gone into defining learning disability might have been much better spent in helping children with specific learning problems (Lovitt, 1971).

General characteristics of those children typically considered learning disabled include the following:

1. hyperactivity
2. perceptual-motor impairments
3. emotional lability
4. general orientation defects
5. disorders of attention
6. impulsivity
7. disorders of memory and thinking
8. specific disability in reading, arithmetic, writing, and spelling
9. disorders of speech and hearing
10. equivocal neurological signs and EEG irregularities

These characteristics represent a summary of the results of an exhaustive review of the literature by Clements (1966). In that review, the author identified over 100 specific behaviors considered to be evidence of learning disability. For example, under the heading of reading disability may be included such behaviors as omitting letters and words, confusing words that start with the same letter but are otherwise different, substituting even simple words, and reversing letters (eg., reading "b" for "d") and words (eg., reading "tap" for "pat") (Strang, 1968).

In view of the multitude of behaviors exhibited by learning disabled children, many authors have proposed systems for classifying specific behaviors. For example, Myers and Hammill (1969) divide problems into disorders of motor activity, emotionality, perception, symbolization, attention, and memory. Kirk and Kirk (1971) group behaviors into academic, symbolic, and nonsymbolic disorders. The diversity of the systems proposed and their very general nature points up the fact that most have little relevance to remediation or prognosis, and therefore can be of little value. Some classification systems are related to remediation; for example, Myklebust's distinction between disorders of auditory language, reading, written language, arithmetic, and nonverbal disorders. These systems are usually based upon a specific theory regarding the underlying cause of the disability, with a corresponding approach to remediation (eg., Myklebust's emphasis on auditory language systems). The system thus reflects the bias of its author, and may be of little utility to one with a different point of view. Some authors feel a more profitable approach to learning disability might be to ignore definitions and classification systems, and concentrate solely on the behavior of the child in question (Lovitt, 1971; Martin & Gelfant, 1970).

Remedial Techniques

The growing interest in learning disability has led to the development of a number of widely varying approaches to remediation. Myers and Hammill (1969) have reviewed

many of these, noting that they can be grouped into seven categories according to the primary orientation of each instructional system. The first category cited covers the perceptual-motor systems, namely those systems developed by Barsch (1967), Friedus (1964), Getman (1966), and Kephart (1960). These authors stress the importance of early motor learning and the visual-spatial development of the child. Kephart's Perceptual-Motor Rating Scale (1960) assesses the child's sensorimotor learning, ocular control, and form perception. Results indicate which developmental stages of learning are not adequate and require treatment. Remediation consists of training in perceptual-motor areas rather than in specific academic behavior. Unfortunately, the hypothesis that a lack of visual-motor skills adversely affects acquisition of academic skills is disputable (Bateman, 1964).

The systems developed by Fernald (1943), Cruikshank (1961), and Lehtinen (1947) are considered multisensory systems since they emphasize no particular sensory modality. Lehtinen's approach is based on Strauss's research and theory of cortical damage. Lehtinen believes that the distractibility and perceptual disturbance of the learning disabled child are due to damage to the forebrain, but may be overcome by teaching the child to exercise voluntary control. While proposing no one method of treatment, she advocates removal of all sources of environmental stimulation (she suggested the child work in a small, undecorated

cubicle), and emphasizes working with the child's weaknesses rather than building on his strengths. Fernald has developed a specific remedial reading approach utilizing the kinesthetic sense in tracing exercises. This method has been successful with children whose difficulties stem from visual perception and imagery problems. However, as Myers and Hammill pointed out, others may benefit little from this kind of approach.

The language development systems include those advocated by Barry (1961), McGinnis (1963), and Myklebust (1967). These systems were developed primarily for use with aphasic children, and their main purpose is to facilitate the development of language. Emphasis is placed on associating sounds with meaningful visual cues.

A similar group of systems are the phonic systems developed by Gillingham and Stillman (1965) and Spalding (1957). Here the primary reliance is on the auditory input mode, and the teaching of sound-letter associations is viewed as most important. The meaningfulness of the material learned is not considered relevant. Spelling and reading are taught simultaneously. Due to such heavy reliance on auditory input, the child with auditory deficiencies might have considerable difficulty when being taught by these methods.

The Fitzgerald Key (1963) is a highly structured, visually-oriented way of teaching the structure of the English language. The method was designed originally for deaf and hard-of-hearing children, but can be effectively

used with children with severe auditory and visual problems. The system concentrates specifically on providing an understanding of parts of speech and their sequencing in the English language.

A sixth category identified by Myers and Hammill deals with test-related systems; that is, training systems directly related to diagnostic tests. The Frostig-Horne program in visual perception (1964) fits into this category. Frostig contends that perceptual adequacy is fundamental to academic success, and has designed a program to develop perceptual skills rather than provide instruction in academic subjects. To assess perceptual adequacy she has designed the Developmental Test of Visual Perception, which is composed of subtests measuring eye-motor coordination, and perception of figure-ground, form constancy, position in space, and spatial relations. Remediation consists of training in these five areas as well as training eye movements, and techniques for developing gross and fine coordination. Unfortunately, studies such as that by Olson (1966) have cast doubt on the efficacy of the program. Another test-related system is the Preschool Diagnostic Language Program which is based on the Illinois Test of Psycholinguistic Abilities (ITPA) (1968). The remedial program consists of a series of language activities divided into sections known as decoding, association, encoding, automatic or closure processes, and memory. Although there is evidence to suggest that this training program leads to

improved score on the ITPA, there is little indication that the program will improve academic performance in the school setting (Myers & Hammill, 1969).

The final category cited by Myers and Hammill is devoted to the neurological organization system of Doman and Delcato (1959, 1963). This most controversial system is based on the assumption that if man does not follow a sequential continuum of neurological development, he will show problems of mobility and communication. Children with problems in language (eg., reading) have not attained cortical hemispheric dominance due to some interruption in their natural progression of neurological development. The level at which development was interrupted can be determined through special evaluative procedures designed by Doman and Delcato. Treatment begins at the level of development where the child fails, and involves the external imposition of those bodily patterns of activity which were the responsibility of damaged brain levels. Special patterning exercises have been devised to manipulate the child's limbs. It is assumed that these movements will activate live cells in the area of the brain responsible for the activity. Then, when neurological organization is restored, the learning problem is overcome. There has been considerable criticism of the Doman-Delcato method. A particularly systematic attack was made by Robbins and Glass (1969) who refuted the central assumptions of the theory and pointed out basic weaknesses in eleven studies claiming to demonstrate the efficacy of the technique. An

official statement critical of the procedures was approved in 1968 by ten medical, psychological, and educational organizations in the United States and Canada.

The systems reviewed by Myers and Hammill are recognized approaches to treating learning disabled children. Some of them have been used for many years - Fernald's dates back to 1943 and Lehtinen's to 1947. Newer approaches to reading instruction originally intended for all students have found success in teaching learning disabled children. Among these are methods involving colored coding of phonetic elements within words, programmed readers, and the initial teaching alphabet (Myers & Hammill, 1969). In addition, techniques based on behavior modification principles have recently been used with learning disabled children.

In these behavior modification studies (Haring & Hauck, 1969; McKenzie, Clark, Wolf, Kothera, & Benson, 1968; Nolan, Kunzelmann, & Haring, 1967; Sluyter & Hawkins, 1972), learning disabled children showed improvements in academic skills following classroom participation in the behavior modification program. Making reinforcement in the form of money, trinkets, and privileges contingent upon academic behavior served to strengthen that behavior, and led to marked improvement in reading, arithmetic, etc. In none of these studies were the experimenters concerned with underlying perceptual deficits, neurological dysfunction, or the like. Their sole concern was remediation of the academic deficits displayed by the subjects. The

target behaviors were identified, and appropriate consequences for improved behavior provided. As a result, subjects' performance on academic tasks improved.

Parent Participation

The McKenzie et al (1968) study was innovative in involving the subjects' parents in the modification program. The parents served in providing a weekly allowance for their child, which acted as a back-up reinforcer for academic behavior in the classroom. This was a small role for them to play and reflects the fact that, in the past, parents have rarely been included in remedial academic programs. Parents have been involved in carrying out patterning exercises with their children in accord with the Doman-Delcato program. Yet for academic behavior, responsibility has been placed almost entirely with teachers or other professionals.

Most parents of learning disabled children are extremely concerned with helping them (Tarnapol, 1969; Thompson, 1967), and professionals familiar with the problems of the learning disabled stress the importance of involving the parents and family of the child (Kloss, 1969; Richardson, Kloss, & Timmons, 1971). At first parents were given only counseling to help them understand and cope with their children at home (Barsch, 1967). Recently, programs providing more specific instructions in management of behavior problems have been set up (Vallett, 1971). A program for coordinating actions in the home and school

has been proposed to assist culturally disadvantaged children in academic skills (Henderson, 1970). However, programs for involving parents in the remediation of their children's specific academic problems still are very limited. As recently as 1971, Webb and Kronick, two writers familiar with the problems of the learning disabled, merely advise parents to be patient, "pray for the dawn", and join some organization concerned with learning disability.

Despite the paucity of studies employing parents to modify academic behavior, the literature abounds with accounts of their successful modification of other undesirable behaviors exhibited by their children. For example, alteration of reinforcement contingencies by parents has been successful in modifying encopresis (Conger, 1970), psychogenic seizures (Gardner, 1967), autistic behavior (Dodge & Harris, 1969; Wetzel, Baker, Roney, & Martin, 1966), behavior of brain-injured children (Hall & Broden, 1968; Salzinger, Feldman, & Portnoy, 1970), extreme isolation (Patterson, McNeal, Hawkins, & Phelps, 1967), excessive dependency (Wahler, Winkel, Peterson, & Morrison, 1965), non-verbal behavior (Dmitriev & Harris, 1969), as well as what has been termed the "brat syndrome", including tantrums, assaultiveness, threats, etc. (Bernal, Duryee, Pruett, & Burns, 1968). Usually it is the parents who are unwittingly reinforcing such undesirable behavior and thereby maintaining it. Thus, it is essential that they be taught to alter their reinforcement practices in order that any change in

the child's behavior endure. In the earlier studies, parent instruction was often carried out in a clinic setting. The parent (usually the mother) would watch the experimenter in interaction with her child, and later take over the experimenter's role in providing appropriate consequences for the child's behavior. In the interests of maximizing generalization of the desired behavior to the natural environment, later studies were carried out solely in the home. Often other family members were taught to provide appropriate reinforcement for each other's behavior. In order to utilize the professionals' time in the most economical way, group training sessions for parents were introduced (Mira, 1970; Patterson, Cobb, & Ray, 1970; Walder, Cohen, Breiter, Daston, Hirsch, & Liebowitz, 1969; Wetzel, 1970). These sessions typically provided instruction in principles and techniques of behavior modification, identification and recording of behavior, and included modeling of appropriate behavior by the experimenter, and role playing by the parents.

In view of the success that parents have had in modifying undesirable behavior, it is surprising that they have rarely been involved in the modification of academic skills. Although Mathis (1971) and Ryback and Staats (1970) have included parents in remedial programs, such studies are not common. Perhaps the fact that parental behavior seems less obviously related to the etiology of specific learning disorders has delayed the realization that parents could serve as remedial teachers for their learning disabled

children. It should be noted, however, that some authors have maintained that parental behavior may be related to their children's learning disability (Carter & McGinnis, 1970; Peck, 1971).

In the specific area of reading disability, Staats and his colleagues pioneered in employing nonprofessionals (students and housewife volunteers) as instructional-technicians in remedial reading projects (Camp & von Doorninck, 1971; Staats & Butterfield, 1965; Staats, Minke, & Butts, 1970; Staats, Minke, Goodwin, & Landeen, 1967). In these studies, contingent reinforcement of correct reading responses resulted in improved reading performance. The techniques used in the studies were eventually incorporated into the "Staats Motivation Activating Reading Technique" (SMART) (Camp & Staats, 1970). SMART is a simplified program through which nonprofessionals can train children to read. Reading material is presented in small steps beginning with words and building them into sentences and paragraphs. Immediate reinforcement in the form of tokens is presented contingent upon correct responses. According to Staats and Staats (1962), such gradual stages reduce the aversiveness produced by the intensive training of the school situation. Camp and Staats feel their program is unique in several ways: it utilizes a general drill and practice procedure which can be adapted to different materials; it uses incentives for eliciting good work and attention from reluctant readers; it recognizes the importance

of immediate consequences; and it can be learned by non-professionals in a short period of time.

SMART was employed in the only study to date employing group training for parents of learning disabled children (Ryback & Staats, 1970). The purpose of the study was to determine whether parents could successfully function as therapy-technicians to help their own children overcome reading deficits. Subjects were four children ranging in age from $8\frac{1}{2}$ to 13 years who had been described as poor readers, and who met a criterion of reading correctly between 20 and 80 words on a 100 word pre-test. Parent training began with four hours of group meetings during which the procedures were outlined, demonstrated, and practised. During the first two weeks of the program, the parents were observed and directly supervised by the experimenter. Gradually the supervision was withdrawn and the parents carried on the program independently.

In assessing the effectiveness of their program, Ryback and Staats considered several dependent variables: total number of words read, reading rate, short-term and long-term retention of words learned, and a comparison of the scores obtained by the subjects on the 100 word tests and Spache Diagnostic Reading Scales administered before and after training. Improvement in the children's reading ability was demonstrated by all these measures.

Ryback and Staats concluded from their study that parents using the SMART method were highly successful in

improving their children's reading. There are, however, several shortcomings in the Ryback and Staats study which preclude any definitive statements regarding the effectiveness of their program with parents. Taking the criteria for an applied behavioral analysis set out by Baer, Wolf, and Risley (1968) as a guideline, the weaknesses of the Ryback and Staats study become apparent. In order to conclude that the program was effective in changing behavior, the experimenters would have to prove that the behavior in question actually changed. That is, evidence of the reliability of measurement of the target behavior should be provided. Since this study relied on human observers to measure behavior, there exists the possibility that the changes in reading behavior recorded by the observer may reflect changes in his own perceptions rather than in the subject's behavior. Explicit measurement of reliability of observers is a requirement that was overlooked by Ryback and Staats.

Ryback and Staats assessed the generality of the change in reading behavior in terms of changed scores on an alternate measure of reading ability, the Spache Diagnostic Reading Scales. They did not, however, investigate the durability of the improved reading. Follow-up data indicating maintained improvement in reading would provide impressive support for the efficacy of their remedial program. The absence of such data weakens their claims.

Description of the Program

The present study will investigate the effectiveness of a program of drill and response-contingent reinforcement such as SMART when presented by parents. This study will also include measurement of reliability and follow-up assessment of the subjects' behavior. In addition, the present study will employ a multiple baseline design for the purpose of assessing change in the target behavior (Baer, Wolf, & Risley, 1968; Hall, Cristler, Cranston, & Tucker, 1970). This design has an advantage over the pre- and post-test design used by Ryback and Staats in that it does not require grouping of data and reliance on levels of statistical significance. Baer, Wolf, & Risley (1968) feel the multiple baseline design is the only one other than a reversal design in which the experimenter can demonstrate that his techniques can control the behavior in question. The multiple baseline design is often more appropriate than the reversal in dealing with academic behavior. Once a subject reaches criterion on a reading or spelling task, the behaviors are likely to become very resistant to extinction, reducing the appropriateness of using a reversal design. With the multiple baseline method, several behaviors are observed to establish the baseline or pre-treatment level of each. Then the experimental variable (eg., the remedial program) is applied to one of the behaviors only, although its effects on all the behaviors are measured and compared. Presumably the experimental variable will have produced a change in the first

behavior, but have had no effect on the others. It is then applied to the second behavior and its effects noted. If the behaviors change maximally only when the experimental variable is applied to them, it is concluded that the experimental variable is the factor responsible for the change. This multiple baseline technique is well suited to work with learning disabled children. Generally these children demonstrate several specific behavioral deficits that require remediation (eg., deficits in reading, arithmetic, spelling, etc.). It should, therefore, be appropriate to take baseline measurements of a few of these behaviors, and then apply the experimental variable to each in turn.

The purpose of the present study is to determine whether parents can be taught to serve effectively as modifiers of their children's academic deficits. Reading and spelling will be the target behaviors; reliability of scoring will be assessed, and a follow-up study conducted. It is expected that the parents' actions will lead to an improvement in the reading and spelling of their children.

CHAPTER II

METHOD

Subjects

The three children who served as Ss were selected from second grade classes at a Winnipeg elementary school. Teachers were asked to select students from their classes whose reading, in their opinion, fell below the level appropriate to the grade placement.

The children can be described as follows. J was a $7\frac{1}{2}$ year old boy living at home with his mother, grandmother, and $8\frac{1}{2}$ year old sister. The parents were separated and the boy had no contact with his father. On the P.M.A. administered one year before the present study, J had obtained an IQ score of 124, indicating superior intelligence. His reading, however, was well below a mid-grade 2 level. He showed confusion between "b" and "d", reversed words such as "was" and "saw", and frequently substituted words beginning with the same letter but which were otherwise completely different (eg., he read "potato" instead of "pilot"). J was also quite distractible. For example, stimulus words presented during the reading lessons reminded him of stories which he proceeded to relate. J's mother had completed grade ten, and was working as an office clerk.

W was also $7\frac{1}{2}$ years old, and living at home with his parents and four siblings aged $8\frac{1}{2}$, $6\frac{1}{2}$, $5\frac{1}{2}$, and $2\frac{1}{2}$. An IQ score of 99 on the P.M.A. suggests that W was of average intelligence. At the end of grade one he received a grade of C-. His present teacher and also his grade one teacher

had described him as lacking in self-confidence. W seemed to attend well to the lesson material. His mother had completed her high school education. She was not employed outside the home.

Z was an 8 year old boy who was repeating the second grade. The oldest of three children, his siblings were 7 and 4 years old. Z lived at home with both parents. Teachers had described him as being very immature. He often had difficulty in attending to the lessons, and moved around a great deal in his chair. In reading and spelling he tended to confuse "b" and "d", and he reversed the order of letters when spelling words. Unfortunately, no IQ score was available for Z. His mother had a grade eight education, and was working as a hairdresser.

Materials

Reading. The reading material consisted of thirty stories taken from the grade two level of the Rate Builders section of the Science Research Associates Reading Laboratory, Elementary Edition (Parker, Tuttle, McGrath, Hickey, and Longfield, 1958). The procedure used to present the material was adapted from SMART. It consisted of three separate phases for each story, namely: vocabulary words, oral reading, and silent reading and comprehension questions. The vocabulary words and sentences in the oral reading phase were printed in colored letters on white 3" x 5" cards and presented to S through the window of a reading board. The

story material and comprehension questions were typed on a sheet of white paper. Questions were separated from each other by colored lines.

Spelling. The spelling material consisted of words taken from readers corresponding to a late grade one level (On Cherry Street from the Ginn Basic Readers Series, and We Three from the Gage Curriculum Foundation Series).

Although there was some overlap, an effort was made to exclude words taught in the reading program. Lists were compiled in order of increasing difficulty. Each word from a list was to be printed on a long strip of yellow paper which could be folded over to conceal previous responses.

Procedure

Parent Instruction. The mothers of the Ss were taught to serve as instructors.

Reading. Training began with three group meetings. At the first meeting E explained the general format and schedule of the program, summarizing the successes achieved with the procedures in the past. The concept of reinforcement was introduced and explained in some detail. The objections to using tangible reinforcers raised by O'Leary, Poulos, & Devine (1972) were discussed. As a homework assignment, the mothers were asked to complete two chapters of Vallett's (1969) programmed guide dealing with reinforcement. The second meeting, held six days later, was devoted to a detailed explanation of the reading program. The

mothers were shown samples of stimulus materials and data sheets, and were given a comprehensive outline of the procedures to be followed in conducting the program. The outline was to be used as a reference only. All the procedures described therein were modeled by E. At the third group meeting, held the next night, the mothers each practised administering the reading program to E.

Half-hour sessions were conducted daily in the home. For the first three sessions, E administered the program to S while the mother observed. Then, for the next two sessions, E presented the stimulus materials to S while the mother recorded S's responses. Following that, E and the mother reversed roles during two sessions, so that the mother was working with S while E recorded responses. Then the mother took over sole administration of the program under E's direct supervision. After four or five days of correct administration by the mother, E discontinued daily observation, but did observe at least one session per week in order to insure that correct administration was being maintained. At first, on those days when E was not present for the session, she contacted the mothers by telephone to check on S's progress and answer any questions that had arisen. Gradually the telephone supervision was reduced to one call every three days. Probe sessions were held approximately every seven to ten days to assess spelling performance and to check on retention of reading material. These sessions were conducted by E. As well, in order to assess

the effectiveness of the mother as an instructor, E taught three lessons herself. Comparisons of S's performance with each instructor could then be made. The scheduling of these control lessons varied for each S in order to avoid possible confounding from any time-related changes in performance.

Spelling. After the last S had completed the reading program (43 days later), the final group meeting was held. At that time the spelling program was introduced. The mothers were given an outline of the procedures, and again E modeled them. Then the mothers practised among themselves, taking turns serving as instructor and subject. For the first two sessions in the home, E administered the program to S while the mother observed. Then she took over under E's direct supervision. After about a week, E discontinued direct supervision but maintained telephone contact. E again conducted weekly probe sessions to assess reading performance and retention of spelling words.

At the last spelling session, E discussed with the mother the advantages of her carrying on with the reading program on her own. E showed her how to prepare the stimulus materials from stories in readers and magazines. She was strongly encouraged to continue the program.

Throughout the programs, reliability of the mothers' scoring was assessed. E scored S's responses as correct or incorrect independently of the mother. An index of reliability was calculated for each lesson by dividing the total number of agreements by the total number of agreements plus disagreements. The mean of these individual indices was

taken as the overall index of inter-scorer reliability for each mother.

Child Instruction. E introduced the program to each S. She explained that it was a new way of learning to read and that he could earn points for doing well. She explained the reinforcer system and the way points could be exchanged for back-up reinforcers. Three types of tokens were used as reinforcers, distinguished by color and representing different value in terms of items for which they could be exchanged. Ss were given the higher value tokens for correct responses emitted without prompting. Blue tokens were worth one point, white were worth two points, and red were worth five points. A point was considered equivalent to one-tenth of a cent. A menu of back-up reinforcers was provided for S. The mother filled a box with candy and toys and labelled each item with a price in terms of points. At the end of each session, S counted up his tokens and the mother converted them to points. S was then allowed to purchase items from the box, exchange the points for money, or save them to be put toward a larger item.

Reading. A list was made of all the new words appearing in each story. Each word from the list was printed on a card. Before training on each lesson began, the list for that lesson was presented to S to read. No reinforcement was given. This provided a baseline measure of S's ability to read those words. Each list was divided in half, and following training on the vocabulary of the first half, a second baseline was

taken on S's performance on the second half of the list and compared to his performance on the first half. After training on all phases of the lesson, a final assessment was made of S's reading of both halves of the list, including those words which had been correct on the baselines. The three phases of training were conducted as follows.

1. Vocabulary words. All of the words that S had missed during the baseline were presented in training. Each word was presented individually and S was asked to read it. If he responded correctly, he received a high-value (red) token and that word was dropped. If he could not read the word correctly, the instructor told him the word and S repeated it several times while looking at it. That word was returned to the group of words yet to be presented. Words were retained until S had read them correctly on one unprompted trial. If he responded correctly on the second or third trial, S received a mid-value (white) token. After that, a correct response earned a low-value (blue) token. Words rarely had to be presented more than three times.

2. Oral reading. After S had successfully read all the vocabulary words, he was presented with cards containing one or two sentences from the story. Later lessons contained up to four sentences, thus requiring Ss to work harder for their reinforcement. If all the words on the card were read correctly, S received a red token. If S made errors, he was corrected by the instructor and told to repeat the correct words while looking at them. That card was then put aside

for re-presentation after the others had been shown once. When the card was read correctly, S was given a white token.

3. Silent reading and comprehension questions. After S had completed the oral reading, he was given the sheet of paper containing the entire story and five comprehension questions. S was told to read the story to himself (he was allowed to read out loud but was given no help or corrections unless he requested it) and to make sure he understood it so he could answer questions about it later. He received a white token for completing the story. Then he was asked to select the correct answer from a list of alternatives to each of the questions which followed the story. He received a red token for each correct answer. If the answer was incorrect, S was told to re-read the relevant section of the story and to correct his answer. A correct answer at that point was reinforced with a white token.

Spelling. From the pool of words taken from the readers, fifteen lists, six words in length, were compiled. Before spelling training began on each list, S was asked to spell each word from the list to provide a baseline on spelling performance. The list was divided in half and S received training on the first half. Then another baseline was taken on the second half. Following training on both halves, a final assessment was made on all words in the list, including those which had been correct during baseline.

Only those words which S missed on the first baseline

were presented in training. For each word, S was given a long sheet of paper. The instructor said each word and asked S to print it at the top of the paper. If he printed it correctly, he received a red token and training on that word was discontinued. If he made an error, S was instructed to fold over the paper and copy the word printed there. After he copied the word, he was told to keep folding the paper and filling in the missing letters. The paper was designed so that each time S folded it over, fewer letters in the word were printed there, requiring S to fill in more letters to complete the word. Eventually all prompts were removed and S had to print the entire word himself. Correct responses in filling in letters were reinforced with blue tokens. Correct printing of the entire word at the end of the sequence was reinforced with a red token. Although Ss could earn more tokens by responding incorrectly at first and having to go through the whole paper, none of the Ss in the present study caught on to this. They preferred to get the response correct initially rather than having to complete the whole paper. If S made any errors in filling in letters, he was told to turn back to his previous responses for the correct spelling. This rarely was necessary.

After all the words had been spelled correctly once, a practice drill was provided. All the words from the list that had been read incorrectly in the baseline were covered. In the drill, S was asked to spell the words as they were

dictated to him. If he spelled each one correctly the first time, he received a red token. If he made an error, the instructor printed the word correctly and S copied it. That word was put aside and presented again after all the words had been presented once. A correct response on the second or third trial was reinforced with a white token. After the third trial, a blue token was given for a correct response. The drill continued until each word had been spelled correctly.

Approximately two months after the termination of the spelling program, E held two sessions with Ss in which retention of the material covered in the programs was assessed. Words which had been missed during baselines were presented to S to read and spell.

Design

The present study employed a multiple baseline design with three sets of data: the reading-spelling baselines, the inter-lesson baselines, and the intra-lesson baselines.

For the reading-spelling baseline analysis, baselines were taken initially on reading and spelling. Following application of the remedial program to reading, performance on the two behaviors was compared. Then the program was applied to spelling and its effects assessed in terms of change from baseline.

The inter-lesson baseline analysis involved an examination of lessons in groups of three. The purpose was to see if training on one lesson would affect performance on a

different lesson. A baseline was taken on the pool of vocabulary words from the three lessons. Then the remedial program was applied to the words from the first lesson, followed by another baseline on the whole pool of words. The program was then applied to the second and third lesson in turn, followed each time by a baseline on the pool of words. In this way the effects of training on the first lesson could be assessed in terms of change in that lesson as compared with the absence of change in the second and third lessons.

For the intra-lesson baseline analysis, each lesson was divided in half. Following measurement of baseline performance on both halves, the independent variable was applied to the first half only. The changed performance on this half was compared with the unchanged performance on the second half. After this stage, the independent variable was applied to the second half and its effects noted.

CHAPTER III

RESULTS

The major dependent variable used for analysis was the per cent correct responses emitted by S under conditions of no reinforcement, during baseline and post-teaching assessment. This dependent variable was used by Bailey, Timbers, Phillips, & Wolf (1971). It has the advantage of approximating more closely natural environmental practices in which S is not immediately reinforced for each correct response. Thus, the data give a better indication of how S will perform in the natural environment.

Over the nine week period, J learned to read 197 new words and to spell 55 new words. W learned 159 new reading and 57 new spelling words. Z learned 162 new reading and 59 new spelling words. New words learned were defined as those words which S got wrong on baselines taken before training, but which he got correct after training. It should be noted that because of time factors, J was taught fewer lessons than W or Z. The larger number of words learned by J reflects the fact that he missed more words during baselines and was thus presented with more new words to be learned.

To ascertain the durability of the results, review tests were administered every seven to ten days, covering all the new words taught during that period. In reading, J retained an average of 61.80% of the words, W retained

79.77% and Z retained 74.23%. In spelling, J retained 46.63%, W retained 66.44% and Z retained 58.14% of the new words he had been taught.

To assess the long-term durability of the results, a follow up was conducted two months after the termination of the spelling program. In reading, J retained 45.24% of the words he had been taught, W retained 81.21%, and Z retained 66.64%. In spelling, J retained 28.07%, W retained 64.81% and Z retained 64.91% of the words.

Results indicate, then, that Ss could read and spell a number of new words and that many of these words were retained over a considerable length of time. Figures 1, 2, & 3 show the effectiveness of the remedial program of drill and contingent reinforcement in producing the observed changes. For each S, the baseline level of performance in reading and spelling was lower than the post-training level. The level of performance in spelling during reading training remained relatively low until the application of the remedial program to spelling. At that time, spelling performance improved for all Ss. As Tables 1 & 2 show, a comparison of the mean scores obtained by each S during baseline and post-training assessment indicated that the change in performance in reading and spelling was significant for all Ss. In addition, Figure 4 shows that performance on the first half of the reading lists increased following implementation of the program to that half, while performance on the second half remained near the baseline level. Only when the program

was applied to the second half did the performance level increase. The inter-lesson analysis shown in Tables 3 & 4, revealed little change in performance on each lesson until the program was applied specifically to that lesson.

The finding that Ss were able to read more words as a result of the program would be of little practical value unless it could be shown that Ss were able to understand what they read. Taking the mean per cent correct responses to the comprehension questions as an index, it appears that Ss did understand the new words they learned. Of the 150 or more comprehension questions presented, J answered 90.66% correctly on the first trial, W answered 88.75%, and Z answered 96.25%.

The mothers performed effectively throughout the program. No difference was observed in scores obtained by Ss under their mothers' instruction as compared to E's (the "E"s next to the points on Figures 1, 2, & 3 indicate those lessons which were administered by E). As well, reliability of scoring was high for both reading and spelling. For J's mother, reliability averaged 98%. For W's and Z's mothers, the average inter-scorer reliability was 99.5%.

The mean cost of reinforcers for each child was \$3.63. J earned \$3.38; W earned \$3.38; and Z earned \$3.58 over the nine week period. Because of the small expense, the parents, all of whom had limited incomes, had no objections to providing back-up reinforcers for their children.

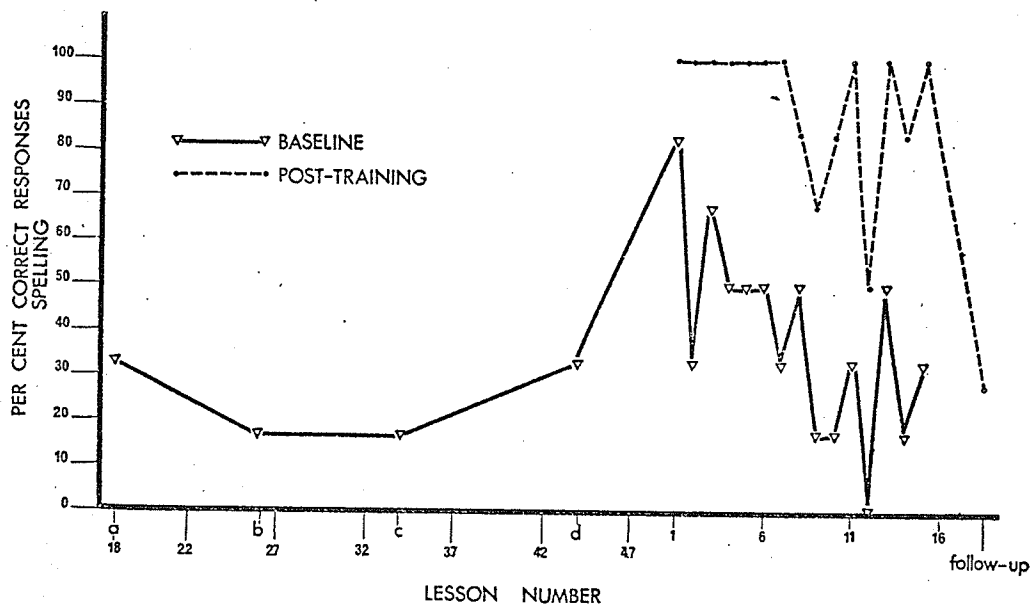
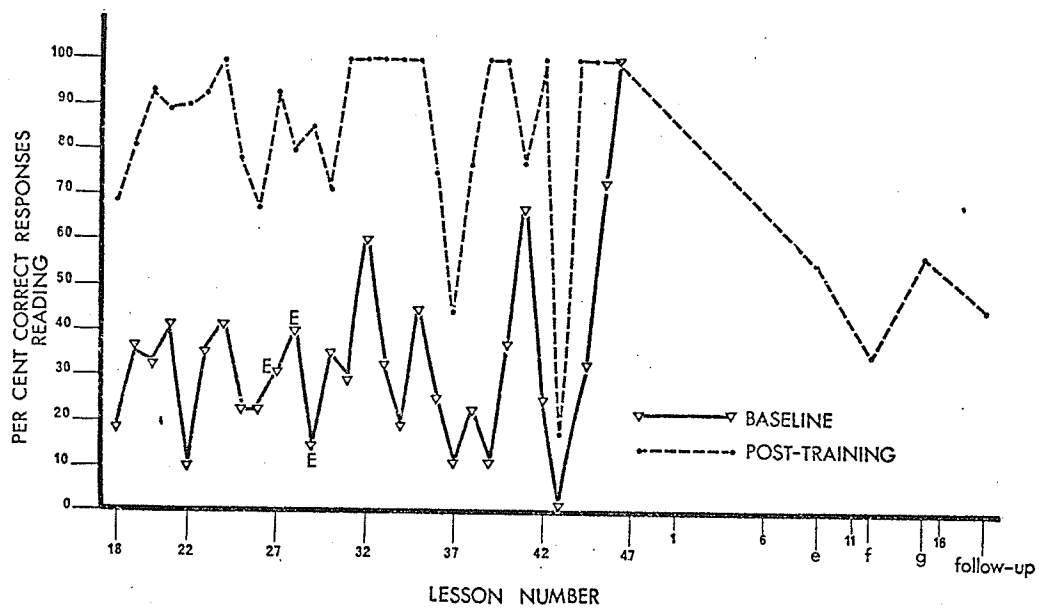


Fig. 1 Per cent correct responses on reading and spelling tasks during baseline and post-training assessment; J.

NOTE: Numbering of reading lessons begins with 18.

Probe sessions are lettered a to g.

Lessons taught by the experimenter are indicated by E.

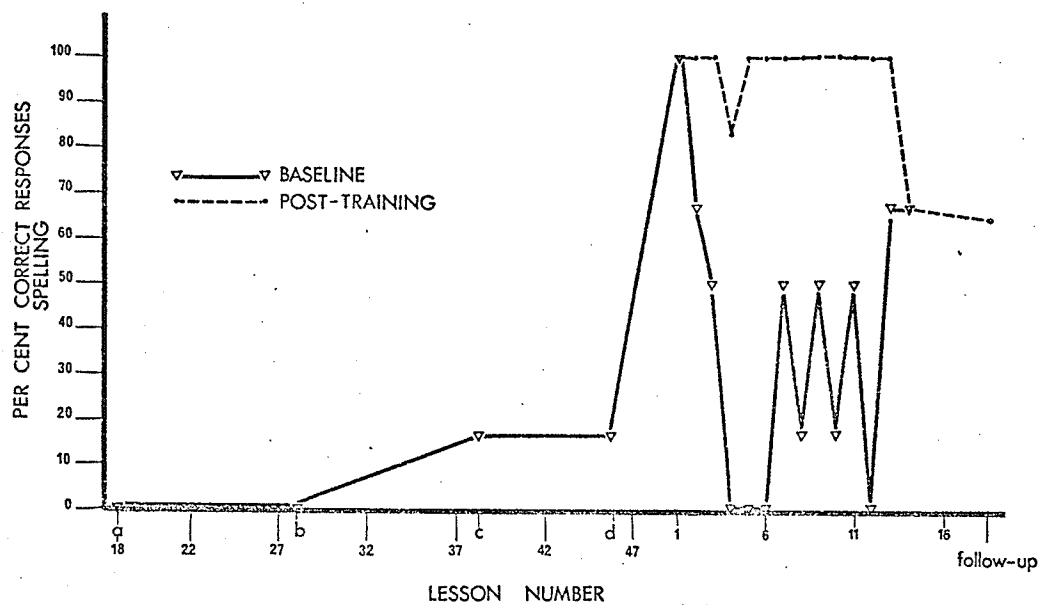
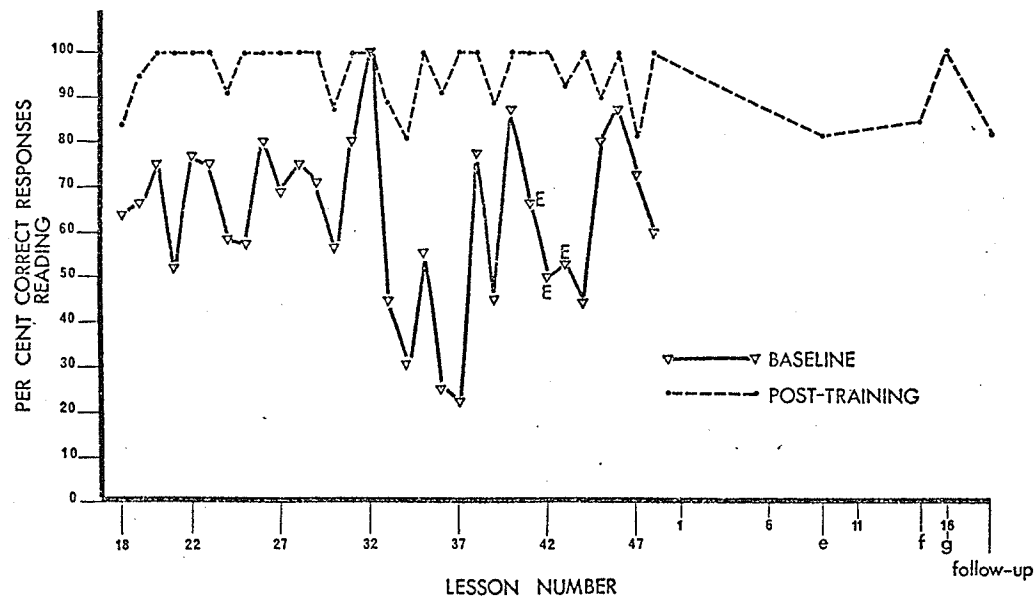


Fig.2 Per cent correct responses on reading and spelling tasks during baseline and post-training assessment; W.

NOTE: Numbering of reading lessons begins with 18.

Probe sessions are lettered a to g.

Lessons taught by the experimenter are indicated by E.

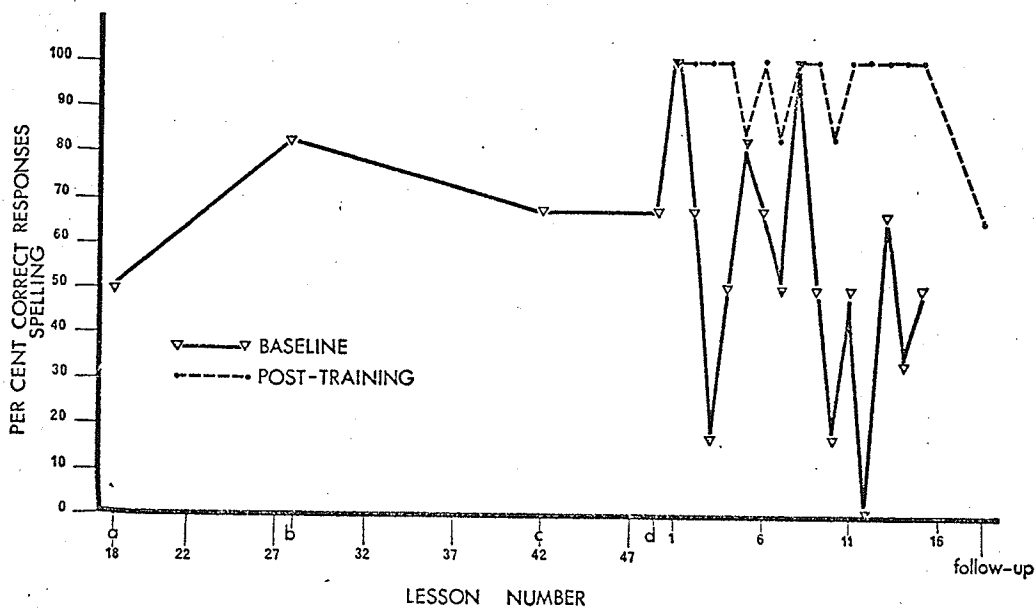
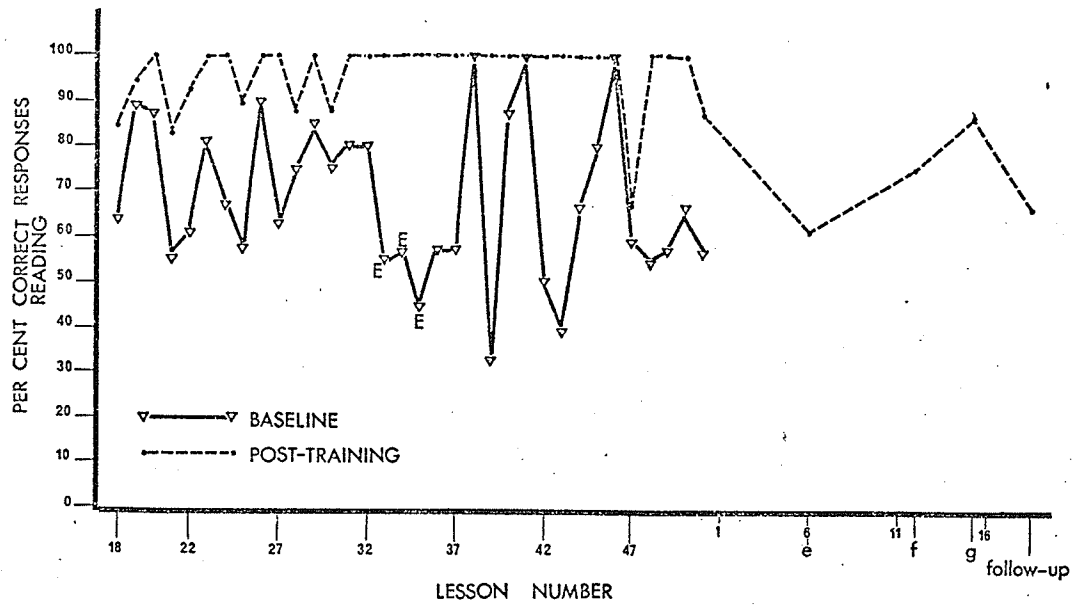


Fig.3 Per cent correct responses on reading and spelling tasks during baseline and post-training assessment; Z.

NOTE: Numbering of reading lessons begins with 18.

Probe sessions are lettered a to g.

Lessons taught by the experimenter are indicated by E.

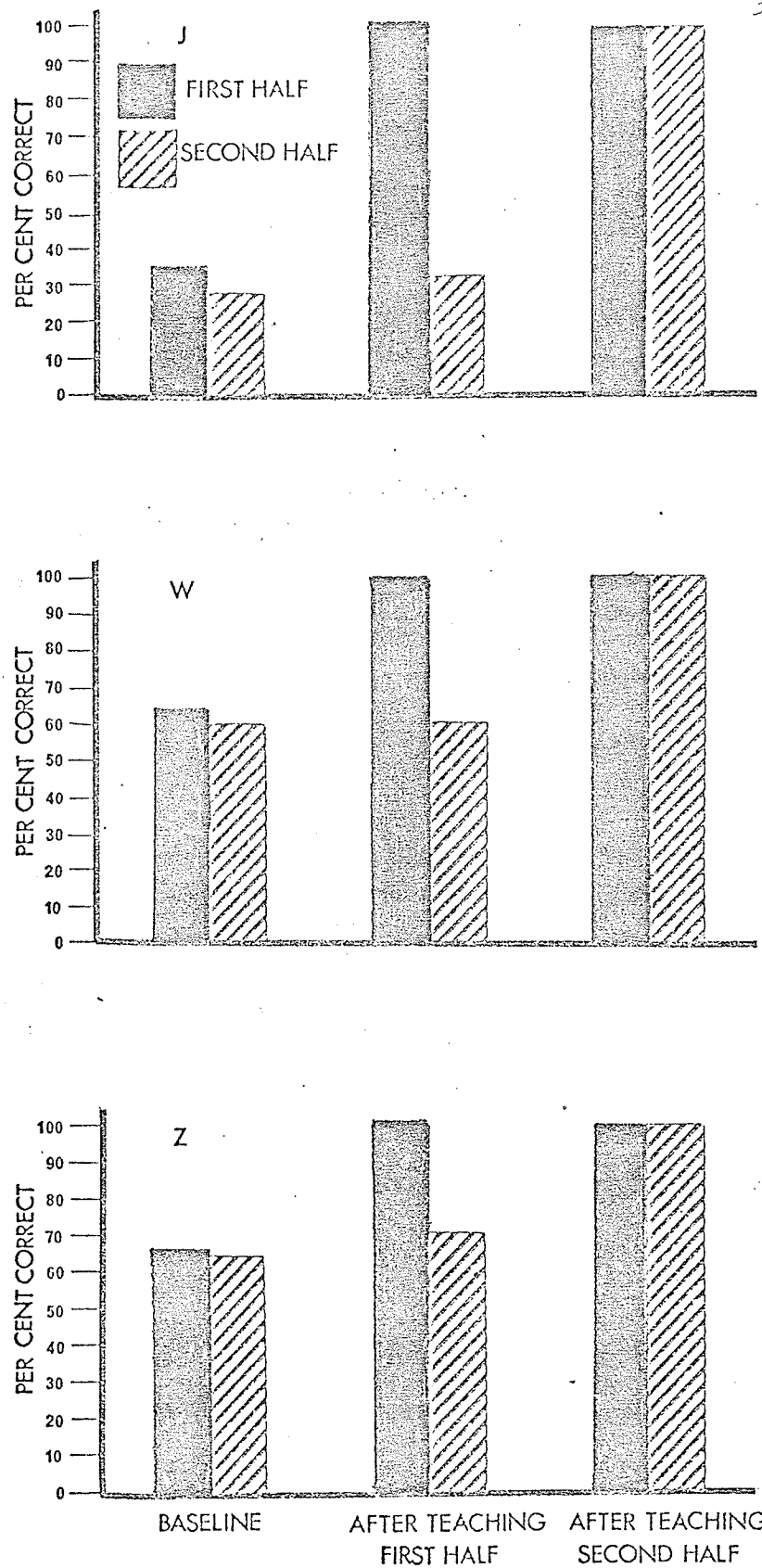


Fig.4 Performance level on both halves of vocabulary lists at three stages of training.

TABLE 1

Comparison of Mean Reading Scores During Baseline and
Post-Training Assessment

<u>S</u>	Baseline Score	Post-training Score	<u>t</u>	<u>df</u>
J	3.41	9.24	9.92*	28
W	7.35	11.19	9.30*	30
Z	8.18	11.62	8.39*	33

* $p < .001$

TABLE 2

Comparison of Mean Spelling Scores During Baseline and
Post-Training Assessment

<u>S</u>	Baseline Score	Post-training Score	<u>t</u>	<u>df</u>
J	2.53	5.47	11.87*	14
W	2.50	5.79	6.34*	13
Z	3.20	5.80	5.71*	14

* $p < .001$

TABLE 3

Results of the Inter-Lesson Baseline Analysis Showing Mean Changes in Per Cent Correct Responses on the Third Lesson in the Series After Training on the First Two Lessons.
Reading

<u>S</u>	Mean Change	
	After 1 Lesson	After 2 Lessons
J	-2.9%	+7.72%
W	+3.45%	+3.46%
Z	+1.49%	+8.98%

TABLE 4

Results of the Inter-Lesson Baseline Analysis Showing Mean
Changes in Per Cent Correct Responses on the Third Lesson
in the Series After Training on the First Two Lessons
Spelling

<u>S</u>	Mean Change	
	After 1 Lesson	After 2 Lessons
J	+3.3%	+0.2%
W	+0.14%	+0.75%
Z	+1.1%	+0.8%

CHAPTER IV

DISCUSSION

The results of the present study demonstrate the effectiveness of the remedial program when administered by parents. As indicated by Figures 1, 2, & 3, reading and spelling performance changed maximally only when the program was applied specifically to that behavior. It thus appears that the remedial program was responsible for the significant improvement in performance. Similarly, the intra-lesson baseline analysis suggests that the remedial program was responsible for improving Ss' reading of both halves of the vocabulary lists in the reading lessons. Ss' reading of the first half improved markedly after training on that half, but reading of the second half remained near the baseline level. Only when the program was applied to the second half did Ss' performance on that half increase.

The follow-up results indicate that at least two Ss retained over a two month period much of the material covered in the program. J's performance in the follow-up was considerably lower than that of the other Ss. It should be noted that during the follow-up sessions J attended poorly to the stimulus materials and was very anxious to end the sessions. His inattention may be partly responsible for his poor performance.

On the whole, the present study indicates that parents can learn in a short time to remediate the academic deficits of their children. The mothers in this case had no previous

training, nor had they any more than a high school education (and in two cases, less than high school). As well, two of the mothers held full-time jobs at the same time they were participating in the program. Yet they responded well to the instructions and supervision given by E, and learned to become effective instructors for their children.

Group meetings were held in order to cut down on training time for the mothers. In this study, the group meetings provided the mothers with an overview of their role and rudimentary practice in carrying out their duties. However, they all stated that E's supervision during their initial sessions with the children was necessary. They felt more comfortable at first having someone to correct them or help them if they forgot a step in the program. The present study did spend more time than the Ryback & Staats (1970) study in directly supervising the mothers. Perhaps this time could have been reduced with longer, more intensive practices at group meetings. Yet the mothers responded differently to their own children than to the other mothers serving as Ss. Thus, it was difficult for E to foresee problems that might arise in the parent-child interaction. For example, Z's mother had no difficulty in providing social reinforcement for another mother, but with her son she behaved differently. She rarely praised him for good work, but expressed impatience and annoyance at his errors. E's presence at the training sessions was needed in order to

detect the problems and point them out to the mother. Thus, though they save time initially, group meetings alone may not provide sufficient training for parents. Personal supervision appears to be necessary as well.

In the past, studies using parents as modifiers of behavior have occasionally provided external reinforcement for the parents themselves (Patterson, McNeal, Hawkins, & Phelps, 1967; Patterson, Ray, & Shaw, 1968; Patterson & Reid, 1970). One way of reinforcing the mothers at no cost to E would be to ask them to submit a sum of money at the beginning of the program, and to return portions of it periodically, contingent upon their cooperation with instructions. This plan was suggested to the mothers in the present study. As Z's mother objected vigorously, the suggestion was dropped. Although external reinforcement proved to be unnecessary for the other two mothers, as they cooperated fully with E, some incentive would have been desirable for Z's mother. On three occasions when E had told her she was coming to observe the lesson, the mother was absent or too busy to hold the lesson at the time E had arranged. As well, at the beginning of the spelling program, the mother told E that she would no longer work with her son on Sundays, as she had originally agreed to do. It is likely that Z's father was responsible for the latter decision. On several occasions he remarked to his wife and to E that he hoped the program would soon be finished. It would

probably have been advisable to include the fathers in the program. When E contacted the mothers initially, she had requested that both parents attend the group meetings. It was hoped that the fathers would gain some understanding of the rationale behind the program, although the mothers would serve as instructors. As neither father came to any of the three meetings despite repeated requests, however, E abandoned plans to include them.

The children were usually eager to have their lessons. The back-up reinforcers apparently provided a strong incentive to work. Their importance was clearly illustrated with W. W found the spelling program more difficult than the reading, and eventually refused to come in the house when called for lessons. Yet after the ratio of back-up reinforcers to tokens was increased on a trial basis for him, he came in and asked his mother when they could have the lesson. He was most anxious to begin. Previous experimenters have stressed the fact that as their programs progressed, Ss were required to do more work for their tokens (Ryback & Staats, 1970; Staats, Minke, & Butts, 1970; Staats, Minke, Goodwin, & Landeen, 1967). The present study included this feature in the reading program. That is, in the oral reading phase, Ss eventually had to read three or four sentences for one token, whereas initially they had read only one. When the spelling program was introduced, Ss' reluctance to participate (all Ss disliked that program) necessitated the

reinstatement of a dense schedule of reinforcement. But Ss continued to respond correctly during post-training assessment, a condition wherein they received no reinforcement, suggesting that the amount of reinforcement given during training should have no ill effects on Ss' performance in the natural environment when no reinforcement is given.

As noted above, Ss disliked the spelling program but not the reading program. It is difficult to account for this result. It may be partly because the reading program was composed of several phases. The change of activity within each lesson may have made the work more appealing. All the Ss liked the last phase in which they read the whole story without correction. They usually read it out loud and with expression. Perhaps the opportunity to read meaningful material without correction was reinforcing in itself. The spelling program lacked any comparable phases. In addition, as part of the reading program, S was required to read both old and new words. Thus, although S might get the new words wrong and not receive a token, he would still be able to read many words correctly. Perhaps being able to read words correctly was reinforcing to S. In the spelling program, only new words were presented, making it more difficult for S to respond correctly. In the future, designers of remedial spelling programs should consider these factors in constructing their programs.

Despite these few difficulties, the overall success of the present program points up the potential value of

training parents to work with their learning disabled children. In an area that greatly needs instructors and one in which so many parents have shown concern, the advantages of training parents as instructors must be clear. In relatively little time, one professional could train many parents, who could then carry on the teaching programs over extended periods of time. Although further studies will be needed to refine the techniques of parent training, and to develop more remedial programs such as SMART, the benefits of future programs seem to be many.

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