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LEARNING DISABILITIES AND ANXIETY

by

© CHRISTOPHER JAMES SPILLIOS

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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ABSTRACT

The present study investigated the effects of a differential relaxation procedure as a remedial technique for learning disabled males. A circular relationship involving stress, anxiety, and inappropriate responses was postulated to be a contributing factor in the learning disability syndrome. The Hull-Spence learning model was used as a theoretical framework to explain the effects of anxiety on learning. Intervention at the anxiety level of the circular relationship was undertaken by means of relaxation training. It was hypothesized that the treatment would effect greater gains in the experimental group than the gains shown by the control group on individual and group measures of academic performance and anxiety level.

The subjects consisted of 36 males between 9 and 12 years of age. They were selected from those students attending eight classes for the learning disabled in four schools of the Edmonton Public School System, and who met the requirements of age, sex, average range intelligence, and a minimum of a two year deficit in reading. The subjects were then randomly assigned to the experimental and control groups, with the experimental group receiving 12 treatment sessions.

The hypotheses predicting that the experimental group would make greater gains on the academic measures than the control group were rejected. However, data indicating that the experimental group made significant gains on the Reading Recognition and Mathematics measures, while further indicating the control group gains were not significant, suggest that further research in this area might be beneficial.

The hypotheses predicting that the treatment would effect significant decreases on the anxiety measures were rejected. Some factors which may have contributed to this outcome were discussed.

The hypotheses predicting no differences on the academic and anxiety measures between the high and low anxiety groups were, with one exception, accepted.

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Chapter I

INTRODUCTION

The field of learning disabilities is relatively new in relation to other areas of psychological study. Its "official" beginning was in 1968 when the American National Advisory Committee on Handicapped Children formulated a definition of the term "learning disabilities". This definition was to become the focal point of research, diagnosis, remediation, and education dealing with children whose academic achievement was not commensurate with their intellectual abilities. However, there has been continuing controversy regarding such factors as the definition itself, what constitutes a discrepancy between intellectual capabilities and academic achievement, teaching methods, etiological considerations, and whether the category of learning disabilities should be used at all (Gaddes, 1980; Harring & Bateman, 1977; Mercer, Forgnone, and Wolking, 1976; Myers & Hammill, 1969; Myklebust, 1967; Reger, 1979; Revilak & Janzen, 1980; Sabatino & Miller, 1980). In spite of the varying theoretical approaches, conflicting research results, and differing remedial methods, the study of learning disabilities remains as a valuable, and necessary endeavour in aiding the educational progress of learning disabled children.

The literature on anxiety dates back at least to eleventh century Arab philosophy, although the most important work has been done since Freud's conceptualization of anxiety neurosis in 1894 (Spielberger, 1972). Similar to the learning disability field, however, there has been controversy in this area. Some points of contention have been whether anxiety is synonomous with fear, whether it is emotional or

cognitive in nature, whether it is a unitary or multi-faceted concept, and whether it can be measured accurately (Epstein, 1972; Spielberger, 1972). Sieber, O'Neil, and Tobias (1977) indicated that anxiety research has been vast and fruitful, but little has been done to study anxiety in the school setting. They further indicated that in their opinion it would be difficult to imagine a more beneficial area of research.

Among the reasons for the present study was a concern regarding the observation that some learning disabled children could be taught to read satisfactorily in a clinic setting, but appeared to "lose" this ability when they returned to the regular classroom. It appeared that something besides the mechanics of the reading process was involved in the failure of these children to achieve in the classroom.

Much time and energy has been expended in researching and debating the etiology of learning disabilities, and perhaps the growing interest in the psychoneurology of learning disabilities will, in the long run, prove to be the most fruitful area of research (Gaddes, 1980). However, it seems logical that children enter school with varying levels of neurological development, and that we cannot expect all of them to function at the same academic level. In addition, there is some evidence to suggest that various skills related to the neurological functioning of learning disabled children tend to ameliorate with the age of the child (Dykman, Ackerman, Clements, and Peters, 1971). This seems to suggest that some learning disabilities may initially be a function of a developmental lag. The fact that learning disabilities persist beyond that age (approximately 10 to 12 years of age) further indicates that secondary factors are involved.

In addition to the above information, there is research evidence to suggest that affective variables might play a major role in the learning disability syndrome (Chapman, 1979). Thus, because of (a) the aforementioned evidence, (b) the fact that a major role of the previously mentioned learning disabilities clinic was to provide a relaxed and comfortable atmosphere, and (c) to the writer's knowledge, an investigation regarding the interaction between learning disabilities and anxiety had not been done, the present study was initiated.

The present research is designed to investigate the effects of a differential relaxation procedure in reducing anxiety levels in 9 to 12 year old learning disabled males, and further, to assess the treatment effects on academic performance. A postulated circular relationship involving stress, anxiety, and inappropriate responses is used to explain the involvement of anxiety in learning disabilities. In addition, the Hull-Spence model of learning may be useful as a framework to explain the relationship between anxiety and academic performance.

Given the cycle of stress, anxiety, and inappropriate responses, it seems logical that intervention at the anxiety level should be beneficial in reducing the inappropriate responses. In other words, if anxiety is reduced, the subjects' ability to increase the number of correct responses on academic measures should be facilitated. Further, if the subject is able to maintain improved academic performance the stressfulness of the school situation should be reduced. Thus, if one considers learning some disabilities to be a function of a cyclical relationship, intervention at the anxiety level should effect a

reduction in the strength of the bonds between the components of the cycle, and provide the conditions for improved academic performance.

Previous research has demonstrated that relaxation and systematic desensitization techniques have been useful in reducing anxiety (e.g. Allen, 1971; Deffenbacher & Kemper, 1974a). The utilization of relaxation techniques have been successful in reducing test anxiety in university students but subsequent effects on academic performance have been disappointing. However, the measures used to assess the academic performance were considered lacking in sensitivity to change (Anton, 1975; Bedell, 1975).

There have been few studies reported in the literature regarding the effects of relaxation training on the academic performance of elementary school children. However, there is some evidence (e.g. Word & Rozynko, 1974) to suggest that relaxation training can have beneficial effects regarding the classroom performance of learning disabled children.

The present study focuses on the ability of learning disabled males to reduce their scores on anxiety measures and increase their scores on academic measures, after receiving training in a relaxation technique. In addition, the differential effects of the training on high and low anxiety groups are considered.

The present study should provide a valuable addition to the bodies of knowledge currently existing on learning disabilities and anxiety. The learning disabilities literature is charactrized by its lack of empirical data on affective variables, and the anxiety literature has attracted very little attention in its relationships

to learning disabilities. As has been stated, "The relative lack of activity concerning anxiety in educational psychology is a pity" (Sieber, et al., 1977, p. 76).

Chapter II

LEARNING DISABILITIES

Chapter II includes a general summary of major theories of learning disabilities. Difficulties associated with defining learning disabilities are presented, followed by descriptions of major theoretical approaches and remedial considerations for children with learning disabilities. In addition, etiological and intellectual implications are discussed.

The term "learning disability" emerged from a need to identify and serve a group of children who experienced school failure but eluded traditional categories of exceptionality. During the short history of the field there has been a proliferation of definitions reflecting a variety of individual, regional, and political needs (Mercer, Forgnone, & Wolking, 1976). Complicating the task of arriving at a common definition has been the involvement of various disciplines such as medicine, language, psychology, and education, with their different terminology, focus of interests, basic premises for viewing problems, and models of behavior and treatment (Lerner, 1971). Definitions have ranged from narrow, specific classifications to broad, all encompassing categories, reflected by estimated rates of incidence ranging from 1 to 30 percent of the population. The Commission on Emotional and Learning Disorders in Children (1970) reported incidence rates of 14 percent in Great Britain, 12 to 14 percent in France, 10 to 15 percent in the United States, and 10 to 16 percent in Canada. The massing of conflicting data from research and the heterogeneous

character of learning disabled groups have led some authors to doubt that the term "learning disability" describes a true syndrome (Johnston & Myklebust, 1967; Werry & Sprague, 1970). The inconsistent data and characteristics led Divoky, (1974) to state that the learning disabled were those who the diagnostitions wanted them to be.

In 1968 the National Advisory Committee on Handicapped Children in the United States devised a definition which was to resolve the broad ranging variations found in the field. Although it has been critized as being ambiguous and not suitable as a definition there have been few attempts at refinement, and subsequent progress toward an acceptable operational definition has been minimal (Mercer et al., 1976).

> The NACHC definition was: Children with special (specific) learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to environmental disadvantage (Kirk & Kirk, 1971, p. 4).

The definition was characterized by three fundamental points; the disparity between actual and perceived potential in language, the focus on disorders in learning processes, and the exclusion of those whose disability was primarily due to physical, mental, emotional, or environmental factors.

Criticism has been leveled at the NACHC definition on the basis of its sweeping nature and unclear terms. For example, the term

"basic psychological processes" is open to interpretation from a psychological approach, a neurological approach, or a school skills approach, each singly valid, yet each excluding the others (Revilak & Janzen, 1980). The principle of disparity has been criticized on the grounds of inconsistent methods of deciding what constitutes the discrepancy. Many consider an achievement test score two years below the child's grade level as indicative of the discrepancy (Gaddes, 1980). Others such as Myklebust (1967) recommend the use of a learning quotient which may be derived from dividing the child's reading age (performance on a reading test) by his expectancy age (average of his chronological age, mental age, and the average age of those in his grade level) and multiplying by 100. Learning quotients for any academic skill can be substituted for the reading score. Myklebust considered children to be learning disabled if their quotient fell below 90. According to Gaddes (1980) another method would be to use the same basic formula but drop the grade age because it would make no difference in most cases. The categorical separation of learning disability from mental retardation and emotional disturbance has been questioned by Hallahan and Kauffman (1976) who indicated the comonalities of etiological factors and teaching methods in all three conditions.

Wepman, Cruikshank, Deutch, Morency, and Strother (1975) proposed a definition which limited the number and types of children identified as learning disabled by emphasizing perceptual functioning. To be classified as learning disabled the child must exhibit perceptual or perceptual-motor handicaps. Revilak and Janzen (1980) criticized

this approach on the basis that while perceptual handicaps are present in many learning disabled children, attempts to determine the perceptual basis for all learning disability symptoms run into theoretical difficulties.

Sabatino and Miller (1980) stated the term "learning disability" does not describe a meaningful population nor provide useful information for instructional management. They proposed that learning styles and achievement motivation, including anxiety, self-perceptions, and teacher expectancies, are critical factors in the understanding of broad diagnostic categories such as learning disabilities. Similarly, Smith and Polloway (1979) argued for individualized education focusing on the children's needs rather than on their problems.

At the present time it would appear that the only points of agreement in the area of learning disabilities are that there are children, apparently of normal intellectual, physical, and social attributes, who have difficulty in some aspects of academic learning, and that effective remedial procedures are within the realm of possibility (Chapman, 1979). Reger (1979) urged that attempts at a definitive categorization be abandoned in favor of diverse theory and research methodology. In recognizing the heterogeneous character of the learning disabled population Rewilak and Janzen (1980) stated that using the term "learning disability" as a concept rather than a category might provide a unifying theme, especially if emphasis were placed upon specific behaviours and patterns of abilities.

Approaches to Learning Disabilities

There have been a variety of trends in the conceptualization of learning problems and their remediation in children who appeared unable to achieve academically in spite of average or better intellect. The primary orientations could be categorized as those which focused on perceptual-motor skills, psycholinguistic skills, and teaching techniques. The majority of the theorists considered learning disabilities to be a function of a brain dysfunction. Others, such as Hewett (1968), were not concerned with etiology, and Fernald (1943) considered the major factors to be improper teaching techniques which resulted in emotional problems.

The Perceptual-Motor Approach

The perceptual-motor view of learning disabilities had its beginning in the 1930's with the work of Werner and Strauss on the brain injured mentally retarded. The theorists in this category such as Kephart (1971), Barsch (1967), and Cruikshank (1961), considered early motor and visual-spatial development to be of major importance. According to Myers and Hammill (1969) these theorists considered the motor system to be the first neurological system to be developed by the child, followed by the perceptual system. When these two systems have developed and can function adequately the association system is able to develop. Kephart (1971), for example, stressed the relationship between movement and perception, and perception to higher thought processes. As the child matures he develops the ability to move and control parts of his body. Through bodily movements the child

establishes a body image which enables him to move through space and become aware of his surroundings. Visual perceptual development follows a similar sequence from gross generalizations, such as an awareness of undifferentiated masses, to meaningful perceptions recognizing objects by their specific forms. Kephart stated that because the motor skills developed first, perceptual knowledge must be oriented to motor knowledge. The perceptual-motor match is necessary for verification of information. When these systems can function together the child can then perceive the relationships between himself and objects. Eventually perception becomes the primary mode of receiving information and he develops the ability to understand the relationships between various objects in his environment.

Kephart was of the opinion that motor and perceptual skills such as gross motor abilities, eye-hand coordination, and dexterity, were prerequisite to reading, writing, and arithmetic. Rather than teaching reading to children having difficulty with reading, he advocated teaching basic motor and visual skills such as rail walking for balance and visually following objects for occular control.

Barsch (1967) and Frostig (1965) also emphasized motor skills. However, they placed more importance on visual abilities such as tracking and the discrimination of details in a task. Barsch considered visual perception to be more than vision alone, but the major integrating agent for the tactile, kinisthetic, and auditory senses. He believed language to be a phenomenon which symbolically communicated information derived through the senses, and deficits in

language to be the result of an improperly functioning sensory feedback system. Thus his approach to remediation stressed perceptual-motor functioning and included muscular strength, balance, awareness of body in space, and ability to plan movement. Similarly, Frostig considered the development of perceptual skills to be prerequisite to cognitive development. Her approach to the remediation of learning disabilities was through visual-motor tasks aimed at specific areas of perceptual weakness rather than providing instruction in reading and writing.

While Cruickshank (1961) acknowledged the importance of visual-motor skills, his approach to the remediation of learning disabilities was multisensory. According to Harring and Bateman (1977) Cruickshank initially studied cerebral palsied children but moved from the comparison of brain damaged children to those exhibiting similar behaviors but having no measurable neurological impairments. He listed the characteristics of the latter group as: being distractable, unable to see things as a whole, unable to form figure-ground relationships, having difficulty in shifting from one activity to another, having a poor self-concept, and having a poor body image. He indicated that educational programs developed for normal children were entirely unsuitable for the learning disabled and that special teaching methods were required. Among his prerequisites for reading readiness were a mental age of at least 6 years, adequate language development, adequate memory, motor ability and visual maturity. Environmental influences were also considered important by Cruickshank. The reduction of unessential visual and auditory stimuli, the reduction of physical

working space, a highly structured academic program, and increased stimulus value of instructional material were viewed as necessary for remediation.

The remedial approach advocated by Cruickshank involved training in visual, auditory, tactual, and motor skills. For example, if the child had inadequate visual discrimination Cruickshank would recommend activities such as sorting different forms, matching colors, completing puzzles, and paper cutting. The development of these elementary tasks was thought necessary for the child to accurately perceive whole objects. To teach writing Cruickshank would combine auditory reception to distinguish sounds, tactual reception to distinguish shape, and motor skills to distinguish direction. The combination of the sensory input and motor skills was though to solidify the concept of the letters.

The Psycholinguistic Approach

Psycholinguistic approaches to learning disabilities include those of Kirk and Kirk (1971) and Myklebust (1967). Kirk and Kirk (1971) indicated that nearly all learning disorders are manifested in reading, writing, spelling, arithmetic, and reasoning, and are therefore related to language usage. Their position was that learning disorders occur when there is a deficit in the visual or auditory modalities of the individual's internal communication system. Utilizing Osgood's (1964) model of learning, Kirk developed the Illinois Test of Psycholinguistic Abilities to measure selected psychological and linguistic skills assumed basic to academic

achievement. The theory underlying the development of the instrument postulated two levels of operation. The representational level required active utilization of thought processes to receive, mentally manipulate, and deliver auditory and visual symbols. The automatic level was thought to be mediated by habit chains. Kirk believed three types of psycholinguistic processes were necessary for the acquisition and usage of language. The receptive process was needed to gain meaning from visual or autitory stimuli, the association process to manipulate linguistic symbols meaningfully, and the expressive process to communicate meaning verbally or through gestures.

Kirk's approach to instruction involved the diagnosis of the psycholinguistic processes to ascertain those which were deficient and those which were strong. He would then use materials and methods which would concurrently use weak and strong processes. For example Kirk would present a visual stimulus in conjunction with an associated auditory stimulus if the child had difficulty processing auditory material. In this manner the visual stimulus provides a clue for the auditory stimulus.

Myklebust (1967) considered learning disabilities to be the result of neurological dysfunctions. He believed that the brain functioned through a series of semiautonomous sensory related systems with a transducer for translating information from one system to another. Learning disabilities were thought to be the result of a deficit in one or more of the systems or in the transducer mechanism.

Accurate diagnosis of the child's ability to receive, integrate,

and transmit information was considered essential for re[redacted]ation (Myklebust, 1967). For example, a child who had dif[redacted]y learning through the visual or auditory systems, or could not integrate meaningful experiences, would likely develop a reading problem. If it was found that he had difficulty learning the visual system, a phonetic approach to reading would be recommended. However, while utilizing the child's strengths in teaching him to read, attempts would be made to increase his visual abilities through activities such as matching objects and matching pictures and printed words.

The Teaching Approach

The authors which could be classified under the teaching approach heading are those who have concentrated on teaching techniques with little attention being given to causal factors. A behavioral method which could be applied to learning disabilities can be exemplified by Hewett's (1968) work. Although he dealt primarily with emotionally disturbed children his contribution to the field of learning disabilities is important (Harring & Bateman, 1977). Hewett did not become involved with etiological or definitional problems but instead sought educational strategies for efficient and effective learning. He considered the first step to be that of establishing meaningful contact between the teacher and child. Together, they should develop educational goals and the methods with which they could be accomplished.

Hewett (1968) proposed a developmental sequence of seven educational goals through which each child must progress to be ready for adequate functioning in the classroom. The first four levels

consisted of (a) attaining skills in attending to relevant cues (attention), (b) responding to the cues (response), (c) developing order in patterns of attending and responding (order), and (d) subsequently exploring his environment utilizing the aforementioned skills (exploratory). When a child had command of these four levels he was considered ready to develop socially and intellectually. The next step (e) was learning to relate and interact meaningfully with others (social). The step at which learning disabilities could be considered to develop (f) required the approval and acceptance of peers (mastery). Hewett considered this level to be essential for attaining competence in basic vocational and intellectual skills. An inability to attain this level was thought to result from a failure somewhere in the first four steps. The final level (g) reflects the development of self-motivation in learning (achievement).

Hewett (1968) considered the central problem in education to be the children who have not achieved the four basic goals of "attention", "response", "order", and "exploration". He believed these children could not deal with the stress of failure, and their lack of readiness inhibited their school performance, thus increasing the stress of failure.

According to Hewett (1965) effective teaching required the understanding of appropriate tasks for the child. The elements which he considered essential for teaching were labelled "task", "reward", and "structure". "Task" was related to the attainment of a goal and involved the teacher's selection of activities within the child's

abilities. "Reward" was considered a positive consequence for the child which was contingent upon successful completion of the "task". "Structure" referred to the amount of control the teacher utilized in requiring the student to receive the reward, and included the when, what, how, and how well the task had to be done.

A concept of learning disabilities related to Hewett's approach was that of Fernald (1943). Hewett was not concerned with the etiology of learning problems but rather the emotional difficulties encountered when an individual did not gain competence in one of the developmental levels. It was Fernald's opinion that the emotional problems encountered in school were the result of inadequate teaching methods. She believed that her case studies demonstrated that most children with learning problems had no emotional upset before entering school. The child requires successful experiences to make satisfactory adjustments to his environment. Schools make continuous demands for readjustment, and unless the child is able to master the fundamental subjects of reading, writing, and arithmetic he will be a failure. Fernald believed that the remedial process required the concurrent restoration of the child's self-confidence while teaching him how to read.

Fernald utilized a multisensory approach to teaching children with reading problems. She developed the visual-auditory-kinisthetic-tactile (VAKT) remedial method which consisted of four stages. (a) In the first stage the child selects the word which he wants to learn and the teacher prints or writes it using large letters. The child then traces the word with his fingers and vocalizes each sound.

(b) At stage two the child no longer traces the word but writes it while continuing to vocalize the sounds. (c) In the third stage the child learns words from visual presentations without vocalizing. (d) When the child has reached the fourth stage he is able to read a new word through recognizing its similarities with words which he has previously learned.

According to Faas (1980) the VAKT method is most effective when used with those having difficulty with visual perception and imagery. In addition he noted that words are never spelled orally, words are always written as a whole unit, and a word is never copied, but is written from memory.

Etiological Considerations

The major theoretical writings on the causes of learning problems can be subsumed under categories postulating either an organic basis or an environmental basis (Myers & Hammill, 1969). There has been some conflict between theorists in each camp regarding the efficacy of the other to provide meaningful data and remedial procedures. For example, some authors have stated that the organically based theories would provide a better basis for prediction and remediation (Gaddes, 1980), while other authors have stated that the instruments for assessing organic problems are not sufficiently developed and studies have not provided conclusive data (Green & Pearlman, 1971). Another area of conflict has been the result of terminology from different professional fields being used interchangeably. For example, some consider "minimal brain damage", "minimal brain dysfunction", and "learning disorder" to be equivalent terms (Gaddes, 1980). Myers and

Hammill (1969) cautioned that the terms "specific learning disorder" and "brain dysfunction" were not interchangeable. They stated "specific learning disorder" should be reserved as a generic term representing a collection of language or language related disabilities which may be closely related with "brain dysfunction", but not necessarily caused by it. Gaddes (1980) recognized two distinct categories, those children with learning disabilities who exhibit signs of neurological dysfunction and those who have the learning problems but do not have neurological signs.

Myers and Hammill (1969) indicated that the concept of learning disorders stemming from brain dysfunctions probably evolved from Pain's (1962) description of borderline manifestations of impaired cerebral functioning. These have been referred to as "soft neurological signs" and include such behaviors as excessive clumsiness, impulsiveness, low frustration tolerance, distractibility, overactivity, and short attention span. Sensory deficits such as those involving visual, auditory, or motor functions have been of major interest to theorists in learning disabilities. Also of major interest have been concerns regarding the integrative processing of the sensory modalities (Gaddes, 1980).

Environmentally based etiologies are concerned with the social and psychological phenomena which have impinged on the child. Theorists having this orientation are generally concerned with factors which may have hindered or disrupted the function of perceptive, associative, or expressive skills necessary for adequate school work (Myers & Hammill, 1969). Examples of such factors are

insufficient experience in perceptual-motor activities and emotional maladjustment. However, as Gaddes (1980) indicated, while it appears clinically evident that many children with emotional problems have difficulty in school, the psychological factors involved are difficult to ascertain.

Crossing the boundaries of the organic and environmental approaches are those who regard learning disabilities to be related to a developmental lag in such areas as sensory-motor perception, or sensory integration functioning. For example, Laurita (1976) stated that the average child has traditionally been expected to achieve in reading without regard to the maturation of his sensory-motor skills, perceptual skills, symbolic skills, or experiential and emotional abilities. Synder and Pope (1972) studied the performance of 204 first grade students on auditory discrimination, auditory memory, and visual memory. They reported widespread variability in the level of performance on the measures both between the students and between the measures on individual students. Synder and Pope concluded that their results may indicate that the inabilities considered as symptoms of learning disabilities are in fact normal variants. Dykman, Ackerman, Clements, and Peters (1971) suggested that the main cause of learning disabilities is a developmental lag. While studying the performance of learning disabled children in neurologically related areas such as fine motor coordination, gross motor coordination, reflexes, right-left confusion, and attention, they found fewer neurological signs in learning disabled children of 10 and 11 years than in those of 8 and 9 years. There has also been evidence that selective attention is

slower to develop in learning disabled students (Czudner & Rourke, 1972; Deikel & Friedman, 1976; Ross, 1976; Rourke & Czudner, 1972). For example, the Rourke and Czudner (1972) studies compared two groups of learning disabled children and their control groups on reaction time. They found the performance of the younger learning disabled group (mean age 7.7) poorer than the other three groups, while the older learning disabled group (mean age 11.7) was not different from its control group. Rourke and Czudner concluded that selective attention appears to improve with age.

Deviant behaviors observed in learning disabled children were related by Laurita (1976) to behavior found in animals which were experimentally pressed beyond their ability to cope. Experiments by Pavlov (1928) and Maier (1961) forced animals to make extremely difficult or impossible discriminations and resulted in behavior described as disobedient, excitable, withdrawn, and unable to discriminate. For example, Maier (1961) trained rats to discriminate and respond to either black or white circles which were presented together. He then frustrated the animals by making the task unsolvable on every other trial. The animals then manifested behaviors such as aggression, regression, and apathy. Laurita (1976) considered the situations and results of the above animal experiments identical to placing children with a developmental lag into instructional situations in which they cannot cope. For example, if the child cannot make the perceptual discriminations required of him in the classroom he will experience frustration and develop deviant behaviors.

Intellectual Characteristics

There has been some agreement between theorists that learning disabilities imply a discrepancy between the person's academic potential and achievement, but little agreement on whether there should be restrictions regarding the range of tested intelligence (Lutey, 1977). The Association for Children with Learning Disabilities in the United States and its Canadian counterpart, the Canadian Association for Children with Learning Disabilities, have been reluctant to accept definitions of learning disabilities which do not exclude mental retardation (Gaddes, 1980). This type of political pressure has appeared to remain in spite of opposition by some theorists. For example, at a presentation to the CACLD, Cruickshank (1979) recommended the inclusion of all intellectual levels in a definition of learning disabilities. However, even though a majority of the CACLD's Professional Advisory Committee agreed with Cruickshank, the association turned down the recommendation (Gaddes, 1980).

The Wechsler Intelligence Scale for Children - Revised has been a widely used instrument in the assessment of learning disabled children. Some investigators have been interested in correlating discrepancies between the Verbal and Performance scales on the WICS-R in relation to learning disabilities. Differences have been found, with the Performance scale usually being the greater, however the discrepancy can be in either direction (Sattler, 1974). Of 42 learning disabled samples reviewed by Lutey (1977), 36 had Performance IQ averages equal to, or greater than the Verbal averages. Lutey (1977)

also reviewed 21 studies regarding WISC-R subtest scores of learning disabled students and found the lowest scores conformed to the ACID pattern (Arithmetic, Coding, Information, and Digit Span), described by Ackerman, Peters, and Dykman (1971) to be typical of learning disabled students.

Utilizing the WISC-R standardization sample, Kaufman (1975) factor analyzed the test scores of 11 age levels. He stated that the factor structure was consistent across all age levels with three emerging factors. The first factor was labelled "Verbal Comprehension" and had Vocabulary, Information, Comprehension, and Similarities as those subtests with the highest loadings. The second factor consisted of Block Design, Object Assembly, and Picture Completion, and was labelled "Perceptual Organization". "Freedom from Distractibility" was the label attached to the third factor. The subtests with high loadings on the third factor were Arithmetic, Digit Span, Coding, and with some variability across ages, Information.

Studies utilizing the WISC-R with varying learning disability populations have produced results similar to Kaufman's (1975) factor structure (McManis, Figley, Richard, & Fabre, 1978; Smith, Colman, Dokecki, & Davis, 1977; Wallbrown, Werry, Blaha, & Counts, 1974). McManis et al. (1978) utilized 24 male students in grades 3 to 6, ranging in age from 8 to 12 years, and had WISC-R Full Scale IQs of at least 90. The students comprised two groups with the reading disabled group being chosen on the basis of scoring at least one year below grade level on the Wide Range Achievement Test or the Peabody Individual Achievement Test. The control group scored at

or above their grade level on the achievement tests. McManis et al. found the Arithmetic, Coding, Digit Span cluster mean score lower than other subtests by the learning disabled group, but not by the control group. Smith et al. studied 208 learning disabled children from 6 to 12 years of age, two or more years deficient in academic standing, and having a WISC-R Full Scale IQ of at least 75. They found a pattern of Perceptual Organization being greater than Verbal Comprehension, and Verbal Comprehension being greater than Freedom from Distractibility (Kaufman's 1975 labels).

At least two of the three subtests forming Kaufman's (1975) Freedom from Distractibility factor have been associated with anxiety. Initial studies produced conflicting results on the relationships between the Digit Span subtest of the WISC and anxiety. Phillips, Martin, and Mayer (1972) stated that reports by Griffiths (1952), Moldawsky & Moldawsky (1952), and Pyke & Agnew (1963) indicated negative correlations, while Jurjevich (1963) reported a positive correlation, and Jackson & Bloomberg (1958) found no relationship. However, Spielberger (1966) hypothesized that the conflicting findings were the result of not distinguishing between state and trait anxiety. Hodges & Spielberger (1969) found a correlation between Digit Span performance and state anxiety, but no relationship with trait anxiety. Glasser & Zimmerman (1967) indicated that both the Digit Span and Arithmetic subtests were susceptible to the effects of anxiety. While the above authors utilized the WISC and not its revised edition, the distractibility factor consisted of the same subtests in both (Kaufman, 1975). Lutey (1977) stated that the Arithmetic, Digit

Span, and Coding subtests can be referred to as the "anxiety triad", and recommended its calculation on all Wechsler tests except the WPPSI. She added that anxiety, in this case, referred to an uneasy state of the individual rather than chronic anxiety, and may be the result of test anxiety rather than a general anxiety characteristic.

Chapter III

LEARNING DISABILITIES AND ANXIETY

There appears to be consensus in the literature that a positive relationship exists between learning disabilities and emotional problems. Learning disabled students have been characterized as being preoccupied with anxiety, nervousness, worries, and unrealistic fears (Connolly, 1971; Rosenthal & Allen, 1978). However, researchers have disagreed on whether the learning disabilities or the emotional problems are causal in the relationship. For example, Bender (1956) claimed that emotional difficulties arise from learning disorders, while Fernald (1943) was of the opinion that the reverse was true.

Connolly (1971) stated that anxiety is a characteristic found with great frequency in the learning disabled population. However, he suggested that while most theorists acknowledge a relationship between learning disabilities and emotional problems, few have attempted to validate their opinions. Those who do try usually obtain insignificant results. Among the reasons hypothesized for the lack of positive results were: semantic confusion in defining emotional disturbance, the heterogeneous character of learning disabled groups, and the inadequate development of instruments for assessing emotional adjustment (especially in young children).

In terms of alleviating emotional problems related to learning disabilities, one of the major historical difficulties may have been the emphasis on traditional dynamic techniques. In this approach it is assumed that the child would choose when and where he would learn, and

when he discovered the reasons for his academic failures he would then achieve (Connolly, 1971). Rabinovich (1962) claimed that some therapists tended to overgeneralize from the psychoanalytic model and thus had unrealistic expectations when treating the learning disabled. While most children with learning difficulties could profit from certain types of psychotherapy, relatively few benefit from traditional dynamically-oriented treatment methods (Connolly, 1971).

A possible approach to the analysis of learning disabilities might be to view anxiety, stemming from demands placed on the child before he is developmentally ready to copy with them, as a major factor in the disability. These demands might come from school or parental expectations. With age usually being the only criterion for school entrance, there is no reason to expect that every child will be developmentally ready for the behaviors and tasks required in the classroom.

Conceptualizations of Anxiety

There are conflicting views on the nature of anxiety. For example, Izard and Tomkins (1966) and Levitt (1967) considered anxiety and fear to be identical concepts and saw no value in separating them. Other writers such as Epstein (1972, 1976) and Sarason (1975) argued that the two should be separated to gain clearer meaning. It has been said that "anxiety" is the more basic state with "fear" being a derivative, and conversely that "fear is a causal factor in the development of anxiety" (Epstein, 1972).

In his review of the literature, Epstein (1972) identified three major factors in the conceptualization of anxiety. These explanatory constructs were labelled: (a) primary overstimulation, (b) cogntive

incongruity, and (c) response unavailability. Epstein considered the the categories as distinct with unique feeling states, but all being associated with unpleasant, high levels of diffuse arousal. An explanation of these constructs follows.

Primary Overstimulation

Primary overstimulation has been considered the most basic source of anxiety by writers such as Freud (1959) and Pavlov (1927). They considered the cerebral cortex to have an upper tolerance level to excessive stimulation. When this limit is approached, protective mechanisms are activated. Epstein (1972) considered the concomitant subjective mechanisms to be feelings of "being overwhelmed" and "bombarded".

Freud considered anxiety to be a defence mechanism with the sole function of acting as a danger signal for the organism (Hall, 1964). According to Epstein, Freud first introduced the concept of "primary anxiety". Freud considered primary anxiety to be a reaction of the cortex to excessive stimulation. There was thought to be a limit to the amount of stimulation the cerebral cortex could withstand. With stimulus overload, anxiety was produced. Anxiety, however, was carefully distinguished from similar emotional reactions. Freud differentiated between anxiety, fear, and fright. Anxiety had an anticipatory component, or an expectation of danger. Fear involved a definite object of which to be afraid, and fright was considered the resultant state when a person unexpectedly ran into danger (Freud, 1959; Epstein, 1972).

In a similar vein, Pavlov considered "intense stimulation" to be the fundamental source of anxiety. He observed symptoms of fear and behavioral disorganization in animals which were produced by painful stimulation. Pavlov theorized that while the organism could protect itself from the intense stimulation through transmarginal inhibition, other symptoms were produced such as withdrawal or disrupted response hierarchies (Pavlov, 1927).

Cognitive Incongruity

The inability to organize events into meaningful schemata was labelled by Epstein (1972) as "cognitive incongruity". Anxiety is produced when the individual's perceived world does not fit his cognitive expectations. The individual cannot predict future events and thus his self-concept is threatened. The resultant feeling states associated with cognitive incongruity were described as "confusion", "disorganization", and "disorientation" (Epstein, 1972).

In addition to symptoms of fear being caused by painful stimuli, Pavlov (1927) also noted that disturbances in animal behavior could be caused by the inability to discriminate between stimuli which were previously discernible. Whether animal behaviors can be generalized to humans remains in question. However, Wolpe (1958) felt comfortable in this transition. He postulated three ways in which anxiety could be produced in humans. Anxiety could be induced in animals or humans when exposed to difficult discriminations, a relatively small number of severe noxious stimuli, or a relatively large number of mild noxious stimuli. Physical confinement was usually required to produce neurotic-like behavior, such as agitation, excess movement, biting, and barking

in dogs which were previously quiet. However, humans reacted similarly in analagous situations in psychological confinement. For example, if an avoidance-avoidance situation could be considered psychological confinement, anxiety was the resultant characteristic produced.

Rogers (1951) considered anxiety to be the result of the individual being unable to integrate his changing awareness of the environment with his self-concept. The "subception" that a discrepancy between an individual's self-concept and objective reality may enter awareness, was thought to be the precipitating factor in producing anxiety (Meador and Rogers, 1973). The discrepancy between the conceived self and reality generates tension. If the individual becomes aware of the tension, the result is a feeling of anxiety, lack of cognitive and affective integration, and inability to direct oneself (Rogers, 1951). Thus, according to Rogers, anxiety is the result of incongruencies between the self-concept and experiences which are approaching symbolization in awareness.

Response Unavailability

The inability to initiate purposive action was considered by Epstein (1972) to be arousal provoking and thus anxiety producing. Response unavailability may be the result of an unknown source of threat, cognitive incongruity, opposing response tendencies, or ignorance of the required responses. Epstein considered the associated subjective feeling state to be one of "helplessness".

Anxiety was defined by Epstein (1972) as a state of diffuse arousal during which the individual was unable to initiate purposive action. The inability to act may be due to a number of reasons including

repression, failure in discrimination, external restraints on immediate action and conflicting response tendencies. Epstein stated that the consequences of heightened diffuse arousal included behaviors such as restlessness, tension, aggression, apathy, withdrawal, and generally disorganized behavior.

Spielberger's Theory

Viewing anxiety as the result of a temporal series of events, Spielberger (1972) postulated a three phase sequence where (a) stress was perceived as (b) a threat which led to (c) anxiety. Stress was considered to be an objective stimulus condition "characterized by some degree of objective danger as defined by an experimenter, or as consensually validated by two or more observers" (Spielberger, 1972, p. 30). Threat referred to the subjective perception by the individual that a situation would be psychologically or physically harmful. Thus, some circumstances which might not be described as dangerous by others may be so appraised by the individual. Anxiety, therefore, was viewed as a condition of complex emotional reactions arising from the individual perceiving a situation as personally threatening.

Anxiety has been viewed as an emotional state by many theorists (Epstein, 1972; Freud, 1936; Izard, 1972; Lazarus & Averill, 1972; Spielberger, 1966, 1972, 1975). Schacter (1964), as reported by Spielberger (1972), indicated that emotional states were comprosed of physiological arousal and cognitive factors. The feelings that arose from the physiological arousal were labelled in terms of the social interpretations the individual attached to the situation. According to Spielberger (1972), an individual consciously experiences the

phenomenological qualities associated with anxiety and can describe the intensity and duration of these feelings. In addition, he reported that self-descriptions of feelings were the most widely used bases for defining anxiety. He stated that "if an individual reports that he feels anxious (frightened or apprehensive), the introspective verbal report defines an anxiety state" (Spielberger, 1972, p. 30).

Spielberger (1972, 1975) distinguished between two types of anxiety based on their duration over time. Trait anxiety (A-Trait) was conceptualized as a relatively stable characteristic regarding the individual's propensity toward anxiety. Those high in A-Trait tended to perceive a wider range of situations as threatening than those with low A-Trait. In addition, individuals with high A-Trait tended to react to threatening situations with higher levels of State anxiety (A-State).

A-State anxiety has been described as a transitory emotional condition which fluctuates over time, and is characterized by "subjective, consciously perceived feelings of tension and apprehension" (Spielberger, 1972, p. 39). Non-stressful situations would be reflected in low levels of A-State, while situations which the individual perceived as threatening would result in high A-State. Those who have a history of greater frequency and intensity of high A-State experiences, and an expectancy they will occur in the future, could be expected to have higher levels of A-Trait as well.

Most instruments used to assess anxiety measure A-Trait (Spielberger, 1972). Characteristic of high A-Trait individuals are self-depreciatory, self-preoccupying, and self-discontentment tendencies

(Sarason, 1960). According to Spielberger (1972), high A-Trait measures are consistent with a pervasive fear of failure. Those who are high in A-Trait develop higher levels of A-State under conditions which involve personal adequacy, such as performance on academic or intelligence tests. However, differential levels of A-State between high and low A-Trait persons occur only if the high A-Trait individual perceives the situation as threatening to his self-concept. For example, if the high A-Trait individual happened to be proficient at a given task, or did not assign it any significant value, he would not be threatened and hence, his level of A-State would be no higher than a person with low A-Trait.

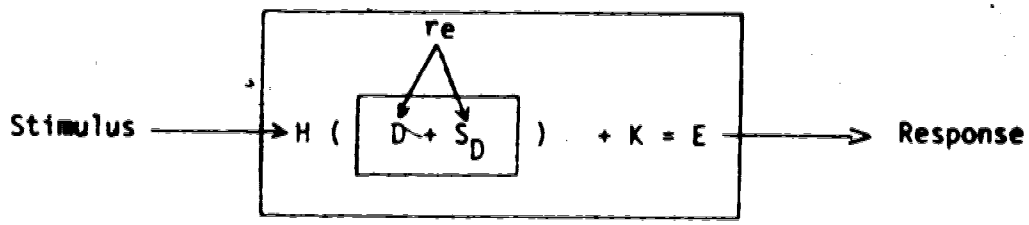
Hull-Spence Theory

Spence and Spence (1966) considered stress to be particularly important in the explanation of complex learning tasks. The Hull-Spence behavior theory assumed that a potential to respond in a particular manner (excitatory potential, or E) was, in part, a multiplicative function of a learning factor (habit strength, or H) and a need factor (drive, or D). This may be presented schematically as:

$$H \times D = E$$

Further, drive and a negative component (drive stimulus, or S_D) are influenced by a persistent emotional response (r_e) (Spence, 1960; Spence and Spence, 1966). The responses evoked by a drive stimulus can be either learned or novel, and either covert or overt (Hull, 1943). In conjunction with the above variables, excitatory potential is dependent upon an additive motivational factor (incentive motivation, or K) which is related to previous success. In diagram form, the

relationship can be illustrated as:



The diagram above may be elaborated in the following manner. When a stimulus impinges upon an organism, the response is dependent upon: (a) the habit strength to respond in a particular manner, which is influenced by previous experience, (b) drive and stimulus drive, which are influenced by the emotional component r_e, and (c) a motivational component, which combine to produce (d) a potential to respond in a particular manner. For example, in a task requiring the identification of alphabet letters, the subject would be expected to respond by verbalizing the name of the presented letter. If the letter "b" is the stimulus, and the subject has had success in identifying "b" in the past, the response "b" should be high in the habit strength hierarchy. If his need to achieve and motivation were adequate, the resultant potential to respond by verbalizing the letter "b" would be high. However, if the subject has had difficulty identifying the letter "b", the correct response would not be high in the habit strength hierarchy. In addition, if he was afraid of being ridiculed for not knowing the correct response, the emotional component would come into play. While it would raise the drive level, it would also raise the level of stimulus drive. Stimulus drive acts as a competing response mechanism to habit strength, and is subtractive to the effects of drive. Also,

the level of motivation would probably be low because of previous failures. Thus, with the combined effects of lower habit strength, the subtractive function of stimulus drive, and lower motivation, the potential to respond with the correct answer would be lower than that of the first subject.

High anxiety subjects were considered to have lower thresholds for emotional arousal in situations perceived as threatening (Spence & Spence, 1966). Therefore "differences in performance due to differences in drive level would be expected to occur only in situations involving some element of stress" (Spence & Spence, 1966, p. 306). In complex learning situations involving competing responses, the effect of high drive level would depend on differences in the habit strengths of the competing responses. The subject's performance would decrease if the emotional component raised the strength of the competing response hierarchy beyond the level of the correct response available in the habit strength hierarchy (Spence, 1956). For example, Spielberger found that high anxious undergradate college students made more errors than low anxious students on a task requiring the recall of complex geometric designs. He also found that high anxiety college students of average intellectual ability obtained consistently lower grade point averages. He attributed the performance decrements of the high anxious subjects to competing response tendencies elicited by high drive levels on tasks where the strength of the correct response tendency was relatively weak (Spielberger, 1975).

Anxiety, Intelligence, and Achievement

Phillips, Martin, and Meyers (1972) indicated that most empirical studies obtain low negative correlations between intelligence and anxiety. Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) addressed the question of whether a deficiency in intellectual ability caused high levels of anxiety, or if test anxiety interfered with intellectual performance. They took the position that test anxiety interfered with intellectual performance since correlations increased when conditions were manipulated to be anxiety producing during testing, as opposed to neutral and relaxed conditions. In addition, Waite, Sarason, Lighthall, and Davidson (1958) found low anxious subjects learned more than high anxious subjects when intelligence was a controlled variable. Their research evidence with children in grades two through five, matched for age, sex and I.Q., indicated that the low anxious groups learned more rapidly than the high anxious groups on paired associate tasks.

Frost (1965) studied fourth and sixth grade boys and girls. He also found a negative relationship between anxiety and achievement. The instruments used were the Children's Manifest Anxiety Scale and the Reading and Arithmetic sections of the California Achievement Test. Davidson (1959) reported that low anxious boys scored higher than high anxious boys on social behavior, language, social studies, science, music, and work habits. Using the TASC and the Stanford Achievement Test, Sarason et al. (1960) found negative correlations ranging from -.23 to -.44 with students from grades three to six. Similarly, Lunneborg (1964) obtained negative correlations between the Reading and Arithmetic scores of the Metropolitan Achievement Test

and the TASC, GASC, and Children's Manifest Anxiety Scale. The correlations ranged from -.18 to -.32, and tended to increase with grade level. In addition, another significant finding was that the relationship between achievement and the TASC was greater than between achievement and the other two anxiety scales.

High anxiety students have been shown to obtain lower reading grades (Colter & Palmer, 1970), have slower reading rates, and reduced comprehension (Colter, 1969; Gifford & Marston, 1966). Ruebush (1960) found that high anxious children in the low and middle intelligence ranges achieved better on tests requiring a cautious approach than children with high anxiety and high intelligence scores. Wrightsman (1962) demonstrated that when a test was perceived as important, high anxious subjects scored lower than the non-anxious. When the test was not viewed as important, there were no differences in the performance between the two groups.

Reasons for the lower academic performance of high anxious students may be that these subjects tend to focus attention on their personal situations (Sarason, 1972). If the student believes the situation to be evaluative, he neglects or misinterprets informational cues or experiences attentional deficits. The individual personalizes the situation and focuses his attention on the self, thus generating inadequate attention to the prescribed task.

Learning Disabilities as a Possible Function of Anxiety

The learning disability literature has been largely concerned with theoretical approaches which render anxiety to a tertiary position in importance. Most of the research studies have focused on perceptual,

motor, psycholinguistic, or specific teaching approaches (Harring & Bateman, 1977). Some researchers such as Bender (1956) and Fernald (1943) have acknowledged the importance of anxiety in relation to a learning disability, but little has been done empirically to isolate the effects of levels of anxiety on learning.

If anxiety is considered a major factor in learning disabilities, instructional demands made in the presence of delayed emotional and cognitive development could be considered a stressful situation. This stressful situation may be perceived by the child as a threat to his self concept. High levels of stress could result in strong inappropriate response tendencies which lower the probability of correct responses and motivation. The resulting anxiety would be increased as each inappropriate response resulted in failure. Laurita (1976) viewed response patterns such as faulty discrimination, reversals, omissions, substitutions, mispronounciations, and misspellings to be fixated or stereotyped behavioral responses arising from a need to do something in a stress situation. Secondary response patterns appear to develop and may include behaviors such as distractibility, hyperactivity, withdrawal, bed-wetting, truancy, petty theft, and cheating (Laurita, 1976).

If the child is unable to produce the required response, the situation could be perceived as harmful or threatening to the self-concept because he does not want to be viewed as incompetent by his teacher, parents, or peers. Following Spielberger's (1972) argument, the perceived threatening situation would result in anxiety. This, in turn, would lead to inappropriate responses. The situation would now be circular, and tend to feed and grow upon itself with inappropriate

responses leading to more stress situations, which would be perceived as threatening, and result in greater levels of anxiety.

There is some evidence to suggest that sufficient neurological maturation may take place by the age of 10 years to allow successful learning of reading skills. For example, Dykman et al. (1971) found 45 neurological signs which differentiated between 8 and 9 year old learning disabled students and their controls. Although Dykman et al. did not report all of the items used to assess the groups, they did report measures on reaction time, simple motor tasks, heel walk, toe walk, hopping on one foot, skipping, laterality, directionality, writing to dictation, and arm drop while standing erect. (For a complete list of the measurements see Ackerman, Peters, and Dykman, 1971a.) On those children between 10 and 11 years of age, Dykman et al. found only 11 items which continued to discriminate between the learning disabled and the controls. While the 11 items were not identified, it was stated that among the tests were measures of writing and spelling "which could be expected in a group selected for learning problems" (Dykman et al., 1971).

Lovegrove and Brown (1978) investigated the rate of visual information processing on learning disabled and control group students. The task was to identify a time interval, or lack of one, between two components presented in a tachistoscope. Lovegrove and Brown stated that the rate of information processing in normal children had previously been shown to increase as a function of age. The results of the study under report indicated that the information processing rate also increased with age in learning disabled children, and that

there were fewer differences between control and learning disabled groups of 10 to 12 years of age than groups of 7 to 9 years of age. Arnold and Smeltzer (1974) obtained negative correlations between hyperactivity and age, which they presented as evidence that hyperactivity ameliorated with age.

From the preceding literature, it may be generalized that learning disabled children probably begin school before they have reached a level of "neurological maturity" shared by most of their school mates. As a result, they may not be able to master the academic skills which the majority of their peers readily accomplish. When placed in the position of being unable to do the tasks expected of them by their teachers, parents, and classmates, these children may perceive the situation as threatening to their self-concept. This, in turn may lead to anxiety, which would inhibit the learning of the tasks. It is suspected that a circular relationship would then develop with anxiety becoming a significant factor. Further, although the learning disabled student may eventually mature neurologically to an adequate level for learning the academic skills, the anxiety associated with the task of performance would be such that it would override the child's capability to accomplish them.

Remediation

A multitude of techniques have been developed to aid in the remediation of learning disabilities. Included in the most prominent strategies would be Frostig's visual-motor program, Fernalds multisensory approach, and Johnson and Myklebust's language-based program. According to Bryan and Bryan (1978), empirical evidence on the various

approaches has been sparse, and the results available have been disappointing (Rosen, 1966; Bryan and Bryan, 1978).

One of the more difficult problems in remediation is choosing the most appropriate place to intervene. According to Sarason (1972), changing situational factors in teaching methods and curricula have proven difficult and usually unsuccessful. As an example he referred to the difficulties encountered in introducing the "new math" program in the United States. Sarason stated that one of the objectives of the new program was to reduce the anxiety level of students. However, Sarason and Sarason (1969) found that as a consequence of the curriculum change, the anxiety level of the teachers increased, which in turn appeared to subsequently raise the anxiety level of the students. In his later writings, Sarason (1972) was critical of program developers that did not take into account the complexity of the school culture. They assumed that the major factor in the school setting was the curriculum, and when it was changed, everything also would change accordingly.

> Far from holding a social psychological - historical - structural - cultural view, these innovators seemed to view the school as comprised of certain kinds of adults, books, and curricula. . . . [The curriculum] was considered most important in that if it was changed, the teachers and children would change (Sarason, 1972, p. 471).

Direct intervention strategies such as remedial reading programs, special classrooms, and individual tutoring appear to have also been ineffective (Silberberg, Iverson, & Gains, 1973). Rhodes (1976) studied 420 central Alberta learning disabled students. He compared the academic achievement of those placed in regular classrooms with those placed in resource rooms. His study indicated that there was no

difference in the achievement levels of the students in regular classes vs. resource rooms in the areas of mathematics, reading recognition, reading comprehension, spelling, or general information, as measured by the Peabody Individual Achievement Test. While short term gains have been demonstrated by using a variety of techniques, longitudinal studies have shown gains to be transitory and usually insignificant (Silberberg et al., 1973).

The complexity of the school culture and the maturity of the child must be considered to be mitigating factors if one were to attempt direct intervention on the child's perception of a learning situation as threatening. It is difficult to conceive of a child being able to dismiss pressures from parents, teachers, and peers as non-threatening when he has already developed anxieties because of these factors.

Intervention at the anxiety level in the hypothesized learning disability circle is believed to be a fruitful area of investigation. Behavioral methods in the treatment of anxiety have found wide acceptance and success. Jacobson (1938) considered the relaxation of muscles to be the direct opposite of tension, and therefore a logical treatment for the anxious person. The autonomic effects are incompatible with those of anxiety, thus, if a person is relaxed, he cannot be anxious (Wolpe, 1958).

Relaxation techniques have been used alone and in combination with other therapeutic methods to alleviate a variety of problems (Bernstein & Borkovec, 1972; Deffenbacher, 1977; Wolpe, 1958). Verbally induced relaxation has been shown to improve performance on recall tasks for high anxious but not low anxious subjects (Stroughan & Dufort, 1969).

Graziano and Kean (1968) found that physical relaxation methods helpled reduce tantrum behavior in autistic children. Self-hypnotically induced relaxation has been used successfully to alleviate insomnia (Kahn, Baker, & Weiss, 1968). In addition, test anxiety has been reduced by systematic desensitization with students in college (Allen, 1971; Kathan, Strenger, & Cherry, 1966), junior high school (Deffenbacher & Kemper, 1974a), and elementary school (Deffenbacher & Kemper, 1974b).

Anton (1975) compared systematic desensitization, group counselling, and no treatment groups on A-Trait, A-State, test anxiety, and grade point average. No changes were found on A-Trait or grade point average after either treatment. However, systematic desensitization was found to affect differences on A-State and test anxiety, while the group counselling situation did not. Anton explained the lack of change in academic achievement by stating that the grade point averages were not sensitive to any changes that may have occurred. In addition, it could be pointed out that the treatment was designed to reduce test anxiety, not increase academic performance.

A comparison of systematic desensitization and relaxation training in the treatment of test anxiety was reported by Bedell (1975). Results indicated both treatment methods reduced test anxiety and A-State, but neither produced changes in A-Trait or in performance on the Wide Range Achievement Test. Once again, it could be argued that the lack of influence on academic achievement may have been due to the focus on reducing test anxiety.

Few studies have been reported in the literature regarding the use of relaxation methods in academic remediation with learning disabled elementary school children. Word and Rozynko (1974) related a case

study where an 11 year old girl became less distractible, talked less, improved her reading ability from failing to passing grades, and demonstrated an increased interest in school work. Culbertson and Willie (1978) reported support for relaxation training in reducing off-task behavior in fifth grade boys. Increased efficiency in handwriting after relaxation training given to 32 learning disabled boys of 8 to 11 years was reported by Carter and Synolds (1974). In addition, improved quality was still evident in a follow-up four months later.

There are a variety of procedures which may be used for the relaxation of children, or that can be adapted for use with children. Some require specialized electronic equipment, such as an electromyogram (e.g., Wilkinson, 1980), some are verbal programs on cassette tapes, such as the Quieting Response Training (Strobel, 1978), and others are verbal techniques used on a face-to-face basis, such as hypnosis or progressive relaxation procedures (Bernstein & Borkovec, 1973).

While the number of studies utilizing relaxation techniques for the remediation of learning disabilities has been minimal, those which have been published appear to indicate positive results. Further research in the area may be beneficial in increasing the theoretical knowledge of etiological factors in learning disabilities and in providing insights on possible remedial techniques which could be economical and practical in the school setting.

Summary

While the relationship between anxiety and learning disabilities can be demonstrated theoretically, the empirical evidence is largely

circumstantial. Learning disabled children have been described as hyperactive, aggressive, negative, disruptive, immature, insecure, learning slowly, attention seeking, quarrelsome, shy, and of short attention span (Becker & Snider, 1979; Strag, 1972). Similarly, these types of behaviors have been reported in the anxiety literature for highly anxious children and children placed in high anxiety producing situations (Krasnagorski, 1925; Laurita, 1976; Phillips, 1978).

With the help of the Hull-Spence paradigm of learning (Spence, 1958), high anxiety can be shown to detrimentally affect learning by the interference of the stimulus drive (S_D) response hierarchy with the habit strength (H) response hierarchy. Spielberger's (1972 concept of anxiety is helpful in explaining the development of anxiety in the learning disabled. If the learning disability stems from demands placed on the child before he is developmentally ready to cope with them (Laurita, 1976), the child will perceive the situation as threatening to his self-concept. The perceived threat results in anxiety Spielberger, 1972) which in turn leads to inappropriate responses (Laurita, 1976; Wolpe, 1958). The situation becomes circular with inappropriate responses leading to more stress situations, which in turn are perceived as threatening, and result in greater levels of anxiety.

The problem for remediation of learning disabilities is choosing the most appropriate place to intervene. Changing teaching methods and curricula have proven difficult and usually unsuccessful (Sarason, 1972). Direct intervention upon the incorrect responses by activities such as remedial reading programs, special classroom, reading clinics,

and individual turoring have also appeared to be ineffective over the long term (Rhodes, 1976; Silberberg, Iverson, & Goins, 1973). The complexity of the school culture and the maturity of the child are thought to be mitigating factors in attempts which might be made in direct intervention on perceptions of threat. This is reflected in the largely unsuccessful use of traditional techniques in remediating learning disabilities (Connolly, 1971; Rabinovich, 1962).

The anxiety factor in the "learning disabilities cycle" is thought to be an appropriate point of intervention. Behavioral methods utilizing relaxation techniques in the alleviation of anxiety have found wide acceptance and success (Bernstein & Borkovec, 1973; Wolpe, 1958), and have been used to reduce test anxiety with students in elementary school (Deffenbacher & Kemper, 1974b), junior high school (Deffenbacher & Kemper, 1974a), and college (Allen, 1971; Kathen, Strenger, & Cherry, 1966).

Research Postulate

Assuming that anxiety is a learned response (Wolpe, 1958) contingent upon a stressful situation (Spielberger, 1972), and that the inappropriate responses of the learning disabled are a function of anxiety (Laurita, 1976), it is hypotesized that a reduction of anxiety through differential relaxation will effect an improvement in the achievement of learning disabled children. Utilizing the theoretical structure of the Hull-Spence model, reduction of the anxiety component (r_e) will reduce drive (D) and the competing response hierarchy of stimulus drive (S_D). By utilizing differential relaxation (in this case, appropriate relaxation while reading) habit strength (H)

should increase. The combined effects of reducing r_e, D, and S_D and increasing H should result specifically in increased reading performance in learning disabled children and generalize to other achievement areas (Spence, 1958; Spence & Spence, 1966).

It is the position of the present study that many learning disabled children, when presented with tasks they cannot accomplish, will perceive the situation as a threat to their self-concept, and subsequently develop anxieties. The anxieties percipitate inappropriate responses which, in turn, result in situations regarded by the children as stressful. At that time, the anxiety becomes the controlling factor in the learning disability. The child will have difficuly learning even though he may be intellectually capable of learning the tasks. This is not to be interpreted as anxiety being a totally negative phenomenon. There is a curvilinear relationship, as postulated by Yerkes-Dodson, on the level of anxiety and its relationship to achievement. Some moderate levels of anxiety are necessary for minimal performance. The question open to debate is to determine the optimal levels of anxiety for optimal achievement, or conversely, to determine when to reduce anxiety to effect positive changes in performance. Intervention at the anxiety component of the circular relationship would seem to be a logical point to break the cycle. Relaxation techniques have been found successful in the treatment of anxiety, although few studies have been reported in the literature on the relationship of anxiety to learning disabilities. Further research is needed to examine the effects of using relaxation techniques in the treatment of anxiety and its subsequent relationship to improved achievement.

Chapter IV

RESEARCH DESIGN AND METHODOLOGY

The following chapter presents the characteristics of the subjects used in the study, the instruments used to assess the children, and the procedure used with the treatment group. In addition, difficulties encountered with the original design proposed for the study, and the method used to alleviate the difficulties are discussed.

Subjects

Thirty-six males between the ages 9 years, 9 months and 12 years, 6 months took part in the study. They were selected from eight special classes for the learning disabled (Junior Adaptation Classes) in four urban schools from the Edmonton Public School District. The Junior Adaptation Classes were comprised of males and females ranging in age from approximately 8 years to 14 years. The students spent the entire school day in the special classes, and received academic programs tailored for their level of ability. The school districts' criteria for placement in Adaptation Classes was average intelligence as measured by an individual intelligence test and at least a two year deficit in one or more academic subjects. In this study all students were at least two years below grade level in reading, language, and mathematics. Most students had attended the special classes since they were in grade three, and some since grade four.

The criteria for inclusion in the study were: males, over the age of nine years and under 13 years with a Full Scale intelligence quotient within one standard deviation of the mean as measured by the

Wechsler Intelligence Scale for Children - Revised; a minimum of a two year deficit in reading, and an absence of major physical, social, or emotional problems. The selection data was provided by the schools as recorded in the student's cumulative records. In addition it was deemed that WISC - R results obtained more than two years previous to the study would not be considered suitable.

It has been suggested that much research in the field of learning disabilities has led to inconclusive or conflicting results because of the heterogeneous character of the student categorized as learning disabled (Chapman, Boersma, & Janzen, 1978). This heterogeneity was reflected in the population of Adaptation Classes used in the present study. Many students were not eligible for inclusion because they could not meet the requirements described above. In addition, while it was initially decided to use more stringent controls for inclusion in the study, the logistics of working within the school system structure made this impossible.

Forty-two subjects from the total special class population of 81 students met the criteria. Of these, two were not included because the parents refused permission for their children to take part in the study. Of the remaining 40 students, four were omitted. One was rejected because an accident left him in a cast, making the relaxation procedure necessary for the study impossible to achieve. Two students moved to different schools, and one was omitted after the discovery of previously unknown social and emotional problems. The remaining 36 students formed four groups of nine subjects.

Table 1 presents the means and standard deviations of the age, intelligence, years in school, and achievement test results of the

sample (Pre- and posttest means and standard deviations in Appendix A).

Table 1

Means and Standard Deviations for Age, Intelligence, Years in School, and Peabody Individual Achievement Pretest Scores[a]

	n	Mean	SD
Age	36	10.995	.855
Verbal IQ	36	89.083	8.005
Performance IQ	36	102.333	10.682
Full Scale IQ	36	94.555	6.813
Years in School	36	5.472	.810
Mathematics	18	36.778	6.537
Reading Recognition	18	31.722	6.181
Reading Comprehension	18	31.555	6.362
Spelling	18	32.055	5.452
Information	18	27.278	9.734

[a]Achievement scores in raw scores

Instruments

The study required the assessment of academic achievement, anxiety levels, and intelligence. To this end the Peabody Individual Achievement Test and the State-Trait Anxiety Inventory for Children were used. They were administered on an individual basis. Also administered were the Metropolitan Reading Achievement Test (Intermediate Level) and the Test Anxiety Scale for Children administered in the classrooms to allow pretest and posttest comparisons in group situations. WISC-R scores were provided by the schools, and had been administered by school

psychologists certified in the Province of Alberta.

The PIAT is an individually administered instrument designed to provide measures of academic achievement in mathematics, reading recognition, reading comprehension, spelling, and general information. Its format consists of questions of ascending difficulty in each academic area, and is normed for ages 5 years 3 months through 18 years 3 months. Test-retest reliability coefficients vary from .42 in Spelling (Kindergarten) to .94 in Reading Recognition (grade 3). According to Dunn and Markwardt (1970) the greatest confidence can be placed in the stability of Reading Recognition (.89) and the least in Reading Comprehension (.64) and Spelling (.65). At the grade five level, which most closely approximates the age of those in the present study, the test manual reports test-retest reliability coefficients over one month to be; Mathematics .73, Reading Recognition .89, Reading Comprehension .64, Spelling .53, and General Information .88. The standard error of measurement for raw scores at the grade five level were reported as follows: Mathematics 4.63, Reading Recognition 3.90, Reading Comprehension 6.51, Spelling 6.38, and General Information 4.21.

The State-Trait Anxiety Inventory for Children (Spielberger, 1973) was developed as a research instrument for the study of anxiety in elementary school children. It is a self report questionnaire of two parts, each consisting of 20 questions. The state anxiety (A-State) section measures how the individual feels at a particular moment in time. The child is presented with the initial comment "I feel" and is required to respond by checking one of three possible answers designated

to examine how he is reacting emotionally at that given moment. For example, after one "I feel" comment the child has the choice of answering "very calm", "calm", or "not calm."

The trait anxiety (A-Trait) section measures how the subject feels generally. Statements regarding various anxiety-related situations such as "I feel unhappy", are presented and the child chooses his response from the given answers "hardly ever", "sometimes", and "often." Test-retest reliability for the STAIC with fourth, fifth, and sixth grade boys was reported as .65 (A-Trait) and .31 (A-State) (Spielberger, 1973). The low coefficient for the A-State measure was expected because the instrument was designed for sensitivity to situational factors. Concurrent validity for the A-Trait scale was obtained by correlations with the Children's Manifest Anxiety Scale (Castaneda, McCandless, & Palermo, 1956) and the General Anxiety Scale for Children (Sarason et al, 1960). The correlation with these tests were .75 and .63 respectively. Construct validity of the A-State scale was obtained by comparing two administrations, one with standard instructions as indicated in the manual and a repeat in an imagined stress situation. Mean scores "were considerably higher in the TEST condition (males, 41.76; females, 43.79) than in the NORM condition (males, 31.10; females, 31.03)" (Spielberger, 1973, p. 9).

The WISC-R yields scores in Verbal, nonverbal (Performance), and overall (Full Scale) areas. It is a widely used instrument and has been described as having excellent standardizations, validity, and extremely high reliability properties (Sattler, 1974). The tests' weaknesses of limited floor and ceiling and possible cultural bias are

thought not to be factors in the present study because of the sample's requirement of average intelligence. Wechsler (1974) reported split-half reliability coefficients of .94 (Verbal), .90 (Performance), and .96 (Full Scale) on the WISC-R. Standard errors of measurement were 3.60 (Verbal), 4.66 (Performance), and 3.19 (Full Scale) IQ points.

The Metropolitan Reading Achievement Test consists of the Word Knowledge and Reading subtests of the Metropolitan Achievement Test (1970). The authors claimed the validity of achievement tests are best defined in terms of content validity. They stated that because each school has its own curriculum, each school must evaluate the test items in terms of what is being taught, and then judge whether the test is valid for that school. Split-half reliability coefficients were reported to be .92 and .93 for Word Knowledge and Reading respectively. The standard errors of measurements were 2.7 for Word Knowledge and 2.6 for Reading.

The Test Anxiety Scale for Children is an experimental instrument purported to measure anxiety which results from the child being placed in evaluative situations. In consists of 30 items which are answered either "yes" or "no" and can be administered to individuals or groups. Factor analyses have demonstrated approximately 40 percent of the variance attributable to a factor labelled "test anxiety", approximately 16 percent to a factor named "remote school concerns", approximately 20 percent to a "poor self evaluation" factor, and approximately 24 percent to "somataic signs of anxiety" (Phillips et al., 1972). Hill and Sarason (1966) reported the means and standard deviations for boys as follows: a) Grade four, 10.20 and 6.50; b) Grade five, 9.44 and 5.51; and c) Grade six, 9.31 and 5.40.

Research Design

The purpose of this study was to investigate changes in performance on the academic and anxiety measures of learning disabled children following a training procedure in progressive relaxation. It had been proposed that a circular relationship between inability to read, stress, anxiety, and inappropriate responses existed. It was expected that the reduction of anxiety through relaxation training coupled with reading tasks would lead to an increase in reading achievement scores as well as changes in the anxiety measures. In addition, measures on arithmetic, spelling, and general information were included to assess any generalization of effects to other academic areas.

A Soloman Four-Group design was proposed initially to examine whether the treatment procedure affected performance on the achievement and anxiety measures. The Soloman design utilizes four groups. One group receives a pretest, treatment, and a posttest. The second group receives treatment and posttest. The third group receives a pretest and a posttest, and the fourth group receives only the posttest. The groups are represented schematically by the following diagram.

Group 1	Pretest	+	Treatment	+	Posttest
Group 2			Treatment	+	Posttest
Group 3	Pretest	+			Posttest
Group 4					Posttest

The analysis can be done by a 2 X 2 ANOVA on the posttest measures

which will yield the main effects of pretested versus unpretested groups and treated versus untreated groups.

	Untreated	Treated
Pretested	Group 3	Group 1
Unpretested	Group 4	Group 2

Utilizing the above design, the posttest data for the present study was subjected to a series of 2 X 2 ANOVAs. The results of the analyses on each set of subtest scores were statistically insignificant with the exeption of the Spelling subtest where the untreated groups scored significantly higher. In addition the posttest only group was superior on seven of the ten measures used, including four of the five academic measures. This led to the suspicion that the random sample did not in fact result in randomness when the students were assigned to the groups. Therefore, it was decided to further analyze the data to ascertain whether there might be differences between the groups which were not readily apparent in the selection procedure.

Pretest Data Analyses

To examine the possibility of initial differences between groups, a one-way ANOVA was conducted on the available pretest results. The *F* ratio on the Test Anxiety Scale for Children yielded a difference between the groups at the .07 level. A Newman-Keuls comparison between ordered means resulted in a significant difference between the posttest-only and the treatment-posttest groups, with the posttest-

only group having the superior scores ($Q = 4.26$, $p < .05$). The smallest difference was between the pretest-treatment-posttest and the pretest-posttest groups ($Q = .67$, $p > .05$). There were no significant differences on the age and IQ variables.

Since it appeared that the random assignment of students to the groups resulted in one group being superior to the others, it was decided to reformulate the hypotheses to conform to a pretest-posttest-control group design. The groups used for this purpose were the pretest-treatment-posttest and the pretest-posttest groups from the original Solomon design. The results of the one-way ANOVA suggested that these two groups were the most similar on the pretest measure of the Test Anxiety Scale for Children.

Procedure

Upon ascertaining those students who were eligible for inclusion in the study, they were randomly assigned to one of the four groups. The parents were then contacted by letter and permission asked for their children to be included in the study (see Appendix B). Those students assigned to the pretest groups received the State-Trait Anxiety Inventory for Children. The A-State scale was first administered in a calm situation after rapport was established, followed by the A-Trait scale. The A-State scale was then re-administered in an in vivo stress situation immediately following a statement indicating their reading ability was to be examined. To effect the stress situation each subject was informed, upon completion of the A-Trait scale, that he was going to be given a reading test. The Peabody Individual Achievement Test was then administered

according to the directions in the test manual with the exception of the Reading Recognition subtest being given first. Following the completion of the individual tests, the Test Anxiety Scale for Children and the Metropolitan Reading Achievement Test were administered to all students in the classes from which the sample was drawn. The time required for each individual test was approximately 45 minutes, and the testing was completed in two weeks. The same examiner administered all tests.

Two experienced female teachers provided a progressive relaxation program for the students. The teachers were trained over three sessions and observed to ascertain their skill in relaxing children.

The relaxation procedure followed was essentially that described by Bernstein and Borkovec (1973). The student was instructed to tense various muscle groups, such as the right hand and forearm, and release the tension until the major muscles throughout the body had been covered (see Appendix C). For example, the procedure for instructing the student regarding his right hand and forearm was presented as:

> Now I'd like you to focus all of your attention on the muscles of your right hand and lower arm . . . by making a tight fist I'd like you to tense the muscles in the right hand and lower arm now . . . [The client holds the tension for 5 to 7 seconds during which the therapist helps to focus attention on the muscle tension by making statements such as "feel the muscles pull."]. . . . The therapist should terminate the tension period with a standard statement like "O.K., relax." At this point the muscle group is released, and the therapist must keep the client's attention focused on the feelings in the muscle group as it relaxes. To achieve this, the therapist would, for 30-40 seconds, make statements to the client . . . [such as] "just let these muscles go . . . focusing on the feeling in this muscle group as it becomes more and more relaxed."
>
> (Bernstein & Borkovec, 1973, pp. 25-26)

This was done in stages with the first stage consisting of 16 muscle groups. The second stage combined muscle groups so that there were a total of seven groups, and the third stage involved four muscle groups. When each muscle group was relaxed the student was instructed to concentrate on the relaxed feeling. Upon completion of the third stage, a fourth stage was introduced where the student was required to relax by recalling the effect of the previous procedure and focusing his attention on letting the muscles go limp without prior tensing. Finally the student was required to relax by the recall method while maintaining a posture suitable for reading in a school desk. Upon completion of the training, the student would sit relaxed in a school desk and read literature he was currently working on in the classroom. The material varied for each student and was appropriate for his present level of reading ability.

Each student was seen on an individual basis for the relaxation sessions in rooms provided by the schools. The children were taught the relaxation technique while either sitting in a comfortable chair or lying on a foam mat. During the initial session it was explained that the purpose of the sessions was to help the student with his school work. It was stated that he was going to be taught how to relax because it was thought some children became too tense when trying to work in school. Each child was asked to practice at least once per day and told that a good time for this was when he went to bed.

There were a total of 12 sessions which were held twice per week for six weeks (see Appendix D). Each session was approximately 20 to 30 minutes in duration. The first six visits involved training in

the tension-release mode of attaining relaxation and the remaining six utilized the recall mode. In the eighth session the student started relaxing in a school desk to more closely approximate a classroom situation. The final four sessions combined relaxzation and reading. Reading material was whatever the child was learning in his reading class at the time.

Upon completion of the treatment sessions the posttests were administered. The tests and procedures were identical to those used for the pretests. Two examiners administered the tests, and testing was completed in two weeks.

Statistical Method

The hypotheses presented in this study were tested by means of a 2 X 2 analyses of variance procedure with repeated measures. For hypotheses one through six, the levels were labeled "group" (treatment and no treatment) and "test" (pretest and posttest). The levels for hypothesis seven were labeled "group" (high anxiety and low anxiety) and "test" (pretest and posttest). In addition, there were further analyses on the groups, utilizing *t*-tests between mean difference scores.

Hypotheses

Hypotheses were formulated to reflect the utilization of the pretest-posttest-control group design. In addition to expecting the reading achievement scores to improve after treatment, it was thought that the effects would generalize to other academic areas. Therefore it was predicted that:

1. The gain scores of the treatment group will be significantly greater than those of the control group on the subtests of the Peabody Individual Achievement Test.

The treatment procedure in the study was utilized to lower anxiety in a stressful situation. Since the State Anxiety Scale for Children has been reported to be sensitive to changes in stress (Spielberger, 1973) it was predicted that:

2. The gain scores of the treatment group will be significantly greater than those of the control group on the A-State measure taken in a stressful situation.

A-State measures are reported to reflect the anxiety conditions of the moment. Thus, in a nonstressful situation, it was predicted:

3. There will be no significant difference between the gain scores of the treatment and control groups on the A-State measure taken in a nonstressful situation.

The A-Trait scale was designed to measure the general anxiety proneness of children (Spielberger, 1973). This is considered to be a relatively stable personality characteristic as opposed to the transitory nature of state anxiety, and there has been evidence that short term relaxation training has minimal effects on trait anxiety (Johnson & Spielberger, 1968). It was predicted therefore:

4. There will be no significant difference between the gain scores of the treatment and control groups on the A-Trait measure.

The group measures on performance in reading, as measured by the Metropolitan Reading Achievement Test, and test anxiety, as measured by the Test Anxiety Scale for Children, were to be examined by a pretest-posttest- control group design. While the treatment procedure

was oriented toward individual sessions, it was thought that the effects would generalize to the classroom situation. The predictions were:

5. The gain scores of the treatment group will be significantly greater than those of the control group on the reading achievement measures taken in the classroom situation.

6. The gain scores of the treatment group will be significantly greater than those of the control group on the TASC.

Consideration was given to the posibility that there might be differences on the academic measures between those scoring higher or lower on the anxiety scales. Since both the high and low groups were expected to score in the higher ranges of the anxiety scales it was thought there would be little difference between them. Therefore it was predicted:

7. There will not be significant differences between the gain scores of the high and low anxiety groups on the subtests of the Peabody Individual Achievement Test.

Hypotheses 1, 5, and 7, as stated above, are general in nature, and encompass a series of specific hypotheses. These specific hypotheses are related to individual subtest measures, and are stated in the following chapter.

Chapter V

RESULTS

In presenting the results, product-moment correlations between the State-Anxiety (A-State) and Trait-Anxiety (A-Trait) measures and the Peabody Individual Achievement Test (PIAT) measures will be reported first. This will be followed by the 2 X 2 analyses of variance with reapeated measures data on the individually administered tests, group tests, and the performance of the high and low anxiety groups. The probability level for accepting or rejecting an hypothesis will be .05.

According to Winer (1971), the main effects between subjects (factor A, Group) in a repeated measures ANOVA is equivalent to an analysis of the difference scores between the pre- and posttests. However, he stated that the factor A analysis is not as sensitive as the main effects within subjects (factor B, Test) or the AB interaction analyses. The reason stated was that the factor A effects are confounded with differences between groups, while the factor B and AB interaction effects are not confounded. Comparisons between the levels of factor A (Group) involve possible characteristic differences between the groups as well as the differences between the treatments. These group characteristics tend to cancel in the factor B (Test) comparisons because the groups are combined. It was decided that if the factor A effects were not significant while the factor B effects were significant, a post hoc comparison between the pre- and posttests for each group would be calculated to provide further data on the differences between the experimental and

control groups. This comparison would be accomplished by means of a *t* test for correlated data.

Correlational Data

Product-moment correlations, presented in Table 2, were calculated to examine the relationships between the Stait-Trait Anxiety measures and the subjects' performance on the PIAT. However, caution must be used when interpreting the results because of the small number of subjects ($n = 18$).

The correlations of the initial, or calm situation, A-State measure with other anxiety measures and the subtests of the PIAT reached statistical significance ($p < .05$) on four of the seven items. A positive correlation was found between the A-State (calm) and the in vivo, or stress situation, administration of the A-State scale. The statistically significant correlations between the A-State (calm) and the Reading Recognition, Reading Comprehension, and Spelling subtests of the PIAT were negative. The results of the A-State (calm) measure did not correlate significantly with the A-Trait, Mathematics, or General Information measures.

The A-State (stress) scale did not correlate significantly with any measure except the A-State (calm) scale. Since both administrations were given during the same session, the insignificant results may be due to the setting of the "stress" administration being relaxed instead of anxiety producing because of increasing familiarity with the examiner.

Table 2

Product - Moment Correlations for the Pre State-Trait Anxiety Measures and the Pre PIAT Measures

	State-Calm	State-Stress	Trait	Mathematics	Reading Recognition	Reading Comprehension	Spelling	General Information
	1	2	3	4	5	6	7	8
1	-	.652*	.174	.195	-.563*	-.587*	-.502*	-.158
2		-	.065	-.187	-.432	-.326	-.319	-.393
3			-	-.038	-.493*	-.471*	-.330	-.374
4				-	.080	.095	.151	.419
5					-	.785*	.789*	.301
6						-	.738*	.527*
7							-	.336

$n = 18$

*$p < .05$

The A-Trait scale results correlated significantly with the Reading Recognition, Reading Comprehension, and General Information results. Correlations did not reach statistical significance with the Mathematics or Spelling measures. All correlations were negative.

The correlations between the Mathematics subtest and the other subtests of the PIAT were not statistically significant. The Reading Recognition scores correlated positively, and reached statistical significance, with the Reading Comprehension and Spelling scores. In addition, the results of the Reading Comprehension subtest correlated significantly and positively with the Spelling and General Information subtests.

Of note was the fact that all but one of the correlations (A-State (calm) - Mathematics) between the anxiety scales and the academic scales were negative. While taking into account that the small number of subjects renders the correlations tenuous, the pattern of negative correlations may be indicative of a detrimental relationship between anxiety and academic performance in learning disabled students. However, the negative correlations might also be function of the scoring procedure whereby as anxiety scores decrease the academic scores increase.

Analysis of Individually Administered Tests

The first set of analyses compared the performance of the treatment group to the control group on individually administered academic and anxiety measures. The academic measures consisted of the PIAT subtests, and the anxiety measures were the A-State (calm), A-State (stress), and A-Trait scales.

Each individual in the treatment group received training in a relaxation technique, followed by sessions requiring the use of the relaxation skills while reading. It was predicted that the relaxation - reading technique would transfer to the other academic areas measured by the PIAT. The control group did not receive any training. In general, it was predicted that the treatment group would demonstrate greater gains on the individually administered achievement tests and the A-State (stress) measure. No differences were predicted on the A-State (calm) or A-Trait measures.

Reading Recognition

H1.1 The gain scores of the treatment group will be significantly greater than those of the control group on the Reading Recognition subtest of the PIAT.

The results of the 2 X 2 analysis of variance with repeated measures on the Reading Recognition subtest of the PIAT (Summarized in Table 3) indicated that there was no statistically significant difference between the treatment and control groups. The difference between the pretests and posttests was significant at the .05 level. However, the group x test interaction effects were not statistically significant

The cell means for the treatment group were 29.67 for the pretests and 31.89 for the posttests, with a mean gain score of 2.22. The cell means for the control group were 33.78 for the pretests and 35.56 for the posttests, with a mean gain score of 1.78. The results of one-tailed t tests on the difference scores were t (8) = 4.14,

$p < .05$ for the treatment group, and t (8) = 1.50, $p > .05$ for the control group.

On the basis of the ANOVA results H1.1 was rejected. However, a comparison of the gain scores for each group indicated that the gains made by the treatment group reached statistical significance at the .05 level while the gains of the control group did not. Thus while the hypothesis was rejected, the data indicated the difference between the groups was in the predicted direction on the Reading Recognition subtest.

Mathematics

H1.2 The gain scores of the treatment group will be significantly greater than those of the control group on the Mathematics subtest of the PIAT.

The analysis of variance results on the Mathematics subtest of the PIAT (Table 4) indicated that there was no statistically significant difference between the treatment and control groups. The analysis did indicate significant gains between the pre- and posttests at the .05 level, but the group x test interaction effects were not statistically significant.

The mean pretest score was 35.44 and the mean posttest score was 41.89 for the treatment group. The mean gain score for the treatment group was 5.45. The control group obtained a mean pretest score of 37.11 and a mean posttest score of 40.56, with a mean gain score of 3.45. The one-tailed t tests between the pre- and posttest measures were t (8) = 4.11, $p < .05$ for the treatment group, and t (8) = 1.12, $p > .05$ for the control group.

Table 3

ANOVA Summary Data for Treatment and Control Groups on Reading Recognition

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	136.090	1.688	.212
Subjects within groups	16	80.632		
B (Test)	1	36.000	7.524	.014*
AB	1	.457	.096	.761
B x Subjects within groups	16	4.785		

*Significant effect

Table 4

ANOVA Summary Data for Treatment and Control Groups on Mathematics

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	.984	.011	.919
Subjects within groups	16	91.063		
B (Test)	1	177.750	6.010	.026*
AB	1	9.035	.305	.588
B x Subjects within groups	16	29.577		

*Significant effect

H1.2 was rejected on the basis of the ANOVA results. The data from the t tests indicated that the gains made by the treatment group were statistically significant while the gains of the control group were not significant. Therefore, the difference between the groups on their gain scores was in the predicted direction on the Mathematics subtest.

Reading Comprehension

H1.3 The gain scores of the treatment group will be significantly greater than those of the control group on the Reading Comprehension subtest of the PIAT.

The results of the analysis on the Reading Comprehension subtest of the PIAT (Table 5) indicated that there were no statistically significant differences between the groups nor between the pre- and posttests. The group x test interaction effects were also non-significant. Therefore H1.3 was rejected.

Spelling

H1.4 The gain scores of the treatment group will be significantly greater than those of the control group on the Spelling subtest of the PIAT.

The analysis of variance data on the Spelling subtest of the PIAT (Table 6) indicated that there was no statistical difference between the treatment and control groups. There was no statistically significant difference between the pre- and posttests, nor the group x test interaction effects. Therefore H1.4 was rejected.

Table 5

ANOVA Summary Data for the Treatment and Control Groups on Reading Comprehension

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	38.013	.463	.506
Subjects within groups	16	82.014		
B (Test)	1	.026	.003	.957
AB	1	4.709	.531	.477
B x Subjects within groups	16	8.861		

Table 6

ANOVA Summary Data for the Treatment and Control Groups on Spelling

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	240.223	4.392	.052
Subjects within groups	16	54.702		
B (Test)	1	6.258	.618	.443
AB	1	3.375	.334	.572
B x Subjects within groups	16	10.118		

General Information

H1.5 The gain scores of the treatment group will be significantlly greater than those of the control group on the General Information subtest of the PIAT.

There was no statistically significant difference between the treatment group and the control group as indicated by the analysis of variance (Table 7). However there was a statistically significant difference between the pre- and posttest at the .05 level. The group x test interaction effects were not statistically significant. Therefore H1.5 was rejected.

The treatment group mean scores were 28.56 on the pretest and 34.33 on the posttest, with a mean gain score of 5.77. The mean scores of the control group were 26.00 on the pretest and 31.44 on the posttest, with a mean gain score of 5.44. The one tailed t tests on the gain scores of each group yielded t (8) = 3.70, $p < .05$ for the treatment group, and t (8) = 3.63, $p < .05$ for the control group. Therefore the gains made by both groups were statistically significant on the General Information subtest.

State Anxiety (Stress)

H2 The gain scores of the treatment group will be significantlly greater than those of the control group on the A-State measure taken in a stressful situation.

The analysis of variance results (Table 8) indicated that there were no statistically significant differences on the group, test, or group x test interaction effects. Therefore H2 was rejected.

Table 7

ANOVA Summary Data for the Treatment and Control Groups on General Information

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	66.683	.262	.616
Subjects within groups	16	254.222		
B (Test)	1	283.351	26.844	.000*
AB	1	.272	.026	.874
B x Subjects within groups	16	10.555		

*Significant effects

Table 8

ANOVA Summary Data for the Treatment and Control Groups on A-State (Stress)

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	.035	.001	.973
Subjects within groups	16	29.132		
B (Test)	1	12.270	1.511	.237
AB	1	1.336	.165	.690
B x Subjects within groups	16	8.118		

State Anxiety (Calm)

H3 There will be no significant difference between the gain scores of the treatment and control groups on the A-State measure taken in a nonstressful situation.

The results of the analysis of variance (Table 9) indicated that there was no statistically significant difference between the groups, between the pre- and posttests, nor were there significant group x test interaction effects. Therefore H3 was accepted.

Trait Anxiety

H4 There will be no significant difference between the gain scores of the treatment and control groups on the A-Trait measure.

Results from the analysis of variance (Table 10) indicated that there were no statistically significant differences on the effects between the groups, between the pre- and posttests, or the group x test interaction. Therefore H4 was accepted.

Analysis of Group Administered Tests

Group tests were administered to the classes from which the subjects were drawn. These tests were included to assess the transfer of any treatment effects to the classroom situation. It was predicted that the treatment group would make greater gains than the control group on the subtests of the Metropolitan Reading Test and the TASC.

Word Knowledge

H5.1 The gain scores of the treatment group will be significantly greater than those of the control group on the Word Knowledge subtest of the Metropolitan Reading Achievement Test.

Table 9

ANOVA Summary Data for the Treatment and Control Groups on A-State (Calm)

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	4.693	.144	.709
Subjects within groups	16	32.597		
B (Test)	1	3.357	.636	.439
AB	1	.701	.133	.720
B x Subjects within groups	16	5.278		

Table 10

ANOVA Summary Data for the treatment and Control Groups on A-Trait

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	4.008	.040	.843
Subjects within groups	16	99.063		
B (Test)	1	5.449	.396	.538
AB	1	5.449	.396	.538
B x Subjects within groups	16	13.757		

The data from the analysis of variance (Table 11) indicated that there were no statistically significant differences between the groups or between the pre- and posttests. In addition, there were no significant group x test interaction effects. Therefore H5.1 was rejected.

Reading

H5.2 The gain scores of the treatment group will be significantly greater than those of the control group on the Reading subtest of the Metropolitan Reading Achievement Test.

The analysis of variance results (Table 12) indicated that the differences between the groups and between the pre- and posttests were not statistically significant. The interaction effects were also not significant. Therefore H5.2 was rejected.

Test Anxiety Scale for Children

H6 The gain scores of the treatment group will be significantly greater than those of the control group on the TASC.

The results of the analysis of variance (Table 13) indicated that there were no statistically significant differences between the groups, or between the pre- and posttests. Similarly, the group x test interaction effects were not significant. Therefore H6 was rejected.

Analysis of High - Low Anxiety Groups

The treatment group was divided on the basis of high or low anxiety scores on the A-State (stress), A-State (calm), A-Trait, and

Table 11

ANOVA Summary Data for the Treatment and Control Groups on Word Knowledge

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	.039	.000	.985
Subjects within groups	9	106.602		
B (Test)	1	39.274	3.106	.112
AB	1	1.276	.101	.758
B x Subjects within groups	9	12.646		

Table 12

ANOVA Summary Data for the Treatment and Control Groups on Reading

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	12.041	.337	.574
Subjects within groups	10	35.708		
B (Tests)	1	22.042	1.592	.236
AB	1	2.043	.148	.709
B x Subjects within groups	10	13.842		

TASC measures. The dividing points were arbitrarily chosen at approxomately the mean of the group's scores on each measure. The dividing points were: (a) High $\geq$ 33, Low $\leq$ 32, on the A-State (stress) and A-State (calm) measures; (b) High $\geq$ 40, Low $\leq$ 39, on the A-Trait measure; and (c) High $\geq$ 16, Low $\leq$ 15 on the TASC measure. In the case of the TASC, the dividing point was approximately one standard deviation above the mean of the normative population reported by Hill and Sarason (1966). Using the high-low status as the criterion, the subjects were assigned to one of the two groups, and their pre- and posttest scores subjected to a 2 X 2 analysis of variance with repeated measures.

High-Low A-State (Stress) and Reading Recognition

H7.1 There will be no significant difference between the gain scores of the high and low A-State (stress) groups on the Reading Recognition subtest of the PIAT.

The results of the analysis of variance (Table 14) indicated that there was no statistical difference between the groups or between the pre- and posttests. The group x test interaction effects were not significant. Therefore H7.1 was accepted.

High-Low A-State (Stress) and Mathematics

H7.2 There will be no significant difference between the gain scores of the high and low A-State (stress) groups on the Mathematics subtest of the PIAT.

The analysis of variance results (Table 15) indicated that there was no statistically significant difference between the groups. A

Table 13

ANOVA Summary Data for the Treatment and Control Groups on the TASC

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	11.201	.279	.609
Subjects within groups	10	40.126		
B (Test)	1	69.143	2.390	.153
AB	1	47.145	1.630	.231
B x Subjects within groups	10	28.931		

Table 14

ANOVA Summary Data for the High and Low A-State (Stress) Groups on Reading Recognition

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	33.611	.416	.539
Subjects within groups	7	80.786		
B (Test)	1	20.545	5.154	.057
AB	1	1.878	.471	.515
B x Subjects within groups	7	3.986		

statistically significant difference was in evidence between the pre- and posttests at the .05 level, however the group x test interaction effects were not significant. Therefore H7.2 was accepted.

The high anxiety group obtained mean scores of 32.50 on the pretest and 36.25 on the posttest, with a mean gain score of 3.75. The low anxiety group mean scores were 39.60 on the pretest and 46.40 on the posttest, with a mean gain score of 6.80. The two tailed t test on the gain scores resulted in t (3) = 2.72, $p > .05$ for the high group, and t (4) = 3.34, $p < .05$ for the low group. The low anxiety group increased its score significantly, while the high anxiety group did not. Therefore it appeared that the low anxiety group made greater gains on the Mathematics subtest.

High-Low A-State (Stress) and Reading Comprehension

H7.3 There will be no significant difference between the gain scores of the high and low A-State (stress) groups on the Reading Comprehension subtest of the PIAT.

The results of the analysis of variance (Table 16) indicated that there were no statistically significant differences between the groups, nor between the pre- and posttests. However, it did indicate a statistically significant group x test interaction. Therefore H7.3 was rejected.

Examination of the mean scores revealed a pretest mean score of 28.25, and a posttest mean score of 30.50, with a gain score of 2.25 for the high anxiety group. The low anxiety group mean scores were 33.00 on the pretest and 30.00 on the posttest, with a gain score of -3.00 for the low anxiety group. Thus while the high anxiety group mean gain

Table 15

ANOVA Summary Data for the High and Low A-State (Stress) Groups on Mathematics

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	330.625	2.888	.133
Subjects within groups	7	114.482		
B (Test)	1	123.681	16.404	.005*
AB	1	10.330	1.370	.280
B x Subjects within groups	7	7.540		

*Significant effect

Table 16

ANOVA Summary Data for the High and Low A-State (Stress) Groups on Reading Comprehension

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	20.069	.201	.667
Subjects within groups	7	99.768		
B (Test)	1	.625	.172	.690
AB	1	30.625	8.448	.023*
B x Subjects within groups	7	3.625		

*Significant effect

scores increased, the low anxiety group mean gain scores changed in the negative direction. Thus, the performance of the high anxiety group increased its performance on the Reading Comprehension subtest after treatment, while the performance of the low anxiety group decreased.

High-Low A-State (Stress) and Spelling

H7.4 There will be no significant difference between the gain scores of the high and low A-State (stress) groups on the Spelling subtest of the PIAT.

The data from the analysis of variance (Table 17) revealed that there were no statistically significant differences on the group, test, or group x test interaction effects. Therefore H7.4 was accepted.

High-Low A-State (Stress) and General Information

H7.5 There will be no significant difference between the gain scores of the high and low A-State (stress) groups on the General Information subtest of the PIAT.

The results of the analysis of variance (Table 18) indicated that there was no statistically significant difference between the groups. A statistically significant difference between the pre- and posttests was in evidence at the .05 level. However, there was no significant group x test interaction effect. Therefore H7.5 was accepted.

The mean gain score for the high group was 4.0, with a mean pretest score of 20.00 and a mean posttest score of 24.00. The low anxiety group mean gain score was 7.20, with a mean pretest score of 35.40 and a mean posttest score of 42.60. The two tailed t test on the gain score for the high anxiety group was t (3) = 1.68, $p > .05$,

Table 17

ANOVA Summary Data for the High and Low A-State (Stress) Groups on Spelling

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	5.878	.072	.797
Subjects within groups	7	82.129		
B (Test)	1	.044	.003	.956
AB	1	5.378	.395	.550
B x Subjects within groups	7	13.628		

Table 18

ANOVA Summary Data for the High and Low A-State (Stress) Groups on General Information

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	1,284.444	4.693	[illegible]067
Subjects within groups	7	273.714		
B (Test)	1	139.378	12.770	.009*
AB	1	11.378	1.042	.341
B x Subjects within groups	7	10.915		

*Significant effect

while the results on the low anxiety group was t (4) = 3.50, $p < .05$. While both groups increased their scores, the low anxiety group made the greater gains on the General Information subtest.

High-Low A-State (Calm) and Reading Recognition

H7.6 There will be no significant difference between the gain scores of the high and low A-State (calm) groups on the Reading Recognition subtest of the PIAT.

The analysis of variance results (Table 19) revealed statistically significant differences between the groups and between the pre- and posttests. However, the group x test interaction effects were not signifficant. Therefore H7.6 was accepted.

The mean scores for the high anxiety group were 26.00 on the pretest and 26.50 on the posttest, with a mean gain score of .50. The low anxiety group mean scores were 32.60 on the pretest and 36.20 on the posttest, with a mean gain score of 3.60. The results of the two tailed t tests on the gain scores were t (3) = .45, $p > .05$ on the high group, and t (4) = 3.09, $p < .05$ on the low group. Both groups made gains on the Reading Recognition subtest; however, the increase by the low anxiety group was greater.

High-Low A-State (Calm) and Mathematics

H7.7 There will be no significant difference between the gain scores of the high and low A-State (calm) groups on the Mathematics subtest of the PIAT.

The data from the analysis of variance (Table 20) indicated that there was no statistically significant difference between the groups,

Table 19

ANOVA Summary Data for the High and Low A-State (Calm) Groups on Reading Recognition

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	295.211	6.800	.035*
Subjects within groups	7	43.415		
B (Test)	1	18.677	6.846	.035*
AB	1	10.678	3.914	.088
B x Subjects within grou	7	2.728		

*Significant effect

Table 20

ANOVA Summary Data for the High and Low A-State (Calm) Groups on Mathematics

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	.399	.002	.962
Subjects within groups	7	161.657		
B (Test)	1	134.444	15.179	.006*
AB	1	1.111	.125	.734
B x Subjects within groups	7	8.875		

*Significant effect

but there was a statistically significant difference between the pre- and posttests at the .05 level. However, the group x test interaction effects were not significant, and H7.7 was therefore accepted.

The mean score on the pretest was 36.00 and on the posttest the mean score was 42.00 with a mean gain score of 6.00 for the high anxiety group. The low anxiety group had mean scores of 36.80 on the pretest and 41.80 on the posttest, with a mean gain score of 5.00. The two tailed t tests had results of t (3) = 3.57, $p < .05$ for the high group, and t (4) = 2.36, $p > .05$ for the low group. Thus the high anxiety group appeared to make greater gains on the Mathematics subtest.

High-Low A-State (Calm) and Reading Comprehension

H7.8 There will be no significant difference between the gain scores of the high and low A-State (calm) groups on the Reading Comprehension subtest of the PIAT.

The results of the analysis of variance (Table 21) indicated that there were no statistically significant differences on the group, test, or group x test interaction effects. Therefore H7.8 was accepted.

High-Low A-State (Calm) and Spelling

H7.9 There will be no significant difference between the gain scores of the high and low A-State (calm) groups on the Spelling subtest of the PIAT.

The results of the analysis of variance (Table 22) indicated that there was no statistically significant difference between the groups, no difference between the pre- and posttests, and no significant group x test interaction effects. Therefore H7.9 was accepted.

Table 21

ANOVA Summary Data for the High and Low A-State (Calm) Groups on Reading Comprehension

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	169.469	2.161	.185
Subjects within groups	7	78.425		
B (Test)	1	1.736	.219	.654
AB	1	.625	.079	.787
B x Subjects-within groups	7	7.911		

Table 22

ANOVA Summary Data for the High and Low A-State (Calm) Groups on Spelling

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	110.002	1.636	.242
Subjects within groups	7	67.254		
B (Test)	1	.469	.034	.859
AB	1	3.803	.275	.616
B x Subjects within groups	7	13.853		

High-Low A-State (Calm) and General Information

H7.10 There will be no significant difference between the gain scores of the high and low A-State (calm) groups on the General Information subtest of the PIAT.

The analysis of variance results (Table 23) indicated that there was no statistically significant difference between the high and low groups. There was a statistically significant difference between the pre- and posttests at the .05 level. However, the group x test interaction effects were not significant. Therefore H7.10 was accepted.

The mean scores for the high group were 22.75 on the pretest and 29.00 on the posttest, with a mean gain score of 6.25. The low group mean scores were 33.20 for the pretest and 38.60 for the posttest, with a mean gain score of 5.40. The results of the two tailed t-tests were $t(3) = 2.50$, $p > .05$ for the high group, and $t(4) = 2.43$, $p > .05$ for the low group. Thus, while the ANOVA indicated a statistically significant difference between the pre- and posttests, the independent differences for each group were not statistically significant on the General Information subtest.

High-Low A-Trait and Reading Recognition

H7.11 There will be no significant difference between the gain scores of the high and low A-Trait groups on the Reading Recognition subtest of the PIAT.

The data from the analysis of variance (Table 24) indicated that there were no statistically significant differences on the group effects, test effects, or group x test interaction effects. Therefore H7.11 was accepted.

Table 23

ANOVA Summary Data for the High and Low A-State (Calm) Groups on General Information

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	446.670	1.135	.322
Subjects within groups	7	393.397		
B (Test)	1	150.803	12.137	.010*
AB	1	.803	.065	.807
B x Subjects within groups	7	12.425		

*Significant effect

Table 24

ANOVA Summary Data for the High and Low A-Trait Groups on Reading Recognition

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	3.211	.038	.852
Subjects within groups	7	85.129		
B (Test)	1	21.510	5.087	.059
AB	1	.179	.042	.843
B x Subjects within groups	7	4.228		

High-Low A-Trait and Mathematics

H7.12 There will be no significant difference between the gain scores of the high and low A-Trait groups on the Mathematics subtest of the PIAT.

The analysis of variance results (Table 25) indicated that there was no statistically significant difference between the groups. The difference between the pre- and posttests was statistically significant at the .05 level. The group x test interaction effects did not reach statistical significance. Therefore H7.12 was accepted.

The high group obtained mean scores of 33.40 on the pretest and 38.40 on the posttest, and had a mean gain score of 5.00. The low group had mean scores of 40.25 on the pretest and 46.25 on the posttest, with a mean gain score of 6.00. The two tailed t tests on the gain scores for each group resulted in t (4) = 3.04, $p < .05$ for the high group, and t (3) = 2.48, $p > .05$ for the low group. While both groups made gains on the Mathematics subtest, it appeared that the high group's gains were greater.

High-Low A-Trait and Reading Comprehension

H7.13 There will be no significant difference between the gain scores of the high and low A-Trait groups on the Reading Comprehension subtest of the PIAT.

The results of the analysis of variance (Table 26) indicated that there were no statistically significant differences between the high and low groups, no significant differences between the pre- and posttests, and no significant group x test interaction effects. Therefore H7.13 was accepted.

Table 25

ANOVA Summary Data for the High and Low A-Trait Groups on Mathematics

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	240.104	1.884	.212
Subjects within groups	7	127.415		
B (Test)	1	134.444	15.179	.006*
AB	1	1.111	.125	.734
B x Subjects within groups	7	8.857		

*Significant effect

Table 26

ANOVA Summary Data for the High and Low A-Trait Groups on Reading Comprehension

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	.470	.005	.948
Subjects within groups	7	102.568		
B (Test)	1	3.803	.833	.392
AB	1	24.025	5.259	.056
B x Subjects within groups	7	4.568		

High-Low A-Trait and Spelling

H7.14 There will be no significant difference between the gain scores of the high and low A-Trait groups on the Spelling subtest of the PIAT.

Data from the analysis of variance (Table 27) indicated that there were no statistically significant differences on the group effects, test effects, or group x test interaction effects. Therefore H7.14 was accepted.

High-Low A-Trait and General Information

H7.15 There will be no significant difference between the gain scores of the high and low A-Trait groups on the General Information subtest of the PIAT.

The data from the analysis of variance (Table 28) revealed that there was no statistically significant difference between the groups. The difference between the pre- and posttests reached statistical significance at the .05 level. However, the interaction effects were not statistically significant. Therefore H7.15 was accepted.

The high anxiety group obtained mean scores of 22.80 on the pretest and 28.60 on the posttest, with a mean gain score of 5.80. The mean scores of the low group were 35.75 on the pretest and 41.50 on the posttest, with a mean gain score of 5.75. The two tailed t tests on the gain scores of each group resulted in t (4) = 2.25, $p > .05$ for the high group, and t (3) = 3.05, $p > .05$ for the low group. While the combined groups increased their scores significantly, neither group independently made gains which reached statistical significance on the General Information subtest.

Table 27

ANOVA Summary Data for the High and Low A-Trait Groups on Spelling

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	7.803	.095	.766
Subjects within groups	7	81.854		
B (Test)	1	1.224	.126	.733
AB	1	33.003	3.409	.107
B x Subjects within groups	7	9.682		

Table 28

ANOVA Summary Data for the High and Low A-Trait Groups on General Information

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	742.465	2.114	.189
Subjects within groups	7	351.139		
B (Test)	1	148.229	11.821	.011*
AB	1	0.0	0.0	.999
B x Subjects within groups	7	12.539		

*Significant effect

High-Low TASC and PIAT Variables

Those subjects entered in each of the high and low anxiety groups on the basis of their performance on the TASC were the same subjects categorized as high and low from the results of the A-State (stress) measure. Thus, the results of the high-low TASC and PIAT analysis were identical to those obtained from the A-State (stress) analysis. Therefore, only the hypotheses and decisions, with a reference to the appropriate A-State (stress) section, will be entered here.

High-Low TASC and Reading Recognition

H7.16 There will be no significant difference between the gain scores of the high and low TASC groups on the Reading Recognition subtest of the PIAT.

The analysis of variance results indicated that there were no statistically significant differences between the groups or tests, nor was there a statistically significant interaction effect (see Table 14). Therefore H7.16 was accepted.

High-Low TASC and Mathematics

H7.17 There will be no significant difference between the gain scores of the high and low TASC groups on the Mathematics subtest of the PIAT.

The analysis of variance results (see Table 15) indicated there was no statistically significant difference between the groups. A statistically significant difference was in evidence between the pre- and posttests at the .05 level, and further analysis indicated that the low anxiety group increased its mean gain score significantly while the high group did not. The group x test interaction was not

statistically significant. Therefore H7.17 was accepted.

High-Low TASC and Reading Comprehension

H7.18 There will be significant difference between the gain scores of the high and low TASC groups on the Reading Comprehension subtest of the PIAT.

The results of the analysis of variance indicated that there were no statistically significant differences between the groups or between the pre- and posttests (see Table 16). However, there was a statistically significant difference on the group x test interaction. Therefore H7.18 was rejected. Observation of the mean scores indicated that the performance of the high group increased, while the performance of the low group decreased on the Reading Comprehension subtest.

High-Low TASC and Spelling

H7.19 There will be no significant difference between the gain scores of the high and low TASC groups on the Spelling subtest of the PIAT.

The analysis of variance (see Table 17) indicated that there were no statistically significant results on the group differences, pre- and posttest differences, or the group x test interaction. Therefore H7.19 was accepted.

High-Low TASC and General Information

H7.20 There will be no significant difference between the gain scores of the high and low TASC groups on the General Information subtest of the PIAT.

The analysis of variance results (see Table 18) indicated that there was no statistically significant difference between the groups.

A statistically significant difference was found between the pre- and posttests, with the low anxiety group demonstrating a statistically significant gain, while the high anxiety group's gain was not significant. The group x test interaction effects were not statistically significant. Therefore H7.20 was accepted.

3-Way ANOVA on High-Low A-State (Stress) and PIAT Variables

To examine the relationships between the high and low anxiety groups on both the experimental and control groups' performances on the PIAT a 2 x 2 x 2 ANOVA was calculated. The format consisted of the main effects between the experimental and control groups (factor A, Group), main effects between the high and low groups (factor B, High-Low), and the main effects between the pre- and posttests (factor C, Test). With the exception of the Reading Comprehension subtest (see Table 29) the ABC interactions were not significant. Simple effects tests on the Reading Comprehension subtest results indicated that the mean achievement scores for the high anxiety experimental group declined significantly from 33.0 to 30.0 after the treatment condition ($F(1, 14) = 5.89$, $p \leq .05$). The results of the other simple effects tests were not significant.

Summary

The purpose of the present research was to study the efficacy of utilizing a differential relaxation technique, which combined relaxation and reading, in improving the performance of learning disabled boys on various achievement and anxiety measures. In addition, the effects of high and low anxiety on the performance of the treatment group was investigated. The basis for the study was the theoretical position that

Table 29

ANOVA Summary Data for the Experimental and Control High-Low A-State (Stress) Groups on Reading Comprehension

Source	df	M.S.	F-Ratio	Probability
A (Group)	1	38.281	.419	.528
B (High-Low)	1	33.882	.370	.553
AB	1	.260	.003	.958
Subjects within groups	14	91.297		
C (Test)	1	.087	.013	.912
AC	1	1.997	.290	.599
BC	1	1.424	.207	.656
ABC	1	44.010	6.395	.024*
C x Subjects within groups	14	6.882		

*Significant effect

anxiety was a major factor in the development of learning disabilities, and that relaxation techniques would be effective in alleviating the anxiety. It was predicted that by reducing the anxiety levels of the subjects a gain in their performance on the academic measures would be effected.

The results of the analysis regarding the academic measures were negative. However, there were indications that the performance of the treatment group was in the predicted direction on some of the academic subtests (see Table 30). In addition, subtests other than those indicated in Table 30 appeared to be in the predicted direction, although the gain scores did not reach significance. These will be discussed in the following chapter.

Of major importance to the study was the failure of the treatment to effect a significant change in the performance of the experimental group on the A-State (stress) anxiety measure. According to the Hull-Spence theory a reduction on this measure would be prerequisite to effecting gains on the academic measures. Thus, the rejection of the hypotheses regarding the academic measures would be expected. Possible reasons for the insignificant results are discussed in the next chapter.

With one exception, the hypotheses predicting no differences between the high and low anxiety groups were accepted. It had been expected that the learning disabled population would characteristically score high on the anxiety measures, and differences on the academic measures between the relative high and low groups would be minimal. However, there were some indications, which are discussed later, that the effects of differential relaxation training might be different for the high and low groups on some academic measures.

Table 30

Summary of Hypotheses with Results as Predicted or in Predicted Direction*

Hypothesis	Accepted	Rejected	Predicted Direction
1.1		x	x
1.2		x	x
3	x		
4	x		
7.1	x		
7.2	x		
7.4	x		
7.5	x		
7.6	x		
7.7	x		
7.8	x		
7.9	x		
7.10	x		
7.11	x		
7.12	x		
7.13	x		
7.14	x		
7.15	x		

*Predicted direction ascertained by Treatment group gain reaching significance as measured by t test.

Chapter VI

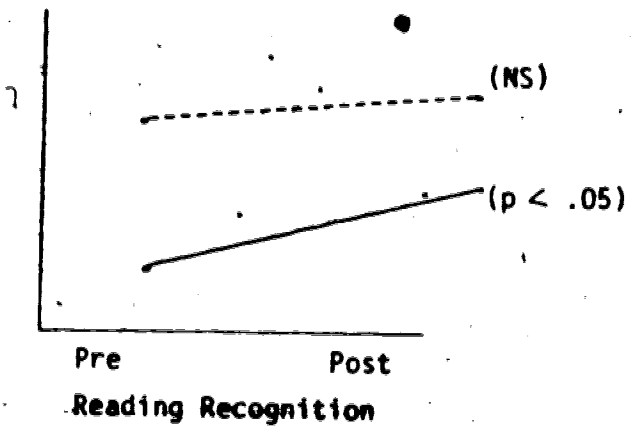
DISCUSSION AND CONCLUSIONS

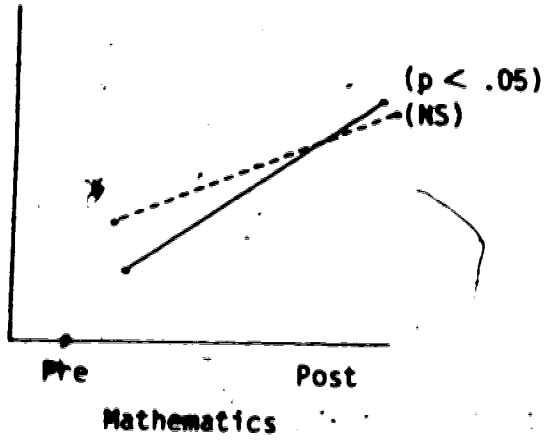
This study postulated that learning disabilities become a function of a circular relationship which involves the student (a) responding in an inappropriate manner, which (b) leads to stress, which (c) leads to anxiety, which (d) leads to inappropriate responses. While the initial inability to respond correctly might be the result of a developmental phenomenon, it was thought that the circular relationship becomes the determining factor over time. Further, it was theorized that intervention at the anxiety component of the cycle would be appropriate in the amelioration of learning disabilities as measured by the research instruments.

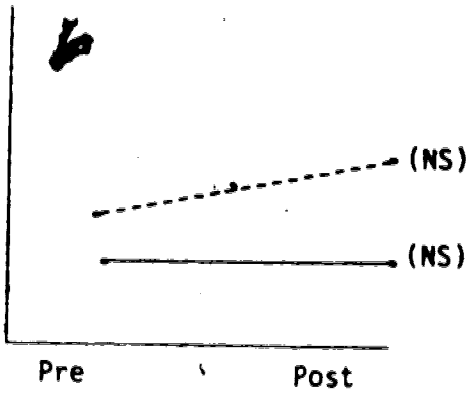
Treatment Effects on the Experimental versus the Control Groups

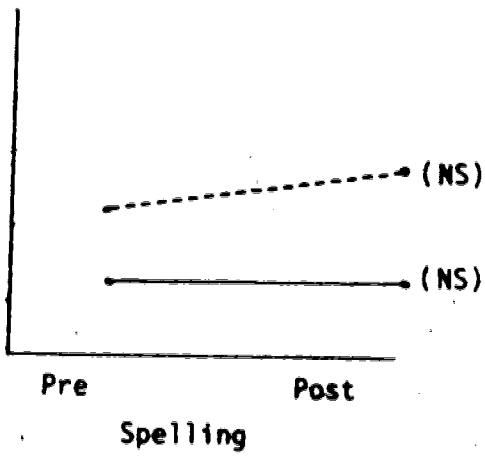
Analysis of the individual test data indicated that the treatment group made statistically significant gains on the Reading Recognition and Mathematics subtests of the PIAT. Conversely, the gains of the control group did not reach significance on these two subtests. On the General Information subtest, the mean gains of both groups were statistically significant. Finally, on the Reading Comprehension and Spelling subtests, neither group demonstrated significant gains. Illustrations of the results can be found in Figure 1.

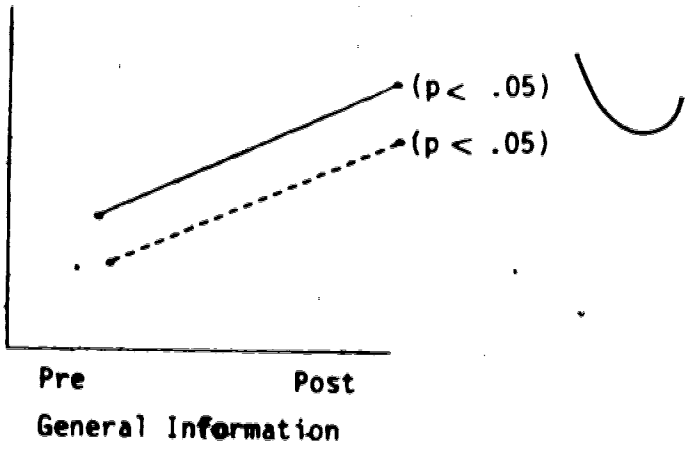
As can be seen in Figure 1, there was an increase in the experimental group's performance on the Reading Recognition and Mathematics subtests. Since the treatment was directed at reading as well as anxiety, the gains in Reading Recognition were to be expected. The secondary gain











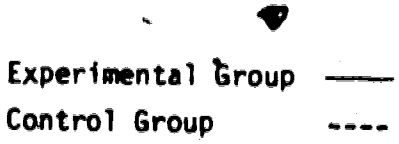


Figure 1. Group gains on the dependent variables following treatment

on the Mathematics subtest was possibly due to lessened anxiety plus more efficient reading skills as related to the mathematics problems. Alternately, the improved performance could be considered test-retest gains.

Both groups demonstrated statistically significant gains on the General Information subtest. This could be considered a retest gain where the scores increased due to a practice effect on some items. Lessened anxiety, however, might also have been an influence since previous research has shown that anxiety is a factor effecting performance specifically on the Information subtest of the WISC-R (Lutey, 1977).

Neither the treatment nor the control group demonstrated significant gains on the Reading Comprehension and Spelling subtests. The insignificant gains could have been the result of not having remedial tasks directly related to these areas in the treatment procedure. As was indicated by Bryon and Bryon (1978), some learning disability studies using remedial procedures which are secondary to specific deficits do not demonstrate significant results. For example, Rosen (1966) studied children receiving perceptual-motor training for reading disabilities as compared to a control group receiving reading instruction. He found that the experimental group gained most in perceptual-motor skills, while the control group gained most in reading. Other factors which may have contributed to the insignificant results on the Reading Comprehension and Spelling subtests are discussed later in this chapter.

Significant gains were not obtained by either group on the classroom measures of Work Knowledge and Reading, as measured by the Metropolitan Reading Test. The lack of significant results might be

due to the fact that the treatment concentrated on having the subjects work in isolation and not in a group situation. Thus, it would appear that the treatment effects were insufficient to transfer to the classroom situation.

Treatment Effects on High versus Low Anxiety Groups

Those subjects who received treatment were separated into high and low anxiety groups to ascertain whether there were differential effects. The mean score on the A-State (stress) measure was chosen as the point of separation between the high and low groups.

On the Reading Recognition subtest, both the high and low anxiety groups displayed increased mean scores. However, neither group made gains which reached significance on the two-tailed t tests. Thus, while the treatment group, as a whole, made a statistically significant gain, the high and low anxiety divisions were not differentiated on the basis of increased scores. Therefore it appeared that the treatment effects were similar for both groups.

The data on the Mathematics subtest also indicated that both the high and low anxiety groups increased their scores after treatment. In this case however, the gains made by the low anxiety group were statistically significant ($p < .05$), while the increase by the high anxiety group did not reach significance. Since there were no interaction effects, the gains were considered similar for both groups.

A statistically significant interaction ($p < .05$) was found between the gains made by the high and low anxiety groups on the Reading Comprehension subtest. In this instance, the mean score of the high anxiety group increased, while that of the low group

decreased. The reduced mean posttest score of the low anxiety group may have been due to the complexity of the task. However, this would be contrary to existing research results which indicate low anxious groups perform better than high anxious groups on complex tasks (Spielberger, 1966). Since the Reading Comprehension subtest involved recall of what had been read, an alternate explanation might be related to the findings of Stroughan and Dufort (1969) who found that relaxation improved recall in high anxious but not low anxious subjects, where complexity was not a confounding factor. Another explanation of the increased scores of the high anxiety group and the decreased scores of the low anxiety group could be that they reflect a statistical regression to the mean.

On the Spelling subtest, neither the high nor the low anxiety groups demonstrated statistically significant changes. However, observation of the data indicated that the low anxious group increased its performance, while the high anxious group's mean score decreased.

Both the high and low anxious groups increased their performance on the General Information subtest after the treatment. The increase made by the low anxious group was statistically significant at the .05 level. However, the gain made by the high anxious group did not reach statistical significance. Thus, while both groups gained after the treatment, it appeared that the low group gained most.

Treatment Effects on State and Trait Anxiety

According to Spielberger (1972, 1975), State and Trait anxiety could be differentiated on the basis of their duration over time.

A-State was conceptualized as being transitory in nature. It was seen as a fluctuating emotional condition which was dependent upon whether or not the situation was construed as threatening by the individual. A-Trait was considered to be a relatively stable personality characteristic whereby an individual with high A-Trait perceived a wider range of situations as threatening than one with low A-Trait. A-State could be thought of as an acute anxiety condition, while A-Trait could be viewed as a chronic condition.

Given these two differences in conceptualizing anxiety, the following results examine the performance of learning disabled children as a function of anxiety types. Table 31 clearly indicates that whether the individuals were high in either the State or Trait categories, the results of the treatment had no interaction effects based on a differentiation between these two constructs. The results of this research indicated that the high and low anxiety groups in the State and Trait conditions made similar gains or losses on the posttests, not as a function of differentiating between types of anxiety, but rather as a function of receiving treatment. In other words, the treatment precipitated similar effects on both the State and Trait categories.

Specifically, both the high and low anxious groups increased their scores for Reading Recognition, Mathematics, and General Information following treatment. No differences were found when one examined the groups on State vs. Trait typology. However, the high anxious groups decreased their Spelling scores on the posttest, regardless of the State or Trait categorization. On the Reading

Table 31

Direction of High-Low Anxiety Group Mean Gain Scores between Academic Pre- and Posttests[a]

Dependent Variables	Anxiety Criterion in Order of Presentation	High Anxious Group	Low Anxious Group
Reading Recognition	A-Trait	Increased	Increased
	A-State (stress)	Increased	Increased
Mathematics	A-Trait	Increased*	Increased
	A-State (stress)	Increased	Increased*
Reading Comprehension	A-Trait	Increased	Decreased
	A-State (stress)	Increased	Decreased
Spelling	A-Trait	Decreased	Increased
	A-State (stress)	Decreased	Increased
General Information	A-Trait	Increased	Increased
	A-State (stress)	Increased	Increased*

[a] Mean score change ≥ 1.00 required for classification of Increased or Decreased.

*Significant at $p < .05$.

Comprehension subtest, the high anxious group increased its mean score and the low anxious group decreased its mean score on the post-test, but the direction of change was the same whether State or Trait anxiety was being assessed.

The results of this study indicated that the State vs. Trait typology was not a significant differentiating factor in explaining the effects of treatment. Relaxation therapy was equally effective or neutral, whether the individuals were classified under State anxiety or Trait anxiety types.

Relation of Findings to Theory

Since no significant findings were obtained in regards to State vs. Trait anxiety, one may question the sensitivity of the tests to clearly differentiate groups on this basis. Previous research has shown that relaxation treatment has been effective in producing lowered scores on State anxiety (Anton, 1975; Bedell, 1975). However, no evidence exists to show whether change in State or Trait anxiety would effect change in academic areas for learning disabled children. The present study would conclude that the State and Trait factors do not clearly interact in changing the learning disabled child's ability to perform better on academic measures. However, the treatment in this study did not change the level of State anxiety as much as had been anticipated. Hence, there was a lack of significant differences in academic performance between the experimental and control groups.

The insignificant differences between the experimental and control groups on the academic measures, in this instance, would be

consistent with the theoretical framework of the Hull-Spence model. Since the relaxation training did not effect a statistically significant reduction in the A-State (stress) measure of the experimental group, significant differences between the experimental and control groups on the academic measures would not be expected. In terms of the Hull-Spence model, the anxiety component (r_e) of the experimental group would not have been reduced enough to effect significant gains over the control group's academic performance.

In the Hull-Spence model there are two competing response hierarchies. The habit family hierarchy associated with Habit Strength (H) involves a series of possible responses, with, for example, a single correct response and a number of others which approximate the correct response for a task. The second response hierarchy is that associated with Stimulus Drive (S_D), and can consist of a number of task-irrelevant and interfering responses. According to Spence and Spence (1966), if the response tendencies elicited by S_D are incompatible with the task being attempted, increased S_D will be detrimental to performance. For example, if S_D produces an avoidance response, it will interfere with the completion of the task being attempted. Since the level of S_D is directly related to the level of r_e, high r_e will result in high S_D. The associated response hierarchy of the high S_D will, in turn, hinder performance through competition with the habit family hierarchy. In terms of the present study, if r_e was not reduced sufficiently the competing responses of S_D would remain in conflict with the response hierarchy of H.

The results of the present study could be construed as not being entirely consistent with previous findings. Spielberger had found

that low anxious groups were superior to high anxious groups on complex tasks (Spielberger, 1966; Spielberger & Smith, 1966). In the present study both the Reading Comprehension and Spelling subtests could be considered more complex than the other subtests. The Reading Comprehension subtest involved reading, understanding, and remembering a written passage, followed by recalling the meaning of the passage and identifying, from four pictures presented, the one which most closely represented what had been read. The Spelling subtest required the recognition of the correctly spelled word, from a choice of four possibilities, following the auditory presentation of the word. In that written words be verbalized. However, of the results from the Reading Comprehension and Spelling subtests, only those of the Spelling subtest conformed to what would be expected from the complexity research. That is, the low anxiety group made greater gains than the high anxiety group. The reverse was true on the Reading Comprehension subtest, where the high anxiety group made greater gains than the low anxiety group following the treatment.

The findings of Stroughan and Dufort (1966) may provide some insight regarding an alternate explanation of the increased scores of the high anxious group on the Reading Comprehension subtest. They stated that verbally induced relaxation improved the performance on recall tasks of high anxious, but not low anxious subjects. Stroughan and Dufort explained their results in terms of high anxious subjects having developed interfering behaviors on recall tasks, and the relaxation helping to reduce these interfering behaviors.

The present study has given little support to existing evidence that relaxation techniques can be useful in alleviating school related

problems of learning disabled students (Carter & Synolds, 1974; Word & Rozynko, 1974). However, based on test-retest results, the anxiety levels were not reduced significantly in this study. Therefore no support could be given to theories that changing anxiety levels can affect performance on school related tasks (Deffenbacher, 1977; Phillips, 1978; Phillips et al., 1972; Sarason, 1972; Sarason et al., 1960).

Delimitations of the Study

The intent of the present study was to examine the relationship between anxiety and learning disabilities, and to investigate the effects of a relaxation procedure on the academic performance of learning disabled children. A broad definition of learning disabilities was used in that the criteria for inclusion in the study was (a) attendance in classes for the learning disabled as operated by the Edmonton Public School System, (b) a Full Scale intelligence quotient within one standard deviation of the mean as measured by the Wechsler Intelligence Scale for Children - Revised, (c) a deficit of at least two grade equivalent years in reading ability as measured by the schools, (d) a chronological age between 9 and 12 years, (e) maleness, and (f) a lack of severe emotional and physical handicaps. Factors other than the relationship between anxiety and academic performance, such as the etiology of the learning disabilities, were not considered.

Some dependent variables in the first part of the study were used as independent variables in the last section. The initial analysis examined the effectiveness of relaxation training on changing the levels of anxiety and academic performance, while the final

analysis utilized the pretest anxiety measures as the criterion for examining differences on academic performance between high and low anxiety groups.

The present study was only concerned with learning disabled children. There were no comparisons made with children in regular classrooms, or any other groups.

Limitations of the Study

While the schools were very cooperative and provided the best space available for the relaxation training, the locations were generally not conducive to the success of the study. One of the requirements was a location which would be quiet and free from distractions. However, this was not possible in most of the schools. For example, the sound dampening qualities of the walls in the schools was poor. One location had a washroom on one side and a doorway to a classroom on the other. Another school was overcrowded, and the pressure for space necessitated moving the location for the relaxation training a number of times. Most of the sessions in this school were located in a space which was also used as an infirmary and a thoroughfare between two sections of the school. Another school was able to provide a quiet location, however the temperature was uncomfortably low and that was a distraction in itself.

The timetable for the treatment may also have adversely influenced the results. In order to standardize the relaxation training procedure and stay within the available time frame, each subject was required to progress from one stage of the treatment to the next on a schedule. Thus, each subject moved to the next level

of training regardless of whether or not he had mastered the previous level.

Another factor which might have negatively influenced the results was the small number of subjects within each group. The small numbers limited the power of the analyses of variance because of the low degrees of freedom and the variability of the subjects. In addition the small numbers limited the value of the correlations.

The learning disability clasification could have had an influence on the outcome of the study. The Peabody Individual Achievement Test is a multiple choice instrument, and this could affect the performance of those for whom attention and concentration was a major disability. Also, the PIAT has a high visual component which could be a complicating factor for learning disabled children.

The anxiety tests may also be open to question. As was mentioned previously, the A-State (stress) and A-Trait measures did not appear to differentiate levels of performance on the academic tests. In addition, the mean score of the TASC was approximately one standard deviation above the mean reported by Hill and Sarason (1966), however the mean score of the A-State (stress) measure was at approximately the mean reported by Spielberger et al. (1973). Yet the high and low anxiety groups formed on the basis of the performance on each of these tests was identical. Further, the rapport established during the testing sessions could have mitigated against the A-State (stress) measure actually being a measure of a stress situation. By the time the A-State (stress) test was administered the relationship between

the examiner and the student might have been such that an actual high stress condition was not possible.

Suggestions for Further Research

As a result of the present study most of the hypotheses remain open to question. However, there were indications that further research pertaining to the same hypotheses might be benificial to the fields of learning disabilities and anxiety. It is thought that the lack of control over the physical environment was a mitigating factor in the rejection of the hypotheses predicting improvement in the anxiety and academic measures. Subsequent research should ensure a distraction free location for the relaxation training. Perhaps studies of this nature would be best confined to clinic settings, rather than attempting to accomplish the training in school situations.

In addition, future research should be designed to accommodate individual differences regarding the subjects' ability to progress through the training procedure. While some subjects were able to conform to, or even surpass the requirements needed to complete the training on the schedule used, many students could not become proficient within the required time limits. It might also be beneficial to utilize some method of monitoring the state of relaxation each subject achieves, such as incorporating the use of an electromyogram.

Further, more subjects are needed than the present study could accommodate. The variability of the subjects' performance made significant results difficult to obtain with small numbers.

In addition to the measures used in the present study, it is suggested that some assessment be made of the child's, and his familiy's,

attitude toward school. It was the subjective opinion of the author, and the people involved in the relaxation training, that the attitude of some of the subjects was detrimental to the project. This could be considered to impart a negative value to the Incentive Motivation (K) aspect of the Hull-Spence model. In the present study K was considered, perhaps erroneously, to be a constant.

It may also be advantageous to have stricter control over the IQ level of the subjects. Initially it was thought that the present study had a sufficiently large pool of subjects to ensure the criterion that the IQ scores range between 90 and 110. However, the liberal interpretation of the guidelines for entrance into the learning disability classrooms made adherence to this criterion impossible. Thus, the IQ range was expanded to include those scores from 85 to 115. While there were not many subjects in the outer limits of this range, it is not known if this loosening of control had a detrimental effect.

Another area in which further research might prove fruitful is that of the high and low anxiety groups. While it was predicted, in this study, that there would be no differences between the groups, there were indications that interaction effects might exist. The present study did not have a sufficiently large number of subjects to obtain high and low anxiety groups from the extremes of the continuum. Instead, the mean was used as the dividing point between the groups. Being unable to utilize the extremes made it difficult to ascertain whether there were differences between the high and low anxiety groups.

Summary

The present study assumed a negative relationship between anxiety and learning disabilities. It was postulated that the relationship is

circular in nature and involves difficulty in accomplishing a task (in this case, reading), which is considered stressful and perceived as a threat to the self concept, which leads to anxiety, which further hinders the accomplishment of the task. The initial reason for the reading difficulty was not considered important for this study. While the cause might have been construed as delayed neurological development, evidence was cited which suggested that sufficient neurological development for the acquisition of reading skills occurs by the age of subjects used (10 to 12 years). It was thought that by the time the children reach the age of the subjects the anxiety level of the cycle has become a major factor in their continuing difficulty with reading and overrides any gains in neurological development.

Previous research was cited which indicated that intervention by means of traditional supportive counselling (self concept level) and various indirect techniques, such as visual motor training, have proven to be of limited value in alleviating learning disabilities. In addition, studies were reviewed which indicated that while direct interventions on specific academic tasks (task difficulty level) related to individual learning disabilities have shown some success, the resulting improvement tended to be of limited duration.

It was thought that intervention at the anxiety level of the postulated cycle coupled with reading tasks would result in improved academic performance as measured by achievement tests. The method of intervention was to individually train the subjects in a differential relaxation technique followed by the use of the relaxation skill while engaged in reading tasks. The relaxation training would enable each

subject to relax when involved in an anxiety provoking situation, which was considered to be the case when these subjects were required to perform academically. Theorically, when an individual is relaxed he cannot be anxious. Therefore, it was expected that the relaxation training would break the learning disability cycle and enable the subjects to improve their academic performance.

The primary purpose of the present study was to ascertain whether differential relaxation training could effect an improvement in the performance of learning disabled males on academic achievement measures. Working within the framework of the Hull-Spence learning model, it was predicted that the training procedure would result in the reduction of the emotional component (r_e) of the model. This would reduce the effect of the inappropriate Stimulus Drive (S_D) responses, which compete with the appropriate responses of the Habit Strength hierarchy (H). Thus, with the lessening of the negative effect of S_D, the subjects' performance should improve.

The hypotheses that the treatment would effect a greater decrease in the A-State (stress) measure of the experimental group than would be exhibited by the control group was not substantiated. In addition, the hypotheses that the experimental group would demonstrate significantly greater gains than the control group on the academic measures were not confirmed. However, there were indications that the treatment procedure did effect changes in the predicted direction. The experimental group made statistically significant gains on the Reading Recognition and Mathematics subtests of the PIAT while the control group gains were not significant. In a third academic area (General

Information) both groups made statistically significant gains.

In point form the results were:

1. The experimental group made a statistically significant gain on the Reading Recognition subtest, while the control group did not.

2. The experimental group made a statistically significant gain on the Mathematics subtest, while the control group did not.

3. Neither the experimental nor the control group made significant gains on the Reading Comprehension subtest.

4. Neither the experimental nor the control group made significant gains on the Spelling subtest.

5. Both the experimental and control groups made statistically significant gains on the General Information subtest.

7. The low anxiety treatment group made a statistically significant gain on the Mathematics subtest, while the high anxiety treatment group did not.

8. The low anxiety treatment group made a statistically significant gain on the General Information subtest, while the high anxiety treatment group did not.

9. There was a significant interaction between the high and low anxiety treatment groups on the Reading Comprehension subtest, with the high anxiety group having an increased score and the low anxiety group having a decreased score.

In so far as a significant reduction in A-State (stress) was not accomplished, the present findings theoretically can support the Hull-Spence model of learning. A-State (stress), or in terms of the model, the emotionality component (r_e) was not reduced sufficiently. Therefore the incorrect responses associated with the Stimulus Drive remained in conflict with the responses of the Habit Strength family hierarchy. Thus, the gains demonstrated by the experimental group were not as great as was predicted.

The fact that there was a significant interaction between the high and low anxiety treatment groups on the Reading Comprehension subtests lends support to the findings of Stroughan and Dufort (1969). It would appear that the interaction may have been either a function of the short term memory component of the Reading Comprehension subtest, or a "regression to the mean" effect. Stroughan and Dufort found, as did the present study, that relaxation improved the performance on short term recall tasks for high anxious, but not low anxious subjects.

If one views learning disabilities as a function of a circular relationship involving inappropriate responses, stress, and anxiety, it seems plausible that intervening at the anxiety level would be beneficial. Although research regarding the effects of anxiety in school settings has been sparse (Sieber et al., 1977), the use of relaxation techniques has been generally accepted as valuable in the reduction of anxiety (Bernstein & Borkovec, 1973; Deffenbacher, 1977; Wolpe, 1958).

The results of the present study were inconclusive. While some gains were demonstrated in two specific academic achievement areas (Reading Recognition and Mathematics) they could be explained as test-retest gains. Therefore, intervention at the anxiety level of the learning disability cycle was unsuccessful in this study. This was not interpreted as discounting the effects of anxiety on learning disabled children, but that factors such as more effective anxiety measures and more specific homogeneous learning disability groupings need to be taken into consideration to verify the learning disability-anxiety relationship.

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APPENDIX A

MEANS AND STANDARD DEVIATIONS OF INDIVIDUAL ACHIEVEMENT AND ANXIETY PRE- AND POSTTESTS

Means and Standard Deviations of
Individual Achievement Measures*

	Pretest		Posttest	
	Mean	S.D.	Mean	S.D.
Mathematics	36.778	6.537	41.222	8.066
Reading Recognition	31.722	6.181	33.722	6.731
Reading Comprehension	31.555	6.362	31.611	6.533
Spelling	32.055	5.452	32.889	6.437
Information	27.278	9.734	32.889	12.013

*n = 18

Means and Standard Deviations of
Individual Anxiety Measures*

	Pretest		Posttest	
	Mean	S.D.	Mean	S.D.
State (calm)	31.722	3.709	31.111	4.496
State (stress)	32.889	3.799	31.722	4.331
Trait	38.944	5.835	39.722	8.170

*n = 18

APPENDIX B

LETTERS SENT TO PARENTS OF CHILDREN IN SAMPLE

Dear Mr. and Mrs.

Your son has been chosen to take part in a study on reading difficulties associated with learning disabilities. This project has the approval of the Edmonton Public School system, the principal of your school, and the teacher.

The major focus of the study is the improvement of reading skills by training your son how to relax while reading. It will require twelve training sessions of approximately 30 minutes duration, two testing sessions of approximately one hour, and a few minutes of practice at home each day. All testing and remediation sessions will be done at the school.

If you have any questions, or do not wish your son to take part in the study, please phone Jim Spillios at 483-7611 during the weekend of January 12 and 13.

Thank you very much.

Sincerely yours,

Jim Spillios

JS/dmb

Dear Mr. and Mrs.

Your son has been chosen to take part in a study on reading difficulties associated with learning disabilities. This project has the approval of the Edmonton Public School System, the principal of your school, and the teacher.

The major focus of the study is the improvement of reading skills by training your son how to relax while reading. It will require twelve training sessions of approximately 30 minutes duration, one testing session of approximately one hour, and a few minutes practice at home each day. All testing and remediation sessions will be done at the school.

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Thank you very much.

Sincerely yours

Jim Spillios

JS/dmb

Dear Mr. and Mrs.

Your son has been chosen to take part in a study on reading difficulties associated with learning disabilities. This project has the approval of the Edmonton Public School System, the principal of your school, and the teacher.

Your son has been selected as a member of one of the control groups. It will require two testing sessions of approximately one hour in length, which will be done at the school.

If you have any questions, or do not wish your son to take part in the study, please phone Jim Spillios at 483-7611 during the weekend of January 12 and 13.

Thank you very much.

Sincerely yours

Jim Spillios

JS/dmb

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Your son has been chosen to take part in a study on reading difficulties associated with learning disabilities. This project has the approval of the Edmonton Public School System, the principal of your school, and the teacher.

Your son has been selected as a member of one of the conrol groups. It will require one testing session of approximately one hour in length which will be done at the school.

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Thank you very much.

Sincerely yours

Jim Spillios

JS/dmb

APPENDIX C

MUSCLE GROUPS FOR RELAXATION PROCEDURE

First Stage

16 Muscle Groups

1. Right fist and forearm
2. Right upper arm
3. Left fist and forearm
4. Left upper arm
5. Forehead
6. Middle of face
7. Lower face and jaw
8. Neck
9. Back and chest
10. Stomach
11. Right upper leg
12. Right lower leg
13. Right foot
14. Left upper leg
15. Left lower leg
16. Left foot

Second Stage

7 Muscle Groups

1. Right arm and fist
2. Left arm and fist
3. Face and jaw
4. Neck
5. Back, chest, and stomach
6. Right leg and foot
7. Left leg and foot

Third Stage

4 Muscle Groups

1. Right and left arms and fists
2. Face and neck
3. Back, chest, and stomach
4. Right and left legs and feet

APPENDIX D

TIMETABLE FOR TREATMENT SESSIONS

Timetable for Treatment Sessions

Session	Method	Number of Muscle Groups	Location
1 and 2	Tension - Release	16	Chair
3 and 4	Tension - Release	7	Chair
5 and 6	Tension - Release	4	Chair
7	Recall	4	Chair
8	Recall	4	Desk
9 through 12	Recall and Reading	4	Desk