SPECIAL SECTION

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LEARNING DISABILITIES

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Introduction

A special section on learning disabilities is timely for the *Journal.* Children and adolescents with academic difficulties and/or with school based behavioral and social problems are frequently referred to child mental health professionals.

It is estimated that at least 20% of most school populations have difficulty performing academically at an age-appropriate level. For some of these children the underlying problem is mental retardation; for others the below-normal performance relates to primary emotional problems. There is a third group of these children: those who have difficulty with learning because of the way their nervous systems perform. These children have specific deficits in their learning performance; at the same time they are sensorily intact and of average or above average intellectual ability. They are referred to as learning disabled. Many of these show other evidence of presumed neurological dysfunction. The most frequently noted of these associated difficulties is attention deficit-hyperactivity disorder (Silver, 1981; Halperin et al., 1984).

The recent data from the U.S. Department of Education (1987) shows that during the 1985-1986 school year, 4.73% of all students were diagnosed as learning disabled, a total of 1,872,339 children and adolescents. This group represented almost half (42.8%) of all children served under Public Law 94-142. It is suspected that this figure is an underestimation of the true number. The Centers for Disease Control estimates that between 5 and 10% is a closer estimate (Interagency Committee on Learning Disabilities, 1987).

Definition

Public Schools use the definition established in the federal law, Education for All Handicapped Children, Public Law 94-142. This definition uses inclusionary and exclusionary criteria to define learning disabilities:

> "Specific learning disabilities" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage.

The *DSM-III* did not reflect the educational approach used in this public law (American Psychiatry Association, 1980). Rather than focus on the underlying learning disabilities, *DSM-III* focused on the areas of academic difficulty, using the term *Specific Developmental Disorders.* The specific subcategories focused on general areas of difficulty. The focus on being a developmental disorder reflected the fact that these disorders were found in children and adolescents and that they greatly impacted on all aspects of development. This term does not reflect the reality that for most, these disabilities will last throughout their lives. The current revision of *DSM-III*, *DSM-III-R*, maintains the focus on specific developmental disorders and on general areas of difficulty (American Psychiatric Association, 1987). However, the subgroupings are different than in *DSM-III.* Specifically:

Academic Skills Disorders:
Developmental Arithmetic Disorder
Developmental Expressive Writing Disorder
Developmental Reading Disorder

Language and Speech Disorders:
Developmental Articulation Disorder
Developmental Expressive Language Disorder
Developmental Receptive Language Disorder

Motor Skills Disorder:
Developmental Coordination Disorder

These specific developmental disorders are coded on Axis II. They are characterized by inadequate development of specific academic, language, speech, and motor skills that are not due to demonstrable physical or neurological disorders, a pervasive developmental disorder, mental retardation, or deficient educational opportunities.

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The diagnosis of an academic skills disorder should be based on the results of standardized, individually administered tests that measure both the level of development of the impaired skill and the person's intellectual capacity. In diagnosing the language and speech disorders, it is necessary to compare scores obtained from standardized measures of expressive or receptive language with scores obtained from standardized measures of nonverbal intellectual capacity.

DSM-III-R differs significantly from federal and state classification systems for children and adolescents with learning disabilities. The latter systems state in their definition that such individuals are of at least average intelligence. In *DSM-III-R* a child who is performing academic skills below his or her intellectual potential is diagnosed as having an academic skills disorder even if he or she is mentally retarded.

The inclusion of these categories in a classification of "mental disorders" is considered controversial by some since many of the children with these disorders have no other signs of psychopathology. Further, the detection and treatment of many of these disorders usually take place within schools rather than within the mental health system. However, these conditions are strongly associated with Axis I disorders and conform to the *DSM-III-R* concept of a mental disorder; i.e., a mental disorder is conceptualized as a clinically significant behavioral or psychological syndrome or pattern that occurs in a person and that is associated with present distress or disability or with a significant increase in risk of suffering death, pain, disability, or an important loss of freedom.

When working in or with a school system, the term learning disabilities will be used. When completing medical or insurance forms, *DSM-III-R* will be used. Regardless of the label used, the primary concern must be in an awareness of such a disability. It is essential that a child or adolescent with learning disabilities be recognized and fully evaluated. Once evaluated and diagnosed, educational, family, and individual interventions must be started. Unless diagnosed and properly treated, secondary emotional, social, and family problems may develop, adding to the stresses experienced by the children and adolescents and their families.

As a backdrop to the papers in this section, I would like to review briefly the history of this disorder, the clinical or descriptive definition of learning disabilities, and the process of establishing the diagnosis once such a disability is clinically suspected.

History of Learning Disorders

Prior to the 1940s, children who had difficulty learning were considered as emotionally disturbed, mentally retarded, or culturally disadvantaged. In the early 1940s researchers began to discuss a fourth possible cause for the learning difficulties, a neurological base. The early research suggested that these problems were caused by brain damage (Werner and Strauss, 1941; Strauss and Lehtinen, 1947). Because these children looked normal, it was concluded that this brain damage must be slight or minimal (for a summary of this research, see Farnham-Diggory, 1978). Thus, the earliest label used was *Minimal Brain Damage.* Additional observations and studies revealed no evidence of brain damage. Instead, this research began to suggest that the difficulty was with the way the brain functioned. All of the brain mechanisms were present and operable; but some of the "wiring" did not function the way it should. To move away from the concept of brain damage and to reflect this concept of faulty functioning, the term Minimal Brain Dysfunction (MBD) was introduced (Clements, 1966).

Researchers began to study these dysfunctions. Depending on their disciplines and orientations, they introduced new concepts and terms for the observed academic disabilities. Initially, the basic area of difficulty was noted, using terms that had been in use previously (for a summary of this research, see Farnham-Diggory, 1978). Thus, a problem with reading was called *dyslexia*; with writing, *dysgraphia*; and with arithmetic, *dyscalculia.* Later, an effort was made to clarify the specific learning difficulties that caused the problems with reading, writing, and arithmetic. The focus shifted to the concept of *specific learning disabilities*, and the child with such problems was called learning disabled. As noted earlier, the federal law chose to refer to this handicapping condition as a learning disability.

Descriptive Definition of Learning Disabilities

Most educational test instruments and special educational literature use a cybernetics model for understanding learning and learning disabilities. It is understood that any learning task involves more than one process and that any learning disability can involve more than one area of dysfunction. However, breaking learning down into steps helps to clarify the process.

The first step in this model is *input*, where information from the sense organs is entered into the brain. Once the information is recorded, what is received is processed and interpreted, a process called *integration.* Next, the information must be used or stored and later retrieved, the *memory* process. Finally, this information must be sent out through language or motor activities, the *output* process. Before reading this special section it might be a helpful orientation to review this input-integration-memory-output process, introducing the terminology and concepts used by researchers and clinicians in the area of learning disabilities.

Input Disabilities

Input is a central brain process and does not pertain to peripheral visual or auditory problems. This process of perceiving one's environment is referred to as "perception." A child might have a visual or an auditory perceptual disability.

Visual perceptual disabilities. A child may have difficulty in organizing the position and shape of what he or she sees. Input may be perceived with letters reversed or rotated: An "e" might look like a ɘ; and E might look like a 3, or a W, or an M. The letters d, b, p, q, and g might be confused with each other. The word "was" might be perceived as "saw," or "dog" as "god." This confusion with position of input shows up almost immediately when the child begins to read, write, or copy letters or designs.

Another child might have a "figure-ground" problem, that is, difficulty in focusing on the significant figure instead of the other visual inputs in the background. Reading requires this skill, focusing on specific letters or groups of letters, then

tracking from left to right, line after line. Children with this disability may have reading problems. They may jump over words, read the same line twice, or skip lines.

Judging distance or depth perception is another visual perceptual task that can be dysfunctional. A child may misjudge depth, bumping into things, falling off a chair, or knocking over a drink because the hand reaches too far for it.

Auditory perceptual disabilities. As with visual perception, a child may have difficulty with one or several aspects of auditory perception. A child who has difficulty distinguishing subtle differences in sounds will misunderstand what is said and may respond correctly. Words that sound alike are often confused—"blue" with "blow," or "ball" and "bell." A boy is asked, "How are you?" and answers, "I'm nine." He thought he heard "old" instead of "are," or in addition to the "are."

Some children have difficulty with auditory figure-ground. He or she might be watching television in a room where others are playing or talking. A parent or teacher may call out or speak to this child. It might not be until the third paragraph verbalized that the child begins to pick this voice (figure) out of the other sound inputs (background). It appears that the child never listens or pays attention.

Some children cannot process sound inputs as fast as normal people can. This is called an "auditory lag." At a normal pace of speech, the child may miss part of what is said. If a parent were to say, "It's getting late. Go upstairs, wash your face, and get into your pajamas. Then, come down for a snack," this child may hear only the first part and stay upstairs. If the first part of the instructions were given, then the rest a few seconds later, the child might hear the whole thing.

Integration Disabilities

Once information enters the brain, it has to be understood. At least three steps are required to do this: sequencing, abstraction, and organization. The process of integrating input thus requires *sequencing*, *abstraction*, and *organization.* A child might have a disability in one area or in all. A child who has difficulty sequencing what comes in from the eyes is said to have a *visual sequencing disability.* If the difficulty lies with what comes in through the ears, it is called an *auditory sequencing disability.* So, too, the child might have difficulty with *visual abstraction* or *auditory abstraction.* Organization difficulties usually involve all areas of input.

Sequencing disabilities. A child with such a disability might hear or read a story, but, in recounting it, start in the middle, goes to the beginning, then shifts to the end. Eventually the whole story comes out, but the sequence of events is wrong. Or, a child might see the word "dog" and read it as "god." Spelling words with all of the right letters in the wrong order can also reflect this disability.

Or a child may memorize a sequence, the days of the week, for example, and then be unable to use single units out of the sequence correctly. If asked what comes after Wednesday, the child cannot answer spontaneously but must go back over the whole list, "Sunday, Monday, Tuesday, Wednesday . . .," before she or he can answer. The same may be true with the months of the year.

Abstraction disabilities. Once information is recorded in the brain and placed in the right sequence, one must be able to infer meaning. Most learning disabled children have only minor difficulties in this area. Abstraction—the ability to derive the correct general meaning from a particular word or symbol—is a very basic intellectual task. If the disability in this area is too great, the child is apt to be functioning at a retarded level.

Some children do, however, have problems with abstraction. The teacher may be doing a language-arts exercise with a group of second-graders. He or she reads a story about a police officer, let us say. The teacher then begins a discussion of police officers in general, asking the pupils whether they know any men or women who are police officers in their neighborhoods, and, if so, what do they do? A child with an abstraction disability may not be able to answer such a question. He or she can only talk about the particular officer in the story and not about law officers in general. Older children might have difficulty understanding jokes. Much of humor is based on a play on words, which confuses them.

Organization disability. Information, once recorded, sequenced, and understood, must be integrated with a constant flow of information and also related to previously learned information. Some children will have difficulty pulling multiple parts of information into a full or complete concept. A child may learn a series of facts but not be able to answer general questions that require using these facts. Such an individual's life may reflect this "dys-organization." His or her notebook or reports or room may be disorganized. Work needed at home may be left in school; work for school may be forgotten at home. Organizing time also may be a problem.

Memory Disability

Once information is received, recorded in the brain, and integrated, it has to be stored so that it can be retrieved later. This storage-and-retrieval process, or memory, can be of two types—short-term memory and long-term memory.

Short-term memory is the process of retaining information for a brief time while attending to or concentrating on it. For example, calling the information operator for a long-distance number. Most people can retain the 10 digits long enough to dial the number if it is done right away. However, if someone starts talking in the course of dialing, one may lose the number. *Long-term memory* refers to the process by which one stores information that has been repeated often enough. It can be retrieved by thinking of it.

Most children with a memory disability have a short-term one. (Like abstraction disabilities, a long-term memory disability interferes so much with functioning that children with the disability are more likely to be functioning as retarded. A child with a short-term memory problem may require 10 to 15 repetitions to retain what the average child retains after three to five repetitions. Yet the same child usually has no problem with long-term memory, surprising parents with details from years ago.

A short-term memory disability can occur with information received visually, a *visual short-term memory disability*, or with information received aurally, an *auditory short-term memory disability.* Often the two are combined. For example, the child might review a spelling list one evening and know it well. He or she is concentrating on it. The next morning in

school it is forgotten. Or, a teacher might go over a math concept in class until it is understood. Yet when the child comes home that night to do homework, he or she has forgotten it.

Output Disabilities

Information is expressed by means of words—language output—or through muscle activity (writing, drawing, gesturing)—motor output. A child or adolescent may have a *language disability* or a *motor disability.*

Language disability. Two forms of language are used in communication, spontaneous language and demand language. *Spontaneous language* occurs in situations where one initiates whatever is said. Here, one has the opportunity of selecting the subject, organizing his or her thoughts, and finding the correct words before speaking. In a *demand language* situation, someone else sets up a circumstance in which one must communicate. A question is asked, for example; it is necessary to simultaneously organize, find the right words, and answer more or less appropriately.

Children with a *specific language disability* usually have no difficulty with spontaneous language. They may, however, have problems with demand language. The inconsistency can be quite striking. A child may initiate all sorts of conversation, may never keep quiet, in fact, and may sound quite normal. However, put into a situation that demands a response, the same child might answer "Huh?" or "What?" or "I don't know." Or the child may ask you to repeat the question to gain time, or not answer at all. If the child is forced to answer, the response may be so confusing or circumstantial that it is difficult to follow. She or he may sound totally unlike the child who was speaking so fluently just a minute ago.

Motor disabilities. Difficulty coordinating large muscle groups, is called a *gross motor disability.* Difficulty in performing tasks that require coordination of small muscle groups in an integrated way is called a *fine motor disability.*

Gross motor disabilities may cause the child to be clumsy, stumble, fall, bump into things, or have trouble with generalized physical activities like running, climbing, or swimming.

The most common form of fine motor disability shows up when the child begins to write. The problem lies in an inability to get the many muscles in the dominant hand to work together as a team. Children and adolescents with this "written language" disability have slow, difficult, poor handwriting.

When a child has a visual perceptual problem, the brain, which has incorrectly recorded or processed information, may misinform the muscles during activities that require eye-hand coordination. This is referred to as a *visual motor disability.*

The Learning Disability Profile

Obviously the learning process is much more complex, but this simple model for describing specific learning disabilities can be helpful. Each learning disabled individual will have his or her profile of learning abilities and disabilities. Thus, each must be evaluated and understood differently. For each individual it is important to know his or her profile. This information is essential for understanding him or her and in planning interventions, whether they be educational or clinical.

Establishing the Diagnosis

When a child or adolescent is referred to a child psychiatrist or other mental health professional because of academic difficulties, especially when the difficulties are associated with behavioral problems in school and/or family, the clinician must consider the possibility of a learning disability. This possibility is even greater if the individual also has clinical evidence of attention deficit-hyperactivity disorder.

The history as obtained from the family plus a review of the school records and any evaluation reports is essential. One looks for inconsistencies in performance and discrepancies between potential and performance or between one area of performance and another.

The child or adolescent can be the best diagnostician. Questions can be focused on basic academic skills or tasks. A child with a reading disability may say that he or she skips words, reads the same line twice or skips lines, reads slowly, or reads but does not know what was read. A child with a math disability may say that he or she does not understand math, cannot learn the times tables, or makes silly mistakes like transposing the sequence of numbers, misreading the signs, or confusing the lines or columns. This child may forget the sequence of steps required or the necessary formulas. Children with a written language problem will describe that they hold their pencil differently or that their hand gets tired. A typical expression is "My hand doesn't work as fast as my head is thinking."

These children will report that they have difficulty with spelling and/or with grammar, capitalization, and punctuation. If asked, the child or adolescent may describe difficulty understanding what the teacher says, misunderstanding what friends say, remembering what he or she learns by listening, or expressing him/herself by talking.

During the diagnostic session, the clinician might pick up other clues of a learning disability (Silver, 1976). The child or adolescent might have difficulty with listening and understanding what the clinician says or with expressing him/herself clearly. The patient might have difficulty doing activities requiring visual perception or visual motor tasks or playing a game that requires reading, counting, or following a sequence.

Once the possibility of a learning disability is considered, additional further studies are needed to finalize the diagnosis. This psycho-educational evaluation assesses the individual's intellectual potential and cognitive style as well as his or her level of academic skills and possible evidence of a learning disability.

The psychological assessment may consist of a neuropsychological or a clinical psychological evaluation. One is interested in the child or adolescent's IQ, especially whether there are any discrepancies or scatter within the subtests. Other tests will assess perceptual, cognitive, and language abilities. The educational diagnostician will measure the individual's current level of academic skills using achievement tests and will evaluate for the presence of learning disabilities using such tests as the Woodcock-Johnson.

The results of these two evaluations should establish the presence or absence of a learning disability. If present, the results will clarify also the specific areas of learning disability and learning ability.

This Special Section

In this special section, Dr. Janet Lerner reviews the current types of classroom and individual educational interventions and discusses models for treating reading and mathematics disabilities. The guest editor follows with a review of the emotional and family problems frequently associated with learning disabilities; clinical intervention strategies are discussed. In the last article, Dr. Drake Duane provides a thorough review of the current neurobiological research relating to learning disabilities; current research technology now allows for a better understanding of the neurological basis for this disorder.

It is hoped that the information in this special section will be of help to the clinician.

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Psychological and Family Problems Associated with Learning Disabilities: Assessment and Intervention

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Abstract. Learning disabilities not only interfere with academic tasks; they interfere also with all stages of psychosocial development as well as with peer and family interactions. It is not uncommon, therefore, for children and adolescents with learning disabilities to have psychological, peer, and family problems. These secondary difficulties must be recognized, correctly diagnosed, and treated. *J. Am. Acad. Child Adolesc. Psychiatry*, 1989, 28, 3:319–325. **Key Words:** learning disabilities, secondary psychological problems, secondary family problems.

Learning disabilities are a reflection of a dysfunctional nervous system. This dysfunction results in a discrepancy between the child or adolescent's potential ability and his or her academic performance. It also interferes with each stage of psychosocial development and with peer and family relationships.

Children and adolescents with learning disabilities may have related difficulties that compound the clinical picture. About 15 to 20% will have attention deficit-hyperactivity disorder (ADHD) (Halperin et al., 1984; Silver, 1981). Most will show evidence of secondary emotional, social, and family problems. That is, the emotional, social, and family problems are not causing the academic difficulties. They are the result of the academic difficulties and the secondary frustrations and failures experienced by the individual plus the frustrations and failures experienced by the parents. Thus, when a clinical evaluation is done, it is necessary to assess the total child or adolescent in his or her total environment, not just in the school. Unless the related problems are recognized and addressed, efforts to help will be less than successful.

Learning Disabilities are a Life Disability

Learning disabilities interfere with such school tasks as reading, writing, and arithmetic. They also may interfere with baseball, basketball, four-square, hopscotch, jump rope, dressing, setting the table, reading a menu or TV Guide, or making small talk. Learning disabilities are life disabilities, interfering with all aspects of life. Learning disabilities may also be lifelong disabilities. Except for those few with a maturational delay, the learning disabled child will become the learning disabled adolescent and, later, the learning disabled adult. This disorder must be seen as a chronic disorder.

If the individual also has ADHD, the resulting hyperactivity, distractibility, and/or impulsivity may interfere with school, peer interaction, and family life. Approximately 15% of ADHD children will continue to have this disorder as adolescents; the hyperactivity may lessen but not the distractibility or impulsivity (Weiss et al., 1985). It is estimated that about 1% will continue to be ADHD adults (Wender, 1987). Weiss and Hechtman (1986) report a higher figure with one-third to one-half of ADHD children still showing symptoms as adults. Thus, this related disorder must be seen as a life disability and may become a life-long disorder.

To illustrate the above themes, each type of learning disability is reviewed below, showing the impact on school, family, and peer activities. This review is based on the clinical description of learning disabilities found in the Introduction to this Special Section.

Input Disabilities

A child or adolescent with visual perception difficulties may have problems with sports requiring catching, throwing, or hitting a ball. These motor tasks require visual figure-ground, depth perception, and visual motor skills. Individuals with depth perception problems may fall off seats, bump into things, misjudge the distance to a drink and knock over the glass. Some may be confused by large, open spaces such as gyms or shopping malls. The associated anxiety might expand into a fear or panic disorder. Individuals with auditory perception problems might misunderstand what adults or peers say and thus respond incorrectly. Some may have difficulty knowing what sounds to listen to. They might miss what is being said to them by a teacher, parent, or friend because they were listening to one sound and did not realize that another sound had started. Some may have a delay in processing speech. They appear to be not listening or to be staring into space. A frequent label is "air head" or "space cadet."

Less is known about other sensory inputs. Infants and children may be tactilely defensive, uncomfortable with touch. Some complain of clothes being too tight or of certain materials feeling uncomfortable. Some children seem hypersensitive to smell, complaining of things or places smelling funny. Others may have oversensitive taste. It may be that some clumsy children reflect difficulty with proprioception.

We know little about the effect of perception problems during infancy. If such disabilities are apparent with young children, might not they be present at birth? How would they impact on early interactions or bonding if the infant misperceived sound, vision, smell, or touch?

Integration Disabilities

Children or adolescents with sequencing problems may confuse the steps involved in playing a game or might hit the ball and run to third base rather than first. Young children

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might have difficulty dressing, putting on one's pants before the underpants. Such an individual might have difficulty following directions or making the bed, building models, or setting the dinner table.

Much of humor is based on subtle changes in the meaning of words or phrases. Individuals with difficulty with abstraction may miss the meaning of jokes and be out of place with peers. They might have difficulty with slang expressions. Some will appear to be paranoid because of misinterpretations of words or actions.

Organizational problems may be reflected in a disorganized room or notebook or in an inability to plan, time, or carry out activities.

Memory Disabilities

A child or adolescent might meet someone he or she has known for a long time but not remember his or her name. A father might ask his son to go into the garage to get the hammer, nails and ruler; he returns with the hammer and nails. Some individuals start to discuss something, then forget what they wanted to say. His or her conversation is stopped with an, "oh, forget it."

Output Disabilities

The inability to write quickly and legibly or to spell can be a problem with games, activities, taking telephone messages, or writing notes to friends. Mistakes are laughed at or associated with not being smart. Motor coordination difficulties can affect buttoning, tying, zipping, playing games, cutting up food, or playing sports. Since success with sports is such a major part of childhood peer acceptance, difficulties with motor coordination can be a major social handicap.

Expressive language problems make communication difficult with peers, siblings, and with other adults (Baker and Cantwell, 1987; Cantwell and Baker, 1977; Gualtieri et al., 1983). Individuals with this problem have difficulty with small talk and interactive conversations.

In Summary

When evaluating a child or adolescent with learning disabilities, it is important to know the individual's profile of learning disabilities and learning abilities. Clinical observations, psycho-educational assessments, and information relating to peer, family, and social activities assist the clinician in appreciating how learning disabilities interfere with all aspects of life. This understanding can be the first step in clarifying the presenting problems, helping the individual and family appreciate this impact, and treatment planning.

Emotional Problems

Ideally, the child or adolescent with learning disabilities is recognized by the classroom teacher or through screening tests and referred for further evaluation. The learning disabilities are recognized and the appropriate educational intervention is started. The age when these academic problems become apparent depends on intellectual ability, the types of learning disabilities, and the academic demands. Some students will have difficulty by first grade; some may make it through sixth grade before the problems become obvious; still others may confront the demands of junior or senior high school before having difficulty. The gifted individual with learning disabilities may go through high school as an average to poor student with no one recognizing that the level of performance is significantly underachieving.

Unfortunately, for many it is the behavior secondary to the frustrations and failures that is recognized (Bender, 1987; Hunt and Cohen, 1984; Silver and Brunstetter, 1987a; Valletutti, 1983). The child with ADHD in addition to the learning disabilities may be at an advantage, for the behavior problems may be noticed sooner. Girls are less likely to become behavioral problems; thus they are missed more frequently than boys. This lack of recognition in girls may be especially true with those who have ADHD manifested by distractibility only (Berry et al., 1985).

Therefore, it is essential that clinicians carefully assess children and adolescents who are referred because of behavioral problems in school, especially if the behavioral problems are associated with academic difficulties (Silver, 1976). The presence of ADHD should alert the clinician to the possibility of learning disabilities since this disorder is frequently associated with such disabilities.

The key diagnostic question is whether the behavioral problems are cause or symptom; that is, are the behavioral problems causing the academic difficulty (the emotionally disturbed child) or, are the emotional problems a consequence of the academic difficulties and the resulting frustrations and failures? Each diagnosis leads to a different treatment intervention.

There is another diagnostic theme to consider. For some, the behavioral problems may be yet another reflection of a dysfunctional nervous system. The behavioral or emotional issues might be an individual's characteristic style for coping with a dysfunctional nervous system (learning disability and/or ADHD). Studies of children or adolescents diagnosed as having conduct disorder or young adults diagnosed as having personality disorder, especially the borderline type, show that about one-third have unrecognized or recognized and poorly treated learning disabilities (Forness, 1981; Hunt and Cohen, 1984; Rutter et al., 1970). Similar findings have been observed with adolescent boys in detention centers (Berman and Siegal, 1976; Keilitz, 1979; Lewis et al., 1979, 1980; Mauser, 1974; Robbins et al., 1983).

A child or adolescent with learning disabilities may have difficulty mastering each stage of psychosocial development (Silver, 1974a; Silver and Brunstetter, 1987a). The presenting behavioral or emotional problems might reflect clinical evidence of any diagnosis in *DSM-III-R* (Hunt and Cohen, 1984; Silver and Brunstetter, 1987a; Velletutti, 1983). There are no consistent data on the prevalence of the types of emotional problems found with children or adolescents with learning disabilities. The clinical material that follows is based on the author's work plus examples from the literature.

Some children deal with their frustrating life experiences by trying to avoid the stress. One might see a *withdrawal reaction*, avoiding any potentially frustrating or uncertain situation by drawing back from it and becoming passive. Others avoid stress by *regressing* to an earlier stage of psychological or social development with a recurrence of earlier

behaviors or of immature or infantile interactions with peers or adults.

Some children might try to avoid the stress, conflicts, and resulting feelings by displacement. They may develop a *fear reaction.* For example, rather than experiencing a general anxiety or depression whenever he or she is in school, the child may develop a special fear of a particular child on the school bus who always teases him. Now he can make sense out of his feelings when he wakes up to go to school. Some children displace the cause of their anxiety onto bodily functions. The child may develop *somatic complaints*; stomachaches, lower abdominal cramps, headaches, diarrhea, frequency of urination, or bowel movements. The complaints may often present only in the morning of school days. The discomfort is real. The pain goes away when he or she is allowed to stay home, not necessarily because the child is faking but because the stress was relieved. Some may develop a conversion reaction as an attempt to cope (Silver, 1982).

Other children might displace anxiety to an increasing awareness that something is wrong with their body. They have heard parents and professionals talk of their brain or have had many examinations and tests. Their *hypochondria* is reflected in complaints of bodily difficulties, "My back hurts" or "My head aches." Sometimes this concern with their body extends into a general concern with body integrity or body damage. At times the complaints become their rationalization for failures, "I can't help it if I made a mistake. My arm hurts today."

Children might avoid the stress by becoming *paranoid* and projecting their feelings and thoughts to others. Teachers, classmates, books, desks, all get blamed; everyone is out to get them or to show them up.

Some may use his or her *diagnosis as the excuse* for the problems. They have heard various descriptions and labels used by parents and professionals and might say, "I'm brain damaged so I can't do that." They might generalize their disability and feel totally worthless, "I'm just no good; I can't read."

Some children are not successful in developing defenses. They experience a true sense of *depression.* This depression may be seen as irritability and aggressiveness toward others or as classic symptoms of depression. Some may become self-destructive or suicidal. Some children show a critical superego. They cannot accept praise. If a teacher or parent compliments their work, they might destroy it.

Children may internalize such conflicts, developing a *poor self image* (Black, 1974; Bryan and Pearl, 1979; Rogers and Salkofske, 1985; Shaw et al., 1982). They see themselves as inadequate, bad, worthless people who cannot do anything right. This self-image may be based on realistic outside feedback and life experiences.

A child might have difficulty dealing with anger and might choose an indirect way of showing it. One such style is to be *passive-aggressive.* The behavior in and of itself is not aggressive; yet people become angry with him or her. Dawdling is an example of this. The child might play with his or her clothes until a parent becomes furious. The child then might look up in bewilderment and say, "Why are you so mad? I didn't do anything." Other children might become *passive-dependent.* Initially the child might avoid failure and unpleasant feelings by avoiding situations that might result in failure; this passivity might expand into a style of life. He or she avoids taking the initiative and minimizes getting involved. Unlike the helpless child who creates feelings of sympathy or empathy in adults, this child's helpless dependency and passivity create feelings of anger.

Perhaps the most successful approach children can use to handle stress is *clowning.* Clowning serves several functions. With some, it is a way of controlling feelings of inadequacy, clowning to cover feelings of lack of worth and depression. This behavior has an element of mastery in it. By playing the role of clown, it is as if the child were saying, "They call me a clown but it is only because I have chosen to be one. I really can turn it off if I want to, but it is too much fun this way." If the child is successful at clowning, he or she will disrupt the lesson plan or be asked to leave the group, thus avoiding the academic work that perhaps produced the stress in the first place.

Children with ADHD in addition to learning disabilities may develop an *impulse disorder,* acting before they think, being explosive or aggressive, or having temper tantrums or catastrophic reactions. Some may be emotionally labile, crying or yelling at the slightest frustration. Sometimes a child will break something or hurt someone unintentionally, simply because he or she moved or acted too quickly and without thinking. Such children may show other evidence of this problem by stealing, bedwetting, fire-setting, hoarding of food, or excessive eating.

Occasionally such children will appear to be *pseudo-mature* for their age. Faced with feelings and thoughts related to being different and inadequate, and fearful that no one will take care of them, these children might decide to grow up quickly. They look, act, and relate like a serious young man or woman. This behavior may pay off—adults compliment or spend more time with them.

By adolescence, many of these children, if not provided the necessary help, may become school dropouts and possible delinquents. As adults they often continue to pay the price for their academic underachievement and emotional and social difficulties.

Social Difficulties

Parents and teachers may complain that a child or adolescent has few or no friends, cannot keep friends, or relates poorly to peers. Individuals with learning disabilities appear to have difficulty with social awareness and social skills. The reasons for these problems are not yet clear.

Learning disabilities can directly contribute to peer problems. As discussed earlier, such learning disabled individuals may have difficulty doing activities required for their age group. The young child who cannot express him/herself or who cannot ride a bike may not be able to successfully play with friends. The older child who cannot master games or be successfull in sports or listen and talk easily may not relate successfully with peers. So, too, adolescents who cannot communicate or read or play sports or dance will have peer problems.

Some learn to play with younger children. They seem to intuitively find what age group prefers activities that they can do. For example, a 10-year-old boy with visual perception and visual motor problems might do poorly at age-expected sports. He might prefer to play with 5-year-olds. His gross motor abilities allow him to run, climb, or ride a bike like these younger children. They may accept and look up to him. Parents need to understand this behavior.

The need to control can be another problem. These individuals have a dysfunctional nervous system but do not know it. They try doing things and may not succeed. They learn early to protect themselves from embarrassment by avoiding situations they might not be able to handle. Some learn not to try anything new and to stick to established activities. Some learn to make up rules for activities that minimize their likelihood of not doing well. This need to control activities, to make up rules, or to stop playing if frustrated can result in peers not wanting to play with them.

Because such children and adolescents may withdraw or be excluded from peer relationships or activities, the problems compound with age. Their lack of experiences adds to the problem of relating to peers during the next stages of development.

Family Problems

It is not easy to be a parent. It is even more difficult if one is a parent of a handicapped child (reviewed in Murphy, 1982; Silver, 1974b). It can be even more stressful when this handicap is invisible (Willmer and Crane, 1979). The child does not respond like other children; he or she does not do well in school; behavior may become difficult. Often, family physicians and educators add to the parent's feelings of inadequacy and failure by not taking the complaints seriously or by calling them "overworried parents." School personnel may call to complain about their son or daughter's behavior or lack of progress. If there are two parents, one may feel that the best way to raise the child is to be strict while the other believes that the best way is to be more permissive and understanding. Individual stress and marital stress may be more the norm than the exception.

It is not uncommon for school personnel to tell parents that they have an emotionally disturbed child, probably secondary to marital problems. The family is referred to a child psychiatrist or other mental health professional. Thus, when a clinician sees a family in stress with a child or adolescent who is a behavioral problem in school and who is underachieving or failing, he or she should be alert to the possibility that the underlying theme might be an unrecognized learning disability.

Parents may have difficulty accepting the reality that their son or daughter has a disability. It may be similar to what one experiences when dealing with a real loss. In this case, it may be a loss of an image or ideal. A parent may show evidence of *denial*, refusing to accept test results or wanting another opinion. As parents continue to struggle with their feelings of helplessness they might seek answers for these feelings, becoming *angry* or feeling *guilty*. The anger can be directed toward teachers and others. The guilt may lead to self-critical behavior or to the need to do more for this child to "make up" for what he or she has done to the child. For most parents, these phases are worked through and they become available to mobilize their energy to help. It is important to be aware of these early problems and to not let the denial, anger, or guilt negatively effect the therapeutic process.

Some parents have difficulty resolving these early reactions. Their behaviors may become chronic and, thus, dysfunctional. They need help to understand and to change their behavior. The chronic denier may establish a pattern of doctor shopping, looking for someone who will tell him or her that the child is normal. This pattern results in loss of time, loss of appropriate interventions and, possibly, in negative feelings experienced by the child who senses that his/her parent cannot accept him as he/she is. The chronically angry parent offends teachers and others and can be unpleasant to work with. The chronically guilty parent may become depressed or become so involved with his/her child as to create dependency. A cycle might begin—the more dependent the child becomes, the more the parent senses a need to do for the child; the more the parent does for the child, the more dependent the child becomes.

Siblings may have difficulty (Poznanski, 1969; Silver and Brunstetter, 1987a). They may become worried about their brother or sister and be told little or nothing; thus, their fantasy might upset them, "Is it contagious?" "Will I get it?" "Did I cause it?" Some may be relieved that they do not have the problem and then feel guilt for such thoughts. Siblings may become angry at the extra time this child requires or may become upset at the double standards, "How come when I do it I get punished and when he does it he is not?" or "Why is it I have to make my bed and she does not?"

Siblings might be embarrassed by their brother or sister's behavior or might be upset that parents make them take this child with them when they play with their friends. Some may try to stay away from the house as much as possible.

Thus, family problems might relate to the parents' handling of the child or adolescent, to the stress created within the couple, and/or to problems with siblings. Each theme must be considered, recognized, and handled.

Clinical Interventions

The correct diagnosis is critical to treatment planning. The help provided a child with primary emotional problems and academic and behavioral difficulties at school is different from the help provided a child with unrecognized or poorly treated learning disabilities who, because of frustration and anger, shows behavioral problems in school (Silver, 1983; Silver and Brunstetter, 1987b).

The history of emotional, peer, and/or family problems associated with behavioral problems in school and academic difficulty should lead to the suspicion of learning disabilities. A referral to a psychologist and an educational diagnostician will confirm this diagnosis.

Since learning disabilities are life disabilities, clinicians must address the child or adolescent's needs other than just in school. The initial step should be educational through preventive family counseling. Further interventions depend on the assessed area of difficulty and might include individual psychotherapy, group or family therapy, behavioral management,

or behavioral therapy. Whichever is indicated, and usually a multimodal approach is used, it is critical that the underlying learning disabilities be addressed. A clinician cannot change a poor self-image in individual therapy if the child is experiencing 20 hours of frustration and failure in school. Nor can a clinician approach the behavioral problems at school or in the family without being sure that the reasons for the stress and behavior are being addressed. Unless the child or adolescent is in the appropriate special educational program with appropriate academic therapy, any clinical interventions may be less than successful.

Preventive Family Counseling

It is useful to start with a preventive approach (Silver, 1984). The full information from the educational, psychological, psychiatric, and other evaluations are reviewed in detail with the parents. They need to know their child's intellectual potential, level of academic performance, and why he or she is underachieving. If ADHD is present it is explained. Any existing emotional, social, and/or family problems are clarified and related to other diagnoses. A treatment plan is presented, addressing each of the problems. Parents are counseled on being the necessary advocate for their son or daughter. Next, the full evaluation is shared with the child or adolescent. He or she must understand the reasons for the difficulties, learn that he or she is not bad or dumb or retarded, and understand him/herself and the reasons for each step of the treatment plan. The only difference between explaining all of this to a 5-year-old or a 15-year-old is the style and choice of language. The clinician might ask the educational diagnostician to help. I often find that this interpretive session is the most meaningful time spent in starting a therapeutic relationship. The final step is a family session. Siblings must understand their brother or sister and be informed of the proposed clinical interventions.

The Family Role in Treating the Learning Disabilities

Parents have a critical role to play in helping their child or adolescent. They need to understand how the specific learning disabilities impact on family activities (Silver, 1984; Ziegler and Holden, 1988). With knowledge, parents can both avoid problems and assist their child.

Parents might make a list of the areas in which their child is strong and weak (i.e., learning abilities and learning disabilities). Next to each strength, they can write out all of the things he or she is capable of doing. Next to the weaknesses, they can write out all of the activities that they have noticed are done with difficulty. Then, by thinking creatively, they can build on the child's strengths while helping to compensate for the weaknesses. For example, what household chores can the child do? If gross motor problems result in frequent accidents when the child clears the table, can the child take out the trash instead? The special educator might help by offering suggestions. The goal is to find the right chores rather than to excuse the child from family participation.

For example, in talking to a child with an auditory figure-ground disability, a parent may need to establish eye contact before speaking. If the child has difficulty with sequencing, a parent may need to help the child get started. Parents do not do the job for the child but help him or her get organized. If they want the table set, for instance, they might draw a sample setting on a paper that can be used by their son or daughter. If the child has trouble dressing in the morning because it is difficult to remember the sequence, a parent can set the clothes out in their proper order. They can place a stuffed animal at one end and say, "start here." If the child has fine motor problems and difficulty with buttons or shoe laces, slip-over tops or loafers might be tried. Such behaviors communicate acceptance and encourage independent growth.

The same technique can be applied with sports. Each sport requires different strengths. If the child has sequencing, fine motor, and visual motor disabilities, games with elaborate rules, or those that require eye-hand coordination skills (baseball and basketball) may be difficult. The child's poor performance will add to social and peer problems. But if he or she has good gross motor strengths, especially when minimal eye-hand coordination is needed, then swimming, diving, soccer, horseback riding, skiing, bowling, or certain field and track events may be successful activities. The same 10-year-old who stopped playing baseball because he could not catch, throw, or hit well and who did no better at basketball might do very well in soccer or become an excellent swimmer. Let the child find success and peer acceptance with these sports. Some children with an expressive language disability enjoy drama. They can memorize their lines and always be sure of what they must say.

This approach can be used with outside activities. Whether it be cub scouts, a local youth center, or other activity, the goal for parents is to build on strengths rather than to magnify weaknesses. By working with the coordinator or leader of these activities, tasks can be selected that maximize success and avoid failure.

If properly informed, the club, group, or activity leaders can be helpful in facilitating peer interactions. Such people should understand that the child may not always hear every instruction given; they must be cued in advance to check with the child and to repeat things if necessary. This child may appear quiet or indifferent because language does not come easily. The leader needs to know that the child is not retarded, bad, or lazy; the disability is simply invisible. The same advice holds for Sunday School and religious education programs. The staff must know about the child so that they can design appropriate classroom and activity programs.

Choosing a camp, whether day or sleep-away, requires the same attention. Parents may consider a camp designed for children with special needs, or they might turn to a carefully selected regular camp. They need to think about whether their child would do better in a large or small camp. What strengths and abilities does the child have and how do they match with the offerings of a particular camp? Some camps focus on drama or arts and crafts. Are these activities that will build on strengths or will they set the child up for failure? Some camps are sports-oriented and competitive; other camps focus on noncompetitive activities or on more gross motor-type sports. A clumsy, nonathletic son or daughter might do very well at a camp where the emphasis is on horseback riding or on waterfront activities. Swimming, rowing, and sailing all

are gross motor activities, requiring minimal eye-hand coordination. Communicating with parents is important while at camp. If reading or writing skills are limited, then one might turn to the use of a tape recorder. The child and family can mail each other tapes.

These examples are meant to illustrate a style of thinking and problem solving that can be helpful to families. The clinician must be sure that parents know their child or adolescent's areas of learning abilities and learning disabilities. Once they are informed, these caring adults can then use appropriate strategies to build on the strengths in order to maximize psychosocial growth and peer successes.

Psychotherapeutic Intervention

If the clinician believes that the emotional problems are secondary to frustrations and failures caused by the learning disabilities, the initial phase of treatment should focus on the cause; that is, on establishing the necessary educational programs and clarifying the nature of the problem with both the individual and family. If the secondary psychological problems have become so established that they now have a life of their own, they must be treated.

When internalized difficulties exist, psychodynamically oriented psychotherapy or cognitive therapy may be necessary. If the patterns of learned and/or reinforced behaviors are dysfunctional or if performance anxiety is high, a behavioral management plan or behavioral therapy approach may be needed. For children whose interpersonal skills are poor, group therapy or a social skills group might be useful. When there is family dysfunction, family therapy may be indicated. Often, a multimodal approach is used. Whichever interventions are initiated, the primary clinician must be the one to coordinate the efforts with the school and to provide initial preventive family counseling.

When any therapy is initiated, be it individual, behavioral, group, or family, the clinician must understand the nature of the learning disabilities and how they might interfere with the therapeutic process. This is especially important if the disabilities are in the auditory perception and language areas and the therapeutic interaction consists primarily of listening and talking. Sequencing or memory disorders might decrease the individual's ability to understand concepts involved in a behavioral management approach. If distractibility is also present, it will make for additional problems in attending.

If the child appears to misunderstand the clinician's comments or questions or has difficulty with word finding or organizing thoughts, the clinician should explain that these are understandable problems. A therapeutic alliance can be improved by asking how he or she can help the child communicate and by modifying the style of interaction. The special educator may be able to clarify the learning disabilities and suggest alternative models for interacting or for accomplishing specific tasks. The clinician must understand how the learning disabilities interfere with peer and family interactions. This awareness can be explained to the patient and can be useful in problem solving.

Conclusion

Learning disabilities are life disabilities and usually life-long disabilities, interfering with all aspects of the child or adolescent's life during each developmental stage. Ideally, this invisible handicap is recognized, diagnosed, and treated. The child or adolescent would be referred to a child psychiatrist or other child mental health professional only if there were concerns with emotional, social, or family problems or because of a possibility of ADHD.

More commonly, the present problems are the emotional, social, or family problems, and/or the hyperactivity, distractibility, or impulsivity. The clinician must recognize if the problems are primary or are secondary to unrecognized and untreated learning disabilities. Each conclusion leads to a different clinical approach. If treatment is indicated, the clinician must be aware that the learning disabilities can interfere with the therapeutic process and that adaptations in technique may be necessary.

Learning disabilities, like any chronic disability, can, if not properly treated, result in a lifetime of frustration, pain, and underachievement. Recognition, diagnosis, and correct treatment is essential for each stage of psychosocial development.

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Educational Interventions in Learning Disabilities

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Abstract. Child psychiatrists and other mental health professionals play a key role in recognizing, diagnosing, and planning treatment for children and adolescents with learning disabilities. A review of educational issues related to diagnosis and educational interventions for the preschooler, elementary school child, and adolescent is presented. (*J. Am. Acad. Child Adolesc. Psychiatry*, 1989, 28, 3:326–331.) **Key Words:** learning disabilities, reading disabilities, mathematics disability, individualized education program, mainstreaming.

Child psychiatrists play a vitally important role in identifying and managing children and adolescents with learning disabilities. Professionals in any field are more productive when they have a working knowledge of related disciplines. This paper presents an educational perspective of learning disabilities and some of the major issues in educational intervention: (1) educational implications of learning disabilities at different age levels are reviewed; (2) different types of school placements are described; and (3) intervention methods in the academic areas of reading and mathematics are discussed.

Learning Disabilities at Different Stages of Life

Problems associated with learning disabilities become evident at many stages of life. The problems associated with each developmental stage (i.e., preschoolers, elementary school children, and adolescents) require different intervention methods and school programs.

Learning Disabilities at the Preschool Level

Perhaps the most promising success stories in education today are the research reports of early childhood special education programs. There is conclusive evidence that these programs are working. The school programs for preschoolers with learning disabilities consist of early identification of children who are likely to encounter difficulty in academic learning and the immediate provision of an early intervention program. When at-risk preschoolers are identified before they encounter school difficulty, potential learning failure can be prevented or its effects ameliorated. Research shows that early intervention improves the quality of life for these children; it prevents the occurrence of secondary problems that compound the original difficulty; and it also offers a substantial financial savings for society (Shearer and Mori, 1987, Lerner et al., 1987).

The term "at-risk" is often used for the early childhood years because of the difficulty of identifying learning disabilities at the preschool level. Although these children have not yet failed in school learning, we can predict that they are likely candidates for school failure. Among the characteristics seen in learning-disabled preschool children are inadequate motor development, language delays, speech disorders, and poor cognitive abilities and concept development. The curriculum in early childhood special education programs includes activities for developing abilities in each of these areas of deficit.

In 1986, Congress passed legislation that will significantly benefit young learning disabled children. Public Law 99-457 (the Education of the Handicapped Act Amendments of 1986) extends the rights and protections of Public Law 94-142 to ages 3 through 5. By school year 1990–91, all public school systems must provide free, appropriate, public education for all handicapped children, ages 3 through 5. Moreover, schools will no longer be required to report children ages 3 through 5 by category of handicap; instead they may be identified noncategorically with the designation, "developmentally delayed."

Learning Disabilities at the Elementary Level

For many children, their learning disabilities first become apparent when they enter school and fail to acquire academic skills. Often the failure occurs in reading but it also happens in mathematics, writing, or other school subjects. Among the behaviors frequently seen in the early elementary years are inability to attend and concentrate, difficulty in learning to read, and poor arithmetic and number concepts.

In the later school years, as the curriculum becomes more challenging and complex, problems may emerge in other areas, such as social studies or science. Emotional problems also become more of an impediment after several years of repeated failure and students become more conscious of their poor achievements in comparison with peers. Social problems and the inability to make and keep friends may increase in importance at this age level (Pearl et al., 1986; Lerner, 1989).

Learning Disabilities at the Secondary Level

At the secondary level, there is a radical change in schooling, and adolescents find that a handicap of learning disabilities begins to take a greater toll. The curriculum demands of the junior and senior high school are tougher; secondary teachers are inclined to be more content-oriented (as opposed to child-oriented). The adolescent with a learning disability faces continued academic failure. These conditions all sometimes combine to intensify the learning disability and to create social and emotional stress. Adolescents also begin to be concerned about life after completing school, and they need

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One-to-One Instruction

A few learning disabled students cannot work in even a small group; they need one-to-one instruction, intensive highly individualized instruction over a period of time by a skilled teacher who can keep them on-task. Highly individualized remedial teaching becomes increasingly difficult as the size of the group is increased. Students who are learning disabled often do well in one-to-one instruction (Harris and Sipay, 1985; Wong, 1986; Kirk, 1986). Bloom (1984) found that average students who were tutored individually achieved about 2 standard deviations above the average of their nontutored peers, surpassing 98% of the nontutored students. Similarly, Guthrie et al. (1978) found that individual tutoring produced good results, with children achieving more when instructional groups consisted of 1 to 3 children than when the groups had 4 to 8 children. Kirk (1986) also supports the concept of one-to-one remediation for children with severe learning disabilities, suggesting that many children with severe learning disabilities require individual remediation, probably for 1 hour a day 5 times a week, especially at the beginning of remediation.

The problem, of course, is the expense of instruction in schools for one-to-one teaching from the standpoint of financial cost and professional time to teach a child individually. Bloom (1984) suggests that we should seek ways of bringing about the benefits of one-to-one teaching under more practical, more cost-efficient conditions. He suggested that for effective group instruction, teachers should (a) improve student processing through mastery learning, (b) select instructional materials that have proven effectiveness, (c) obtain home support, and (d) increase emphasis on higher mental processes. Parents must often turn to private services to receive this highly individualized instruction.

Teaching Strategies in Academic Instruction

For most learning disabled students, the presenting problem is difficulty in school in some academic area. Two areas of academic learning that are most troublesome for learning disabled students are reading and mathematics.

Reading

Reading disability is a serious problem for many children, adolescents, and adults. In fact, for about 80% of the learning disabled students, the primary academic problem is in reading. Without appropriate academic intervention, these individuals are destined to be handicapped throughout their lives. As a primary cause of school failure, poor reading ability leads to a lowered self-esteem and serious emotional overlays. Moreover, reading problems prevent individuals from reaching desired career goals, as well as robbing them of the opportunity to read for pleasure and enjoyment.

There are several approaches to teaching reading to people who encounter serious difficulty learning to read. Some of the methods have a long-established tradition and have been widely used for many years. Others reflect more recent ideas about teaching reading and are based on current research of the reading process.

Reading is the most researched area of the school curriculum, as well as one of the most controversial. To provide an overview of the major intervention strategies for the teaching of reading, the various strategies are grouped as follows: (1) preacademic learning methods, (2) adaptation of regular reading methods, (3) special remedial approaches, (4) cognitive learning strategies, and (5) holistic reading approaches.

Preacademic Learning Methods

Learning to read does not suddenly begin when the child reaches age 6 and enters school. During the preschool years, children master many preacademic skills and acquire knowledge that builds the foundation for learning to read (Kirk, 1987). Young children with learning disabilities often have deficits in sensorimotor development, understanding and using language, learning to attend, developing memory skills, perceptual skills and/or cognitive skills. Remedial methods that focus on improving these deficits are among the most controversial in the field. For example, the training of motor skills does not transfer into gains in reading achievement when the training is given in isolation without accompanying instruction in academic skills (Kavale and Mattson, 1983). Visual and auditory perceptual training by itself is insufficient and must be integrated into the teaching of academic skills (Lerner, 1989). Research also suggests that poor auditory perception and inadequate language and phonological skills have a higher correlation to reading problems than deficits in visual perception (Vellutino, 1987; Liberman, 1987). Sensitive learning disabilities teachers are able to use information about the child's preacademic deficits as they help children acquire reading skills.

Adaptations of Regular Reading Method

Reading methods and materials that are normally used by the regular classroom teacher include basal readers, sight words, phonics, and language experience approaches. Methods and materials intended for students progressing normally in reading can be successfully adapted for pupils with learning disabilities. Techniques for adapting developmental methods include increasing the amount of repetition, allotting more time for the completion of work, providing more examples or activities, providing more review, introducing the work more slowly, expanding the background information, and providing more work on vocabulary development. Sometimes, a regular reading method that failed in the past seems to work because it is taught at another time, or in another place, or by a different teacher (Richeck et al., 1989).

Special Remedial Methods

A number of intervention strategies are very special approaches for students having difficulty in learning to read. These methods are not typically used in the regular classroom. Knowledge and skill with these special remedial methods are among the competencies of special teachers who work with problem readers. Among the best known of these methods are the Fernald method (1943/1988) and the Orton-Gillingham method (Gillingham and Stillman, 1970). Both of these techniques are multisensory; the student hears the sound (or word), sees it, says it, and traces it. Thus, the learning is reinforced through several sensory systems. The Orton-Gillingham method also emphasizes decoding skills and the

cannot remember computation facts with quick, automatic recall). Some children find quantitative concepts of arithmetic and measurement to be puzzling, and they may not understand the symbol system of mathematics. Still other learning disabled students have a deficit in mathematics problem solving, particularly at the secondary level. Other students may lack the learning strategies needed for mathematics problem solving (Montague and Bos, 1986; Cawley et al., 1987).

Public Law 94-142 stipulates that learning disabilities occur in two different areas of mathematics: mathematics calculation and mathematics reasoning. The intervention strategies for these two areas differ. Depending upon the nature of the student's problem, both mathematics computation and mathematics problem solving must be considered in planning intervention.

Mathematics Computation Skills

Computation skills are difficult for many learning disabled children (Thornton et al., 1983; Thornton and Toohey, 1985). First, they must develop necessary number *concepts*, or a basic understanding of numbers. Children develop a concept when they are able to classify or group objects, or when they can associate a label with a class (for example, the child recognizes that *round* objects form a group). Another example of a concept is learning to formulate rules (for example, knowing that when a number is multiplied by 10 the product is that number followed by a 0).

Computation skills include knowing the number facts—the basic operations in addition, subtraction, multiplication, and division. A skill can be performed well or poorly, quickly or slowly, easily, or with great difficulty. Skills tend to develop by degrees and can be improved through instructional activities. Students with learning disabilities require much drill and practice, review, and overlearning before they develop computation skills that are automatic, dependable, and usable.

Certain factors contribute to effective teaching of basic facts to learning disabled students. Thornton and Toohey (1985) suggest that teachers:

1. *Modify the sequence in which facts are presented for learning.* The normal sequence of teaching facts may not be best for learning disabled children. Grouping math facts by strategy for recall is more effective. In addition, for example, there are 81 separate facts involved in the span from 1 + 1 = 2 to 9 + 9 = 18. Easy to learn facts are the ones (5 + 1 = 6), or the doubles (2 + 2 = 4). Therefore, if these are omitted, there are 56 basic addition facts to be mastered. Similarly, without the ones and doubles, there are 56 facts to be mastered in each of the other computation areas—subtraction, multiplication, and division.

2. *Modify the presentation of activities to match the learning style of each learning disabled student.* In structuring lessons to teach computation facts, teachers should consider how the individual student learns, the idiosyncratic learning style of the student.

3. *Help students develop self-monitoring skills.* Students should learn the strategy of self-monitoring independently to gain mastery of the basic math facts.

Mathematics Problem Solving

In problem solving, the student applies a concept or uses a computation skill to accomplish some task or solve a problem. Usually, problem solving applications involve the selection and use of some combination of concepts or skills in a new or different setting. For example, in measuring a board of lumber, the concepts involved in rectangle and parallel sides come into play, as well as the skills of measuring, multiplying, and adding.

The National Council of Teachers of Mathematics (1980) identified mathematics problems solving as the top priority in school mathematics for the 1980s. Problem solving is rapidly assuming a larger part of the regular education mathematics curriculum (Resnick and Resnick, 1985), and it is gaining importance in special education as well (Cawley et al., 1987).

Cognitive learning strategies should be taught to students with learning disabilities as an approach to solving mathematics problems. In this approach students receive cognitive learning strategy training in math problem solving. For example, Montague and Bos (1986) used an eight-step procedure to teach cognitive learning strategies for mathematics problem solving. The students were required to actively (1) read the problem aloud, (2) paraphrase the problem aloud, (3) visualize the information, (4) state the problem, (5) hypothesize and think through the problem aloud, (6) estimate the answer, (7) calculate and label the answer, (8) self-check by using the self-questioning technique to ask if the answer makes sense.

Principles of Remediation in Mathematics

In providing remediation in mathematics to learning disabled students, the following principles are helpful:

Establish readiness for mathematics learning. Mathematics is a sequential type of learning. It is important to check back far enough into the previously acquired number learnings to ensure that the student has the foundation for the current instructional lesson.

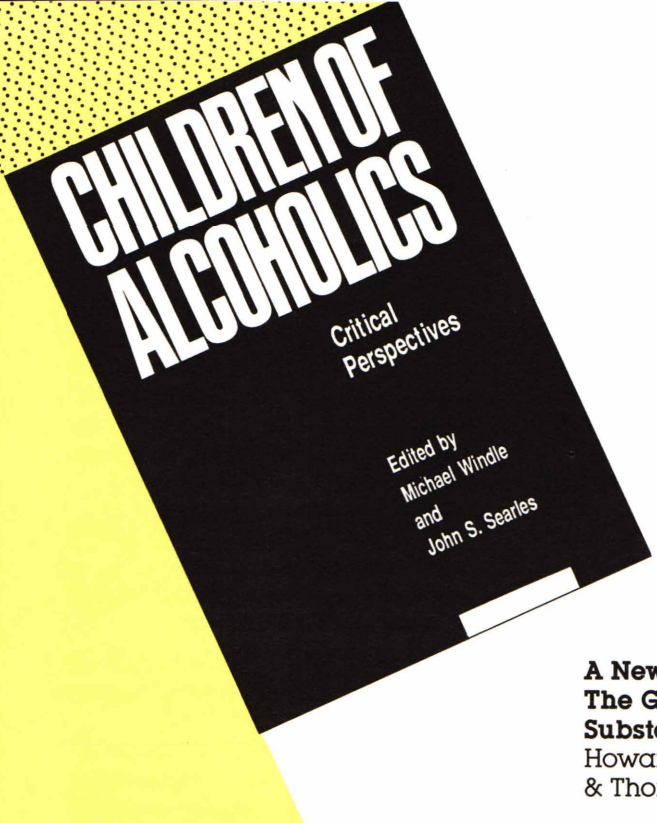
Progress from the concrete to the abstract. Pupils can best understand math concepts when the teaching goes from objects the student can touch and handle (concrete) to the working with numerals that represent objects (abstract).

Provide sufficient opportunities for practice and review. The intervention strategies must provide the pupil with many opportunities to practice, drill, and review. Computer programs can often help do this effectively.

Teach students to generalize to new situations. Students must learn to generalize a skill to many situations. For example, they can practice computation facts with many story problems that the teacher or students create and then exchange. Pupils must gain skill in recognizing and applying computational operations to various new situations.

Summary

This paper describes some of the current issues and practices in the schools and in educational intervention. The health, mental health, and education professions must coordinate their efforts in working with the child who has learning disabilities. It is important for teachers and child psychiatrists



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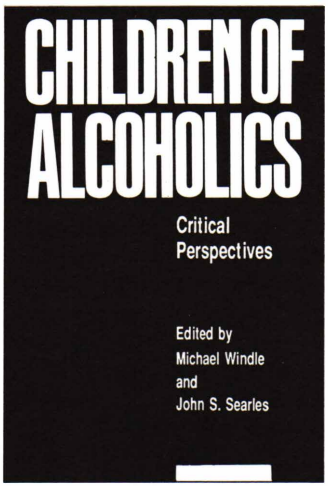

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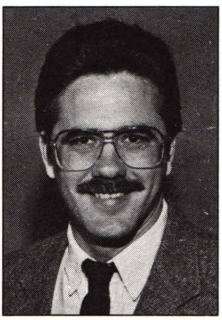
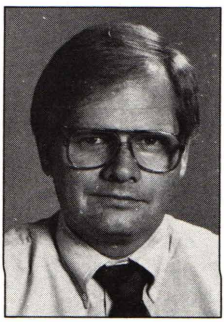


Michael Windle is Senior Research Scientist at the New York State Research Institute on Alcoholism in Buffalo. He received his Ph.D. in Human Development and Family Studies from the Pennsylvania State University, and his research interests include the utilization of a life span developmental perspective to study high-risk factors associated with problems of drinking among adolescents.



John S. Searles is Research Assistant Professor of Psychology in Psychiatry at the University of Pennsylvania as well as a psychologist at the Philadelphia Veterans Administration Medical Center. He received his Ph.D. in Personality Psychology from the University of California, Berkeley, and his research interests include personality and environmental issues in the etiology of alcoholism.

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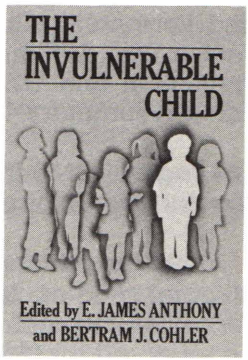

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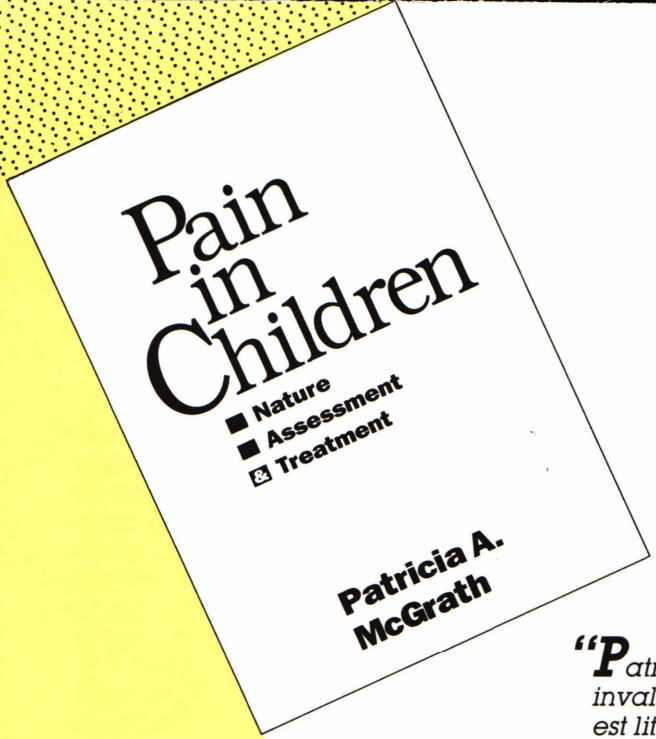

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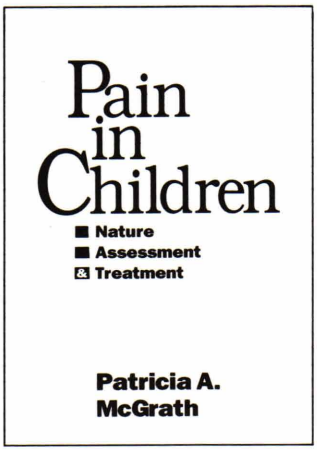

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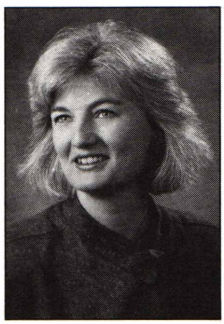

Recipient of the Ontario Ministry of Health's Career Scientist Award, Patricia A. McGrath is founder of the Pediatric Pain Clinic and Director of the Child Health Research Institute at Children's Hospital of Western Ontario. She is also Associate Professor on the Faculty of Medicine, Department of Pediatrics at the University of Western Ontario. Author of numerous book chapters and journal articles, she is Associate Editor on the Pediatrics Panel of *Pain*, and serves on the Editorial Board of the *Journal of Pain and Symptom Management*.

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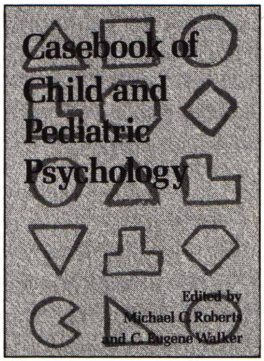

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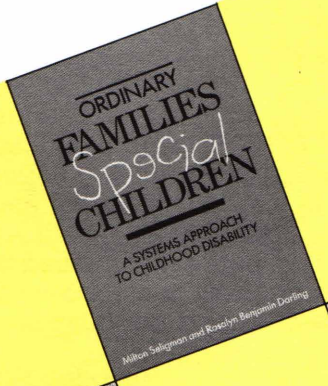

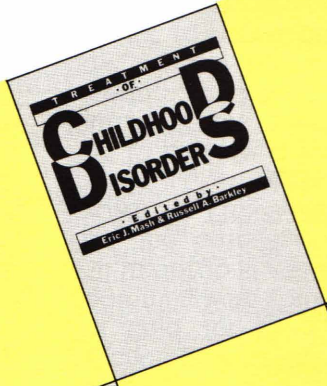

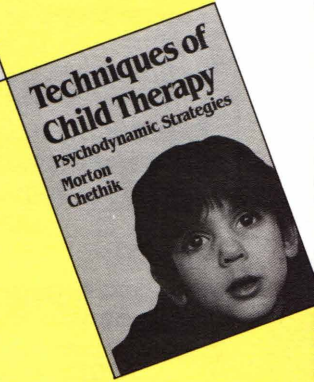

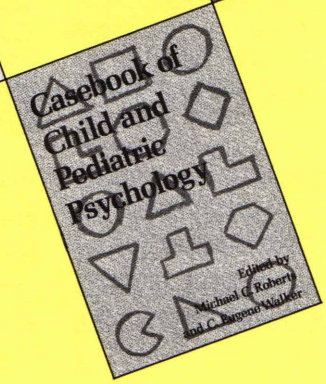

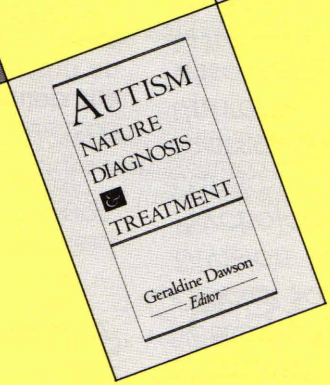

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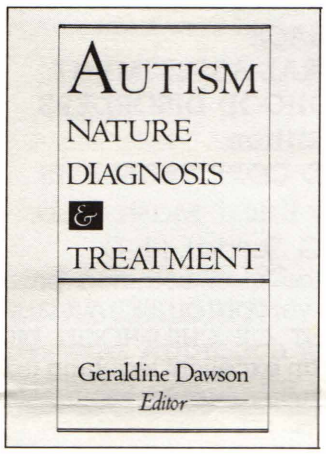

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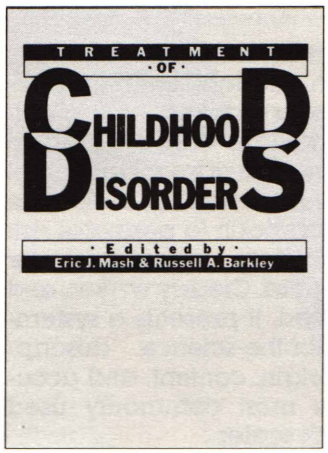

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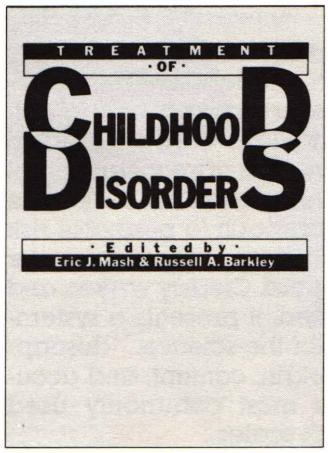

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