SHELTON NEW PARENT SUPPORT

Overview of Learning Differences

The Shelton Experience

Shelton Offers

- A nurturing environment
- Respect by staff for students and parents
- A caring well-trained staff
- Early intervention
- Remediation and instruction
- Development of talents
- Special programs and speakers

a two-way street

Shelton Requires

- Students to care for the environment,
- respect staff, and other students.
- Parents to support the school policies, procedures, and staff.

James Annear
Grade 5
Age 10.8

The Other Schools

The other schools that I went to were completely awful. In fact they were so awful I fortunately don't remember much at all. But I think I do remember is Mrs. Jones classroom. Of no offense to Mrs. Jones it's not that Mrs. Jones. I am mainly just so glad to get away from them.

What Can Parents Do?

By Joyce S. Pickering, Hum.D.,
Executive Director Emerita, Shelton School

The Horizon, Volume 16, Number 2, May 2005

There is a story about a couple who planned a trip to Italy. They studied the geography, history, language and customs, and when completely prepared, they embarked on their trip.

Somehow their travel agent confused their trip with that of another client and the couple landed in Holland. Needless to say, they were shocked and disappointed. They were counting on their treasured dream of Italy.

As they realized there was nothing they could do but adjust, they slowly began to love and appreciate many things about Holland: the beauty of the countryside, the lovely flowers and the friendly, practical people.

Holland did not have the flamboyance of Italy and the couple grieved somewhat about the differences. The longer they stayed, the more they enjoyed their unique experience in this place called Holland.

This allegory exemplifies the feelings and experiences of many parents when they discover that their child has a learning difference due to Dyslexia or a related disorder. As parents absorb the diagnosis and try to project what that means for their child's education and future, they need the guidance of professionals in the field.

Having worked with students with language and learning disorders for over 40 years and having two children and grandchildren with learning differences (LD), I would offer the following guides.

Be Informed

Ignorance is not bliss. The more you know about learning differences and how they are remediated, the more you can help your child. Read, go to lectures and conferences to find out the accurate information about what treatments are research-based and what programs are questionable.

To understand learning differences, it is important to know that they are caused by difficulties in processing spoken and/or written communication. The brain is normal but different in its anatomy and functioning. The intellect is normal and, for

some, above average or superior. Even though intelligent, the student is handicapped by the reduced speed and frequent errors that occur in processing visual and auditory information and integrating that information in the process of reading, writing, spelling, and, in some cases, math. Many of these learning differences are genetic and are seen in multiple family generations. Worrying about the exact cause is non-productive. The important thing is to learn what to do to help the child as early as possible and to minimize the difficulties through well-prescribed specific instruction.

For over 70 years specific instruction for dyslexic individuals has been developed and used to lessen their difficulties. These programs are called Multisensory Structured Language (MSL) approaches. There are a number of different approaches, but all have the same content and principles of instruction. The names of these programs and the common features are listed at the end of this article. It must be clearly understood by the parent that these approaches are therapeutic; they do not cure the student, but help him to become functional in the academic areas of his processing difficulty.

For example, an unremediated individual with Dyslexia may have a second- or third-grade reading level in high school, while a remediated individual will be close to grade level performance, at grade level or, in some cases, above grade level. Most dyslexic individuals can attain grade level performance in reading with remediation, but most are low average in spelling throughout life. In today's world, this poses less of a challenge, in that technology has provided the computer and the software for spell check and grammar check.

In addition to the MSL approaches for language skills, there are specific instructional programs for math. Other areas in which LD students may need specific instruction are organization and study skills, social skills and motor skills.

In my experience, about 70% of the students with the specific learning difference Dyslexia, also have Attention Deficit/Hyperactivity Disorder. ADHD can be seen in three categories: Inattentive, Hyperactive, and Combined types. If a student cannot sustain his attention for a typical amount of time for his age, it of course affects learning. If the student is not focused as a lesson is presented, it is not stored in memory. It cannot be retrieved later to be used.

These programs designed for LD individuals caused by processing disorders do not cure, but do effectively improve academic skills.

If, as a parent, you become informed about the characteristics of learning differences, the challenges presented by these differences and the specific instructional approaches and strategies to improve a student's academic skills, you will find, I believe that you feel more confident in helping your child. Knowledge does set us free from our needless worries. A learning difference is a challenge, but it is not the worst problem in the world.

Be Realistic

Helping a student with a learning difference is not a fast process. It takes years of hard work on the part of the student and the teacher or therapist to attain average to above-average performance in academic subjects.

If a student is dyslexic his greatest challenges are reading, decoding (breaking words apart and blending sounds together), spelling and written expression (writing sentences, paragraphs, essays, reports).

When a student is instructed using an MSL approach, reading decoding usually improves first. As decoding becomes more automatic, most students show improved reading rate and read more smoothly. Spelling improves slowly and will always be a challenge. Written expression requires a combination of language skills. Levels of writing ability from sentences to compositions take several years to improve.

Help Your Child Develop Patience And Perseverance.

During the process of remediation the parent can assist the most by helping the student learn to persevere and be patient with himself. The teacher or therapist will work on this also. It takes a lot of practice to read more accurately and rapidly. This is a difficult skill, which most take for granted, because most individuals can do it with relative ease. Not so for the individual with Dyslexia. It is a slow, laborious and unsatisfying task, and he would rather avoid it. To improve takes disciplined practice. The parent and teacher must keep the student encouraged. Praise for effort - *good try*, *good job*, *you are doing better*, *I'm here to help*, *we'll get there* are words they need to hear.

If a student has a related disorder, you may see average or above-average reading decoding and speed, but difficulty in reading comprehension and math, some weaknesses in spelling and difficulty in organizing thoughts for a written assignment.

Seek Knowledgeable Professionals/Be Aware of Quick Fixes

If it seems too good to be true, it probably is not true. Helping the LD student is not fast. There are a whole group of difficulties that must be addressed individually and assimilated in order for a student to have average or above language skills of reading, writing and spelling. Some programs work on just one aspect of the total profile of the learning difference. They may help partially, but they are not comprehensive therapeutic approaches. Research has not proven that visual or motor training result in improvement of the individual's reading, writing and spelling. Many LD students do have motor coordination deficits and motor programs are helpful to remediate these weaknesses. It is not clear that there is carry over from motor training to academic subjects. Remediation must be specific. If there is a motor problem, do motor training; if there is a written language problem, teach reading, writing and spelling with a program written specifically for written language disorders. The most accepted programs for written language disorders are the MSL approaches. If the student has a math disorder, the instruction should be multisensory and given by a person trained to teach LD students.

One of the best things a parent can do is to ask the remedial program directors for a list of other parents they can talk to about their child's experience and improvement. Also ask for any research or evidence that is available on the efficacy of the remediation.

Collaborate With the Student's School

Most schools will work with the parents. Some are difficult. If at all possible try to communicate calmly and rationally with the school in getting services for your child. If you are in a public or private school you will find different levels of knowledge from school to school. If you cannot get services because your child does not qualify, I advise not to waste your child's time while you try to improve that situation. Try to find services within your community that begin to help your child while you negotiate with the school.

If your child is in an LD school the communication needs to be completely open between you and the staff. Don't try to hide information or play games with the staff. They are knowledgeable and will figure out that they are not getting the full truth from a parent. You have to become a team for your child. Work with the professionals. They have seen many children with similar difficulties. They will do their best to help you and your child face and improve his challenges.

Empathize, Don't Sympathize

Tell your child you understand that some things are really difficult for him or her. Reassure him that you will find help for him and that you will support him. Understand his feelings of frustration and help him learn to deal with them. We all feel frustrated at times. We have to learn to control our feelings, calm ourselves, take a break and start over. An LD child will not succeed if he lets anger or anxiety get the best of him. Teachers and parents have to help with these skills. Never tell your child that he is unable to learn certain things and, therefore, you will not expect him to try. Don't tell his teachers not to expect too much either. Let an experienced professional guide you in what you can expect and what is realistic for the student to achieve. In short, understand how your child feels, but do not feel sorry for him and try to protect him from the world. The goal is to find help for your child and to help your child cope.

Help Your Child to Become Independent and His Own Advocate

It is easy to fall into the trap of taking care of everything for your child when he has learning difficulties. Don't let it happen to you or your child. If you make him dependent on you to function, you rob him of the chance to be independent. Make it a rule: Don't do anything for him he can do for himself. Giving him duties and tasks he can do for himself helps him to feel more competent. Competence enhances self-concept. If you do everything for the child he feels incompetent. He may grow to like the helpless role.

Listen to your student, help him with the best plan to handle a situation, even role-play it with him. Then send him, backed with your confidence, to handle the situation for himself the best that he can. With practice, he will feel empowered, instead of like a victim.

From the day of our child's birth, our role as a parent is to help him become a functioning independent adult. To the extent that we are able to help our children become self-sufficient we can achieve a greater success as a parent.

Special Education Expenses – Tax Deductible or Not?

ldaamerica.org/special-education-expenses-tax-deductible-or-not/

An IRS private letter ruling dealt with payments to a private school on behalf of two children diagnosed with learning disabilities. The children were attending the private school in order to participate in a special education program designed to help the children deal with their conditions and then progress to a regular school program. The question addressed was whether or not the payments would qualify as tax deductible medical expenses.

In the ruling, the IRS clarified that what matters is not the nature of the school but the special education provided to the student. The letter states:

> *"Deductibility of tuition depends on exactly what the school provides an individual because a school can have a normal education program for most students, and a special education program for those who need it. Thus, a school can be 'special' for one student and not for another."*

So, the tuition can be deductible even if the school is not a special needs school and is not attended exclusively by children with learning disabilities, as long as participation by a child with learning disabilities in a special program is the principal reason why the child is attending the school.

The IRS concluded that the two children were attending the private school "principally to receive medical care in the form of special education" and that the tuition was deductible as a medical expense.

The IRS ruling added that a physician or other qualified professional must diagnose the medical condition (e.g., learning disability) requiring the special education. Also, for the education to be medical care, the education must correct the condition or assist the child in dealing with the condition so that the child can then progress to a regular school program. The school need not have physicians providing the care but must have professionals "competent to design and supervise a curriculum providing medical care."
Note that medical expenses generally are deductible only to the extent that the medical expense total figure exceeds a specified percentage of the taxpayer's adjusted gross income figure.

Also, note that a private letter ruling applies only to the taxpayers who requested the ruling, but the ruling is informative as to the IRS's analysis of the issue. Parents considering the deductibility of special education expenses should consult with their tax advisor.

Author: Patricia H. Latham, is a Washington, DC attorney, arbitrator, and co-author of SPECIAL EDUCATION LAW and LEARNING DISABILITIES /ADHD AND THE LAW IN HIGHER EDUCATION AND EMPLOYMENT.

DISABILITY RIGHTS EDUCATION & DEFENSE FUND

A COMPARISON of ADA, IDEA, and Section 504

The Americans with Disabilities Act of 1990 (ADA), the Individuals with Disabilities Education Act (IDEA), and Section 504 of the Rehabilitation Act of 1973 represent three attempts to improve the living conditions of those with disabilities.

Type and purpose

ADA	IDEA	504
A civil rights law to prohibit discrimination solely on the basis of disability in employment, public services, and accommodations.	An education act to provide federal financial assistance to State and local education agencies to guarantee special education and related services to eligible children with disabilities.	A civil rights law to prohibit discrimination on the basis of disability in programs and activities, public and private, that receive federal financial assistance.

Who is protected?

ADA	IDEA	504
Any individual with a disability who: (1) has a physical or mental impairment that substantially limits one or more life activities; or (2) has a record of such impairment; or (3) is regarded as having such an impairment. Further, the person must be qualified for the program, service, or job.	Children ages 3-21 who are determined by a multidisciplinary team to be eligible within one or more of 13 specific disability categories and who need special education and related services. Categories include autism, deafness, deaf-blindness, hearing impairments, mental retardation, multiple disabilities, orthopedic impairments, other health impairments, serious emotional disturbance, specific learning disabilities, speech or language impairments, traumatic brain injury, and visual impairments	Any person who (1) has a physical or mental impairment that substantially limits one or more major life activities, (2) has a record of such an impairment or (3) is regarded as having such an impairment. Major life activities include walking, seeing, hearing, speaking, breathing, learning, working, caring for oneself, and performing manual tasks.

Provides for a free, appropriate public education (FAPE)

ADA	IDEA	504

Not directly. However, (1) ADA protections apply to nonsectarian private schools, but not to organization or private schools, or entities controlled by religious organization; (2) ADA provided additional protection in combination with actions brought under Section 504. Reasonable accommodations are required for eligible students with a disability to perform essential functions of the job. This applies to any part of the special education program that may be community-based and involve job training/placement.	Yes. A FAPE is defined to mean special education and related services. Special education means "specially designed instruction at no cost to the parents, to meet the unique needs of the child with a disability..." Related services are provided if students, require them in order to benefit from specially designed instruction. States are required to ensure the provision of "full educational opportunity" to all children with disabilities. IDEA requires the development of an Individualized Education Program (IEP) document with specific content and a required number of participants at an IEP meeting.	Yes. An "appropriate" education means an education comparable to that provided to students without disabilities. This may be defined as regular or special education services. Students can receive related services under Section 504 even if they are not provided any special education. Section 504 does require development of a plan, although this written document is not mandated. The Individualized Education Program (IEP) of IDEA may be used for the Section 504 written plan. Many experts recommend that a group of persons knowledgeable about the students convene and specify the agreed-upon services.

Funding to implement services

ADA	IDEA	504
No, but limited tax credits may be available for removing architectural or transportation barriers. Also, many federal agencies provide grant funds to support training and to provide technical assistance to public and private institutions.	Yes. IDEA provides federal funds under Parts B and C to assist states and local education agencies in meeting IDEA requirements to serve infants, toddlers and youth with disabilities.	No. State and local jurisdictions have responsibility. IDEA funds may not be used to serve children found eligible under Section 504.

Procedural safeguards

ADA	IDEA	504
The ADA does not specify procedural safeguards related to special education; it does detail the administrative requirements complaint procedures, and consequences for noncompliance related to both services and employment.	IDEA requires written notice to parents regarding identification, evaluation, and/or placement. Further, written notice must be made prior to any change in placement. The Act delineates the required components of the written notices.	Section 504 requires notice to parents regarding identification, evaluation and/or placements. Written notice is recommended. Notice must be made only before a "significant change" in placement. Following IDEA procedural safeguards is one way to comply with Section 504 mandates.

Evaluation and placement procedures

ADA	IDEA	504

The ADA does not specify evaluation and placement procedures: it does specify provision of reasonable accommodations for eligible activities and settings. Reasonable accommodations may include, but are not limited to, redesigning equipment, assigning aides, providing written communication in alternative formats, modifying tests, redesigning services to accessibility locations, altering existing facilities, and building new facilities.	A comprehensive evaluation is required. A multidisciplinary team evaluates the child, and parental consent is required before evaluation. IDEA requires that reevaluations be conducted at least every 3 years. For evaluation and placement decisions, IDEA requires that more than one single procedure or information source be used; that information from all sources be documented and carefully considered; that the eligibility decision be made by a group of persons who know about the student, the evaluation data, and placement options; and that the placement decision serves the student in the least restrictive environment. An IEP meeting is required before any change in placement.	Unlike IDEA, Section 504 requires only notice, not consent, for evaluation. It is recommended that district obtain parental consent. Like IDEA evaluation and placement procedures under Section 504 require that information be obtained from a variety of sources of the area of concern; that all data are documented and considered; and that decisions are made by a group of persons knowledgeable about the student, evaluation data, and placement options. Section 504 requires that students be educated with their non-disabled peers to the maximum extent appropriate. Section 504 does not require a meeting for any change in placement.

Due process

ADA	IDEA	504
The ADA does not delineate specific due process procedures. People with disabilities have the same remedies that are available under the Title VII of the Civil Rights Act of 1964, as amended in 1991. Thus, individuals who are discriminated against may file a complaint with the relevant federal agency or due in federal court. Enforcement agencies encourage informal mediation and voluntary compliance.	IDEA delineates specific requirements for local education agencies to provide impartial hearings for parents who disagree with the identification, evaluation, or placement of a child.	Section 504 requires local education agencies to provide impartial hearings for parents who disagree with the identification, evaluation, or placement of a student. It requires that parents have an opportunity to participate in the hearing process and to be represented by counsel. Beyond this, due process details are left to the discretion of the local education agency. It is recommended that districts develop policy guidelines and procedures.

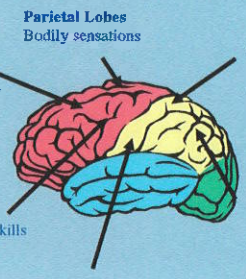
ENGAGE. ENRICH. EMPOWER

SHELTON

Dyslexia and Related Disorders

Reading is not a natural process.
It must be taught.

Mapping the Mind



Parietal Lobes
Bodily sensations

Frontal Lobes
Thinking, planning, creativity; Primary motor area; Coordinates other brain functions

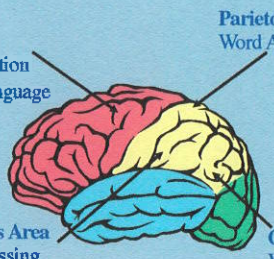
Left Hemisphere
Processes language skills

Right Hemisphere
Processes spatial information & abstract thoughts

Occipital Lobes
Interpret visual images; Evaluation of pieces

Temporal Lobes
Interpret auditory signals

Posterior Reading System



Broca's Area
(Frontal Lobe)
Speech Production
Expressive Language

Parieto-temporal
Word Analysis

Wernicke's Area
Word Processing
Receptive Language

Occipito-temporal
Word Form

PROCESSING WITH DYSFUNCTIONS

5 SENSES INPUT
Receptors of
See, Hear, Feel, Smell, Taste

BRAIN INTERPRETATION DYSFUNCTION

INCORRECT PERCEPTION

FAULTY ATTENTION

CONCEPT FORMATION FAULTY - LANGUAGE WEAKNESSES

GAPS IN HIGHER COGNITIVE FUNCTIONS

INADEQUATE MEMORY STORAGE

Visual and Auditory Processing

Types of Perceptual Errors

- Visual Discrimination
- Visual Memory
- Visual Motor

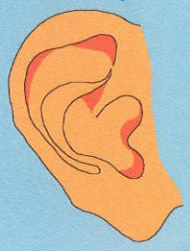
Visual

Examples of each?

Types of Perceptual Errors

- Auditory Discrimination
- Auditory Memory

Auditory



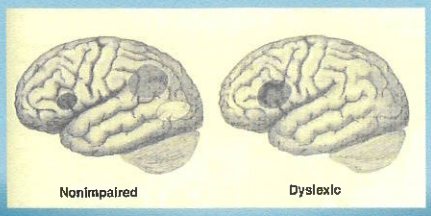
Examples of each?

"While no two brains are alike, the brains of people with dyslexia are distinctively different compared to those without dyslexia.''

Dr. Gordon Sherman

A Neural Signature for Dyslexia

- Under activation of Neural Systems in the Back of the Brain



Sally Shaywitz, M.D.

The study found that dyslexic readers underactivate reading systems in the back of the brain.

Functional imaging studies of adults with dyslexia, including high-achieving university students, reveal this same pattern of strong frontal areas used during reading (Richards, 2001; Shaywitz, 2003; Simos, Breier, Fletcher, Mergman, and Papanicolaou, 2000

Sally Shaywitz, M.D.

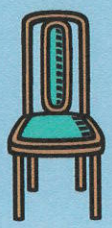
MATCH

- Coordination
- Language
- Attention
- Perception

Oral Language Disorders

Students with oral language disorders have processing differences in associating meaning to spoken language (words, sentences, etc.).

Written Language



CHAIR

25 Characteristics of Dyslexia & Related Disorders

Test Performance

- Spotty Performance on IQ Tests
- Below Mental Age on Tests of Drawing a Person
- Poor Performance on Visual-Motor Gestalt Tests for age & Indicated Intelligence
- Poor Performance on Group Tests Which Require Reading & Writing

25 Characteristics - continued

Perceptual Performance

- Impaired Temporal Orientation
- Impaired Right-Left Discrimination
- Poor Spatial Orientation
- Field Dependent Perception
- Frequent Perceptual Reversals in Reading & Writing Numbers Beyond Age & Instructional Level

25 Characteristics - continued

Perceptual Performance, continued

- Impaired Reproduction of Rhythmic Pattern
- Impaired Reproduction of Tonal Pattern
- Impaired Auditory Discrimination
- Impaired Visual & Auditory Memory

Speech/Language Performance

- Speech Irregularities
- Oral Language Delays & Disorders

25 Characteristics - continued

Motor Skills Performance

- Impaired Coordination
- Impaired Fine Motor Skills

Academic Performance

- Reading Disabilities
- Spelling Difficulties
- Writing Disabilities

25 Characteristics - continued

Observation of Performance

- Variability in Performance
- Poor Ability to Organize Work
- Slowness in Finishing Work
- Short Attention Span for Age
- Impaired Concentration Ability

Dr. Charles Shedd
Joyce S. Pickering, Hum.D. 2000

Patterns of Learning Disorders 2008

- Pattern 1 – Reading Disorder (Dyslexia)
- Pattern 2 – Related Disorder: Reading Comprehension Disorder
- Pattern 3 – Related Disorder: Attention Deficit / Hyperactivity Disorder
- Pattern 4 – Related Disorder: Math Disorder (Dyscalculia)
- Pattern 5 – Related Disorder: Motor Incoordination
- Pattern 6 – Related Disorder: Oral Language Disorder (Dysphasia)
- Pattern 7 – Related Disorder: Social Interaction
- Pattern 8 – At Risk for Learning Disorders
- Pattern 9 – At Risk for Oral Language Disorders

Pattern 1
Specific Developmental Dyslexia
Reading Disorder DSM 315.00 / 315.80

- Reading Accuracy Below Average
- Spelling Below Average
- Written Expression Below Average (Composition)

Process of Reading

Dyslexic

Perceives WHOLE Or PARTS

Cannot go from WHOLE to PARTS to WHOLE

Call the word and get the meaning

then there

Pattern 2
Reading Comprehension Disorder

Related Disorder DSM 315.00

- Reading Comprehension Below Average
- Math Usually Below Average
- Written Expression Below Average (Organization)

Pattern 3
Attention Deficit Hyperactivity Disorder (AD/HD)

Related Disorder DSM 314.00 / 314.01 / 314.09

- Sustained Attention Below Average
- Inhibition Below Average
- Impulsivity
- Hyperactive or Hypoactive Behaviors

Attention Deficit Hyperactivity Disorder (AD/HD)

- Essential features:
  - Developmentally inappropriate degrees of inattention, impulsiveness, & hyperactivity;
  - Display disturbance in each of these areas, but to varying degrees;
  - Manifestations appear at home, in school, at work, & in social situations, but to varying degrees;

Attention Deficit Hyperactivity Disorder (AD/HD)

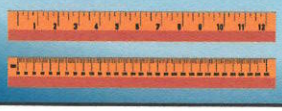
  - In some signs of disorder appear only in one setting, at home OR at school.
- Symptoms typically worsen in situations requiring sustained attention:
  - Listening to a teacher in classroom
  - Attending meetings
  - Doing class assignments
  - Chores at home.

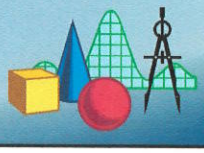
Attention Deficit Hyperactivity Disorder (AD/HD)

- Signs of disorder may be minimal or absent when person is receiving:
  - Frequent reinforcement
  - Very strict control,
- or
  - Is in a novel setting
  - Is in a one-to-one situation

Pattern 4
Math Disorder - Dyscalculia
Related Disorder DSM 315.10

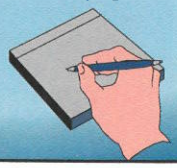
- Mathematics Significantly Below Average
- All Language Areas Within Normal Limits





Pattern 5
Motor Incoordination
Related Disorder DSM 315.40

- Fine Motor Delays
- Gross Motor Delays
- Handwriting Below Average (Dysgraphia)



Pattern 6
Oral Language Disorder – Dysphasia
Related Disorder DSM 315.40

- Oral Language Below Average
- Mixed Receptive / Expressive Language Disorder
- Expressive Language Disorder

Pattern 7
Related Disorder: Social Interaction

- Social Skill Weaknesses
- Non Verbal Learning Disability
- Mood Disorder / Anxiety, and/or Depression

Pattern 8
At Risk for Learning Disorder

Pattern Assigned Students Before End of 1st Grade

- Evidence of Delay or Disorders of:
  - Coordination
  - Language
  - Attention
  - Perception

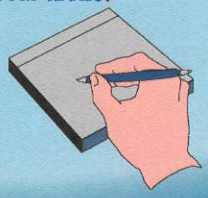
Pattern 9
At Risk for Oral Language Disorder

Pattern Assigned Students Before End of 1st Grade

- Evidence of Receptive-Expressive or Expressive Language Disorder

Dysgraphia

- A handwriting disability which may be present with any of the other learning disabilities or may occur alone.



Self-Concept Formation

- The child with average learning skills has more positive than negative experiences both before entering school and after entering school
  - This builds resistance to anxiety
  - Establishes a strong sense of self worth

Self-Concept Formation

- The child with learning or adjustment difficulties has more negative than positive experiences, *especially* after entering school
  - This exacerbates feelings of anxiety
  - Self-concept is negatively affected
  - Negative behaviors develop

A vicious circle of negative behavior is set into motion

- Adults must intervene to stop the cycle
- The possibility of more positive experiences must be increased
  - Improve academic skills
  - Direct teach social skills/coping strategies
  - Provide success experiences in and out of the academic setting

Dyslexia and Related Disorders

Questions or Comments?

Fact Sheets

About Dyslexia

IDA fact sheets are convenient, professionally reviewed materials designed to improve understanding and support advocacy initiatives. Fact sheets are frequently used to enrich and supplement IEP meetings, school board discussions, and district policy initiatives. Click on topics of interest below to view and download fact sheets.

- AD/HD and Dyslexia **(Click here for Spanish)**
- Adolescents and Adults with Dyslexia **(Click here for Spanish)**
- At Risk Students English Language Learners **(Click here for Spanish)**
- Common Core State Standards and Students with Disabilities
- Dyslexia and the Brain **(Click here for Spanish)**
- Dyslexia Assessment
- Dyslexia Basics **(Click here for Spanish)**
- Dyslexia Stress Anxiety Connection **(Click here for Spanish)**
- Educational Promises
- Effective Reading Instruction for Students with Dyslexia **(Click here for Spanish)**
- Evaluating Professionals **(Click here for Spanish)**
- Gifted and Dyslexic
- Helpful Terminology
- Home Schooling
- Spelling **(Click here for Spanish)**
- Testing and Evaluation
- Transitioning from High School to College
- Understanding Dysgraphia **(Click here for Spanish)**

JUST THE FACTS... Information provided by The International DYSLEXIA Association®

DYSLEXIA BASICS

What is dyslexia?

Dyslexia is a language-based learning disability. Dyslexia refers to a cluster of symptoms, which result in people having difficulties with specific language skills, particularly reading. Students with dyslexia usually experience difficulties with other language skills such as spelling, writing, and pronouncing words. Dyslexia affects individuals throughout their lives; however, its impact can change at different stages in a person's life. It is referred to as a learning disability because dyslexia can make it very difficult for a student to succeed academically in the typical instructional environment, and in its more severe forms, will qualify a student for special education, special accommodations, or extra support services.

What causes dyslexia?

The exact causes of dyslexia are still not completely clear, but anatomical and brain imagery studies show differences in the way the brain of a person with dyslexia develops and functions. Moreover, most people with dyslexia have been found to have problems with identifying the separate speech sounds within a word and/or learning how letters represent those sounds, a key factor in their reading difficulties. Dyslexia is not due to either lack of intelligence or desire to learn; with appropriate teaching methods, students with dyslexia can learn successfully.

How widespread is dyslexia?

About 13–14% of the school population nationwide has a handicapping condition that qualifies them for special education. Current studies indicate that one half of all the students who qualify for special education are classified as having a learning disability (LD) (6–7%). About 85% of those students have a primary learning disability in reading and language processing. Nevertheless, many more people—perhaps as many as 15–20% of the population as a whole—have some of the symptoms of dyslexia, including slow or inaccurate reading, poor spelling, poor writing, or mixing up similar words. Not all of these will qualify for special education, but they are likely to struggle with many aspects of academic learning and are likely to benefit from systematic, explicit, instruction in reading, writing, and language.

Dyslexia occurs in people of all backgrounds and intellectual levels. People with dyslexia can be very bright. They are often capable or even gifted in areas such as art, computer science, design, drama, electronics, math, mechanics, music, physics, sales, and sports.

In addition, dyslexia runs in families; parents with dyslexia are very likely to have children with dyslexia. For some people, their dyslexia is identified early in their lives, but for others, their dyslexia goes unidentified until they get older.

What are the effects of dyslexia?

The impact that dyslexia has is different for each person and depends on the severity of the condition and the effectiveness of instruction or remediation. The core difficulty is with word recognition and reading fluency, spelling, and writing. Some individuals with dyslexia manage to learn early reading and spelling tasks, especially with excellent instruction, but later experience their most debilitating problems when more complex language skills are required, such as grammar, understanding textbook material, and writing essays.

People with dyslexia can also have problems with spoken language, even after they have been exposed to good language models in their homes

and good language instruction in school. They may find it difficult to express themselves clearly, or to fully comprehend what others mean when they speak. Such language problems are often difficult to recognize, but they can lead to major problems in school, in the workplace, and in relating to other people. The effects of dyslexia reach well beyond the classroom.

Dyslexia can also affect a person's self-image. Students with dyslexia often end up feeling "dumb" and less capable than they actually are. After experiencing a great deal of stress due to academic problems, a student may become discouraged about continuing in school.

How is dyslexia diagnosed?

Before referring a student for a comprehensive evaluation, a school or district may choose to track a student's progress with a brief screening test and identify whether the student is progressing at a "benchmark" level that predicts success in reading. If a student is below that benchmark (which is equivalent to about the 40th percentile nationally), the school may immediately deliver intensive and individualized supplemental reading instruction before determining whether the student needs a comprehensive evaluation that would lead to a designation of special education eligibility. Some students simply need more structured and systematic instruction to get back on track; they do not have learning disabilities. For those students and even for those with dyslexia, putting the emphasis on preventive or early intervention makes sense. There is no benefit to the child if special instruction is delayed for months while waiting for an involved testing process to occur. These practices of teaching first, and then determining who needs diagnostic testing based on response to instruction, are encouraged by federal policies known as Response to Intervention (RTI). Parents should know, however, that at any point they have the right to request a comprehensive evaluation under the IDEA law, whether or not the student is receiving instruction under an RTI model.

A comprehensive evaluation typically includes intellectual and academic achievement testing, as well as an assessment of the critical underlying language skills that are closely linked to dyslexia. These include receptive (listening) and expressive language skills, phonological skills including phonemic awareness, and also a student's ability to rapidly name letters and names. A student's ability to read lists of words in isolation, as well as words in context, should also be assessed. If a profile emerges that is characteristic of readers with dyslexia, an individualized intervention plan should be developed, which should include appropriate accommodations, such as extended time. The testing can be conducted by trained school or outside specialists. (See the Testing and Evaluation Fact Sheet for more information.)

What are the signs of dyslexia?

The problems displayed by individuals with dyslexia involve difficulties in acquiring and using written language. It is a myth that individuals with dyslexia "read backwards," although spelling can look quite jumbled at times because students have trouble remembering letter symbols for sounds and forming memories for words. Other problems experienced by people with dyslexia include the following:

- Learning to speak
- Learning letters and their sounds
- Organizing written and spoken language
- Memorizing number facts
- Reading quickly enough to comprehend
- Persisting with and comprehending longer reading assignments
- Spelling
- Learning a foreign language
- Correctly doing math operations

Not all students who have difficulties with these skills have dyslexia. Formal testing of reading,

language, and writing skills is the only way to confirm a diagnosis of suspected dyslexia.

How is dyslexia treated?

Dyslexia is a lifelong condition. With proper help, many people with dyslexia can learn to read and write well. Early identification and treatment is the key to helping individuals with dyslexia achieve in school and in life. Most people with dyslexia need help from a teacher, tutor, or therapist specially trained in using a multisensory, structured language approach. It is important for these individuals to be taught by a systematic and explicit method that involves several senses (hearing, seeing, touching) at the same time. Many individuals with dyslexia need one-on-one help so that they can move forward at their own pace. In addition, students with dyslexia often need a great deal of structured practice and immediate, corrective feedback to develop automatic word recognition skills. For students with dyslexia, it is helpful if their outside academic therapists work closely with classroom teachers.

Schools can implement academic accommodations and modifications to help students with dyslexia succeed. For example, a student with dyslexia can be given extra time to complete tasks, help with taking notes, and work assignments that are modified appropriately. Teachers can give taped tests or allow students with dyslexia to use alternative means of assessment. Students can benefit from listening to books on tape and using text reading and word processing computer programs.

Students may also need help with emotional issues that sometimes arise as a consequence of difficulties in school. Mental health specialists can help students cope with their struggles.

What are the rights of a person with dyslexia?

The Individuals with Disabilities Education Act 2004 (IDEA), Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) define the rights of students with dyslexia and other specific learning disabilities. These individuals are legally entitled to special services to help them overcome and accommodate their learning problems. Such services include education programs designed to meet the needs of these students. The Acts also protect people with dyslexia against unfair and illegal discrimination.

Suggested Readings

Moats, L. C., & Dakin, K. E. (2008). *Basic facts about dyslexia and other reading problems*. Baltimore: The International Dyslexia Association.

Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level*. New York: Knopf.

The International Dyslexia Association (IDA) thanks Louisa C. Moats, Ed.D., and Karen E. Dakin, M.Ed., for their assistance in the preparation of this fact sheet.

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Is My Child Dyslexic?

Individuals with dyslexia have trouble with reading, writing, spelling and/or math even though they have the ability and have had opportunities to learn. Individuals with dyslexia can learn, but they often need specialized instruction to overcome the problem. Often these individuals, who have talented and productive minds, are said to have a language learning difference.

Common characteristics of dyslexia

Most of us have one or two of these characteristics. That does not mean that everyone has dyslexia. *A person with dyslexia usually has **several** of these characteristics that persist over time and interfere with his or her learning.*

Oral language

- Late learning to talk
- Difficulty pronouncing words
- Difficulty acquiring vocabulary or using age appropriate grammar
- Difficulty following directions
- Confusion with *before/after, right/left,* and so on
- Difficulty learning the alphabet, nursery rhymes, or songs
- Difficulty understanding concepts and relationships
- Difficulty with word retrieval or naming problems

Reading

- Difficulty learning to read
- Difficulty identifying or generating rhyming words, or counting syllables in words (*phonological awareness*)
- Difficulty with hearing and manipulating sounds in words (*phonemic awareness*)
- Difficulty distinguishing different sounds in words (*phonological processing*)
- Difficulty in learning the sounds of letters (*phonics*)
- Difficulty remembering names and shapes of letters, or naming letters rapidly
- Transposing the order of letters when reading or spelling
- Misreading or omitting common short words
- "Stumbles" through longer words
- Poor reading comprehension during oral or silent reading, often because words are not accurately read
- Slow, laborious oral reading

Written language

- Difficulty putting ideas on paper
- Many spelling mistakes
- May do well on weekly spelling tests, but may have many spelling mistakes in daily work
- Difficulty proofreading

Other common symptoms that occur with dyslexia

- Difficulty naming colors, objects, and letters rapidly, in a sequence (RAN: *rapid automatized naming*)
- Weak memory for lists, directions, or facts
- Needs to see or hear concepts many times to learn them
- Distracted by visual or auditory stimuli
- Downward trend in achievement test scores or school performance
- Inconsistent school work
- Teacher says, "If only she would try harder," or "He's lazy."
- Relatives may have similar problems

Common characteristics of other related learning disorders

Dysgraphia (*Handwriting*)

- Unsure of handedness
- Poor or slow handwriting
- Messy and unorganized papers
- Difficulty copying
- Poor fine motor skills
- Difficulty remembering the kinesthetic movements to form letters correctly

Dyscalculia (*Math*)

- Difficulty counting accurately
- May misread numbers
- Difficulty memorizing and retrieving math facts
- Difficulty copying math problems and organizing written work
- Many calculation errors
- Difficulty retaining math vocabulary and concepts

ADHD—Attention-Deficit/Hyperactivity Disorder (*Attention*)

- Inattention
- Variable attention
- Distractibility
- Impulsivity
- Hyperactivity

Dyspraxia (*Motor skills*)

- Difficulty planning and coordinating body movements
- Difficulty coordinating facial muscles to produce sounds

Executive Function/Organization

- Loses papers
- Poor sense of time
- Forgets homework
- Messy desk
- Overwhelmed by too much input
- Works slowly

If your child is having difficulties learning to read and you have noted several of these characteristics in your child, he or she may need to be evaluated for dyslexia or a related disorder.

What kind of instruction does my child need?

Dyslexia and other related learning disorders cannot be cured. Proper instruction promotes reading success and alleviates many difficulties associated with dyslexia. Instruction for individuals with reading and related learning disabilities should be:

- Intensive – given every day or very frequently for sufficient time.
- Explicit – component skills for reading, spelling, and writing are explained, directly taught, and modeled by the teacher. Children are discouraged from guessing at words.
- Systematic and cumulative – has a definite, logical sequence of concept introduction; concepts are ordered from simple to more complex; each new concept builds upon previously introduced concepts, with built in review to aid memory and retrieval.
- Structured – has step-by-step procedures for introducing, reviewing, and practicing concepts.
- Multisensory – links listening, speaking, reading, and writing together; involves movement and "hands on" learning.

Suggested Readings

Moats, L. C., & Dakin, K. E. (2007). *Basic facts about dyslexia and other reading problems.* Baltimore: The International Dyslexia Association.

Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level.* New York: Knopf.

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The International Dyslexia Association thanks Suzanne Carreker for her assistance in the preparation of this fact sheet.

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ACCOMMODATING STUDENTS WITH DYSLEXIA IN ALL CLASSROOM SETTINGS

Teaching students with dyslexia across settings is challenging. Both general education and special education teachers seek accommodations that foster the learning and management of a class of heterogeneous learners. It is important to identify accommodations that are reasonable to ask of teachers in all classroom settings. The following accommodations appear reasonable and provide a framework for helping students with learning problems achieve in general education and special education classrooms. They are organized according to accommodations involving materials, interactive instruction, and student performance.

Accommodations Involving Materials

Students spend a large portion of the school day interacting with materials. Most instructional materials give teachers few activities or directions for teaching a large class of students who learn at different rates and in various ways. This section provides material accommodations that enhance the learning of diverse students. Frequently, paraprofessionals, volunteers, and students can help develop and implement various accommodations. Material accommodations include the following:

1. **Use a tape recorder.** Many problems with materials are related to reading disabilities. The tape recorder often is an excellent aid in overcoming this problem. Directions, stories, and specific lessons can be recorded on tape. The student can replay the tape to clarify understanding of directions or concepts. Also, to improve reading skills, the student can read the printed words silently as they are presented on tape.

2. **Clarify or simplify written directions.** Some directions are written in paragraph form and contain many units of information. These can be overwhelming to some students. The teacher can help by underlining or highlighting the significant parts of the directions. Rewriting the directions is often helpful. *For example:*

   Original directions: This exercise will show how well you can locate conjunctions. Read each sentence. Look for the conjunctions. When you locate a conjunction, find it in the list of conjunctions under each sentence. Then circle the number of your answer in the answer column.

   Directions rewritten and simplified: Read each sentence and circle all conjunctions.

3. **Present a small amount of work.** The teacher can tear pages from workbooks and materials to present small assignments to students who are anxious about the amount of work to be done. This technique prevents students from examining an entire workbook, text, or material and becoming discouraged by the amount of work. Also, the teacher can reduce the amount of work when it appears redundant.

For example, the teacher can request the student to complete only odd-numbered problems or items with stars by them, or can provide responses to several items and ask the student to complete the rest. Finally, the teacher can divide a worksheet into sections and instruct the student to do a specific section. A worksheet is divided easily by drawing lines across it and writing go and stop within each section.

4. **Block out extraneous stimuli.** If a student is easily distracted by visual stimuli on a full worksheet or page, a blank sheet of paper can be used to cover sections of the page not being worked on at the time. Also, line markers can be used to aid reading, and windows can be used to display individual math problems.

5. **Highlight essential information.** If an adolescent can read a regular textbook but has difficulty finding the essential information, the teacher can mark this information with a highlight pen.

6. **Locate place in consumable material.** In consumable materials in which students progress sequentially (such as workbooks), the student can make a diagonal cut across the lower right-hand corner of the pages as they are completed. With all the completed pages cut, the student and teacher can readily locate the next page that needs to be corrected or completed.

7. **Provide additional practice activities.** Some materials do not provide enough practice activities for students with learning problems to acquire mastery on selected skills. Teachers then must supplement the material with practice activities. Recommended practice exercises include instructional games, peer teaching activities, self-correcting materials, computer software programs, and additional worksheets.

8. **Provide a glossary in content areas.** At the secondary level, the specific language of the content areas requires careful reading. Students often benefit from a glossary of content-related terms.

9. **Develop reading guides.** A reading guide provides the student with a road map of what is written and features periodic questions to help him or her focus on relevant content. It helps the reader understand the main ideas and sort out the numerous details related to the main ideas. A reading guide can be developed paragraph-by-paragraph, page-by-page, or section-by-section.

ACCOMMODATIONS INVOLVING INTERACTIVE INSTRUCTION

The task of gaining students' attention and engaging them for a period of time requires many teaching and managing skills. Teaching and interactions should provide successful learning experiences for each student. Some accommodations to enhance successful interactive instructional activities are:

1. **Use explicit teaching procedures.** Many commercial materials do not cue teachers to use explicit teaching procedures; thus, the teacher often must adapt a material to include these procedures. Teachers can include explicit teaching steps within their lessons (i.e., present an advanced organizer, demonstrate the skill, provide guided practice, offer corrective feedback, set up independent practice, monitor practice, and review).

2. **Repeat directions.** Students who have difficulty following directions are often helped by asking them to repeat the directions in their own words. The student can repeat the directions to a peer when the teacher is unavailable. The following suggestions can help students understand directions: (a) if directions contain several steps, break down the directions into subsets; (b) simplify directions by presenting only one portion at a time and by writing each portion on the chalkboard as well as stating it orally; and (c) when using written directions, be sure that students are able to read and understand the words as well as comprehend the meaning of sentences.

3. **Maintain daily routines.** Many students with learning problems need the structure of daily routines to know and do what is expected.

4. **Provide a copy of lecture notes.** The teacher can give a copy of lecture notes to students who have difficulty taking notes during presentations.

5. **Provide students with a graphic organizer.** An outline, chart, or blank web can be given to students to fill in during presentations. This helps students listen for key information and see the relationships among concepts and related information.

6. **Use step-by-step instruction**. New or difficult information can be presented in small sequential steps. This helps learners with limited prior knowledge who need explicit or part-to-whole instruction.

7. **Simultaneously combine verbal and visual information**. Verbal information can be provided with visual displays (e.g., on an overhead or handout).

8. **Write key points or words on the chalkboard**. Prior to a presentation, the teacher can write new vocabulary words and key points on the chalkboard or overhead.

9. **Use balanced presentations and activities**. An effort should be made to balance oral presentations with visual information and participatory activities. Also, there should be a balance between large group, small group, and individual activities.

10. **Use mnemonic instruction**. Mnemonic devices can be used to help students remember key information or steps in a learning strategy. (An example of mnemonic instruction is using the word HOMES to remember the names of the Great Lakes. H is for Lake Huron, O is for Lake Ontario, M is for Lake Michigan, E is for Lake Erie, and S is for Lake Superior.)

11. **Emphasize daily Review**. Daily review of previous learning or lessons can help students connect new information with prior knowledge.

Accommodations Involving Student Performance

Students vary significantly in their ability to respond in different modes. For example, students vary in their ability to give oral presentations; participate in discussions; write letters and numbers; write paragraphs; draw objects; spell; work in noisy or cluttered settings; and read, write, or speak at a fast

pace. Moreover, students vary in their ability to process information presented in visual or auditory formats. The following accommodation involving mode of reception and expression can be used to enhance students' performance:

1. **Change response mode.** For students who have difficulty with fine motor responses (such as handwriting), the response mode can be changed to underlining, selecting from multiple choices, sorting, or marking. Students with fine motor problems can be given extra space for writing answers on worksheets or can be allowed to respond on individual chalkboards.

2. **Provide an outline of the lecture.** An outline enables some students to follow the lesson successfully and make appropriate notes. Moreover, an outline helps students to see the organization of the material and ask timely questions.

3. **Encourage use of graphic organizers.** A graphic organizer involves organizing material into a visual format. To develop a graphic organizer, the student can use the following steps: (a) list the topic on the first line, (b) collect and divide information into major headings, (c) list all information relating to major headings on index cards, (d) organize information into major areas, (e) place information under appropriate subheadings, and (f) place information into the organizer format.

4. **Place students close to the teacher**. Students with attention problems can be seated close to the teacher, chalkboard, or work area and away from distracting sounds, materials, or objects.

5. **Encourage use of assignment books or calendars.** Students can use calendars to record assignment due dates, list school related activities, record test dates, and schedule timelines for schoolwork. Students should set aside a special section in an assignment book or calendar for recording homework assignments.

6. **Reduce copying by including information or activities on handouts or worksheets.**

7. **Have students turn lined paper vertically for math.** Lined paper can be turned vertically to help students keep numbers in appropriate columns while computing math problems.

8. **Use cues to denote important items.** Asterisks or bullets can denote questions or activities that count heavily in evaluation. This helps students spend time appropriately during tests or assignments.

9. **Design hierarchical worksheets.** The teacher can design worksheets with problems arranged from easiest to hardest. Early success helps students begin to work.

10. **Allow use of instructional aids.** Students can be provided with letter and number strips to help them write correctly. Number lines, counters, and calculators help students compute once they understand the mathematical operations.

11. **Display work samples.** Samples of completed assignments can be displayed to help students realize expectations and plan accordingly.

12. **Use peer-mediated learning.** The teacher can pair peers of different ability levels to review their notes, study for a test, read aloud to each other, write stories, or conduct laboratory experiments. Also, a partner can read math problems for students with reading problems to solve.

13. **Encourage note sharing.** A student can use carbon paper or a notebook computer to take notes and then share them with absentees and students with learning problems. This helps students who have difficulty taking notes to concentrate on the presentation.

14. **Use flexible work times.** Students who work slowly can be given additional time to complete written assignments.

15. **Provide additional practice.** Students require different amounts of practice to master skills or content. Many students with learning problems need additional practice to learn at a fluency level.

16. **Use assignment substitutions or adjustments.** Students can be allowed to complete projects instead of oral reports or vice versa. Also, tests can be given in oral or written format. For example, if a student has a writing problem, the teacher can allow her or him to outline information and give an oral presentation instead of writing a paper.

The International Dyslexia Association (IDA) thanks Cecil Mercer, Ed.D., a distinguished professor at the University of Florida, for the preparation of this fact sheet.

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MULTISENSORY STRUCTURED LANGUAGE TEACHING

What is meant by multisensory teaching?

Multisensory teaching is one important aspect of instruction for dyslexic students that is used by clinically trained teachers. Effective instruction for students with dyslexia is also explicit, direct, cumulative, intensive, and focused on the structure of language. Multisensory learning involves the use of visual, auditory, and kinesthetic-tactile pathways simultaneously to enhance memory and learning of written language. Links are consistently made between the visual *(language we see)*, auditory *(language we hear)*, and kinesthetic-tactile *(language symbols we feel)* pathways in learning to read and spell.

Margaret Byrd Rawson, a former President of the International Dyslexia Association (IDA), said it well:

"Dyslexic students need a different approach to learning language from that employed in most classrooms. They need to be taught, slowly and thoroughly, the basic elements of their language—the sounds and the letters which represent them—and how to put these together and take them apart. They have to have lots of practice in having their writing hands, eyes, ears, and voices working together for conscious organization and retention of their learning."

Teachers who use this approach help students perceive the speech sounds in words (phonemes) by looking in the mirror when they speak or exaggerating the movements of their mouths. Students learn to link speech sounds (phonemes) to letters or letter patterns by saying sounds for letters they see, or writing letters for sounds they hear. As students learn a new letter or pattern (such as ***s*** or ***th***), they may repeat five to seven words that are dictated by the teacher and contain the sound of the new letter or pattern; the students discover the sound that is the same in all the words. Next, they may look at the words written on a piece of paper or the chalkboard and discover the new letter or pattern. Finally, they carefully trace, copy, and write the letter(s) while saying the corresponding sound. The sound may be dictated by the teacher, and the letter name(s) given by the student. Students then read and spell words, phrases, and sentences using these patterns to build their reading fluency. Teachers and their students rely on all three pathways for learning rather than focusing on a "whole word memory method," a "tracing method," or a "phonetic method" alone.

The principle of combining movement with speech and reading is applied at other levels of language learning as well. Students may learn hand gestures to help them memorize the definition of a noun. Students may manipulate word cards to create sentences or classify the words in sentences by physically moving them into categories. They might move sentences around to make paragraphs. The elements of a story may be taught with reference to a three-dimensional, tactile aid. In all, the hand, body, and/or movement are used to support comprehension or production of language.

What is the rationale behind multisensory, structured language teaching?

Students with dyslexia often exhibit weaknesses in underlying language skills involving speech sound (phonological) and print (orthographic) processing and in building brain pathways that connect speech with print. The brain pathways used for reading and spelling must develop to

connect many brain areas and must transmit information with sufficient speed and accuracy. Most students with dyslexia have weak phonemic awareness, meaning they are unaware of the role sounds play in words. These students may also have difficulty rhyming words, blending sounds to make words, or segmenting words into sounds. Because of their trouble establishing associations between sounds and symbols, they also have trouble learning to recognize words automatically ("by sight") or fast enough to allow comprehension. If they are not accurate with sounds or symbols, they will have trouble forming memories for common words, even the "little" words in students' books. They need specialized instruction to master the alphabetic code and to form those memories.

When taught by a multisensory approach, students have the advantage of learning alphabetic patterns and words with engagement of all learning modalities. Dr. Samuel Terry Orton, one of the first to recognize the syndrome of dyslexia in students, suggested that teaching the "fundamentals of phonic association with letter forms, both visually presented and reproduced in writing until the correct associations were built up," would benefit students of all ages.

What is the Orton-Gillingham Approach?

Dr. Orton and his colleagues began using multisensory techniques in the mid-1920's at the mobile mental health clinic he directed in Iowa. Dr. Orton was influenced by the kinesthetic method described by Grace Fernald and Helen Keller. He suggested that kinesthetic-tactile reinforcement of visual and auditory associations could correct the tendency of confusing similar letters and transposing the sequence of letters while reading and writing. For example, students who confuse ***b*** and ***d*** are taught to use consistent, different strokes in forming each letter. Students make the vertical line before drawing the circle in printing the letter ***b***; they form the circle before drawing the vertical line in printing the letter ***d***.

Anna Gillingham and Bessie Stillman based their original 1936 teaching manual for the "alphabetic method" on Dr. Orton's theories. They combined multisensory techniques with teaching the structure of written English, including the sounds (phonemes), meaning units (morphemes such as prefixes, suffixes, and roots) and common spelling rules. The phrase "Orton-Gillingham approach" refers to the structured, sequential, multisensory techniques established by Dr. Orton, Ms. Gillingham, and their colleagues. Many programs today incorporate methods and principles first described in this foundational work, as well as other practices supported by research.

Is there solid evidence that multisensory teaching is effective for students with dyslexia?

Current research, much of it supported by the National Institute of Child Health and Human Development (NICHD), has demonstrated the value of explicit, structured language teaching for all students, especially those with dyslexia. Programs that work differ in their techniques but have many principles in common. The multisensory principle that is so valued by experienced clinicians has not yet been isolated in controlled, comparison studies of reading instruction, but most programs that work do include multisensory practice for symbol learning. Instructional approaches that are effective use direct, explicit teaching of letter-sound relationships, syllable patterns, and meaningful word parts, and provide a great deal of successful practice of skills that have been taught. Fluency-building exercises, vocabulary instruction, language comprehension and writing are also included in comprehensive programs of instruction and intervention. Word recognition and spelling skills are applied in meaningful reading and writing of sentences and text passages, and students receive immediate feedback if they make mistakes. Guessing at words and skipping words are discouraged and replaced by knowledge of how to analyze and

read unknown words. Other key principles of instruction are listed below.

Summary: What are the principles of a multisensory, structured language approach?

Additional ways to enhance foreign language learning success include the following:

- **Simultaneous, Multisensory (VAKT):** Teaching uses all learning pathways in the brain (i.e., visual, auditory, kinesthetic-tactile) simultaneously or sequentially in order to enhance memory and learning.
- **Systematic and Cumulative:** Multisensory language instruction requires that the organization of material follows the logical order of the language. The sequence must begin with the easiest and most basic concepts and progress methodically to more difficult material. Each concept must also be based on those already learned. Concepts taught must be systematically reviewed to strengthen memory.
- **Direct Instruction:** The inferential learning of any concept cannot be taken for granted. Multisensory language instruction requires direct teaching of all concepts with continuous student-teacher interaction.
- **Diagnostic Teaching:** The teacher must be adept at flexible or individualized teaching. The teaching plan is based on careful and continuous assessment of the individual's needs. The content presented must be mastered step by step for the student to progress.
- **Synthetic and Analytic Instruction:** Multisensory, structured language programs include both synthetic and analytic instruction. Synthetic instruction presents the parts of the language and then teaches how the parts work together to form a whole. Analytic instruction presents the whole and teaches how this can be broken down into its component parts.
- **Comprehensive and Inclusive:** All levels of language are addressed, often in parallel, including sounds (phonemes), symbols (graphemes), meaningful word parts (morphemes), word and phrase meanings (semantics), sentences (syntax), longer passages (discourse), and the social uses of language (pragmatics).

IDA has supported the development of a matrix of multisensory, structured language (MSL) programs to enable consumers to see the similarities and differences among various programs. The programs were chosen for inclusion in the matrix because they have a long history of use in clinics and classrooms where the programs have been refined over time. These programs included in the matrix are those used at every "tier" of student ability. Some are designed for whole class instruction to prevent academic failure. Some are designed for small group instruction. And some are designed for the intensive instruction needed for students with severe reading disabilities. This Matrix of Multisensory Structured Language Programs is posted on the IDA website for downloading or can be obtained in print form from the IDA bookstore.

Related Readings:

Birsh, J. R. (Ed.). (2005). *Multisensory teaching of basic language skills.* Baltimore: Paul H. Brookes Publishing Co.

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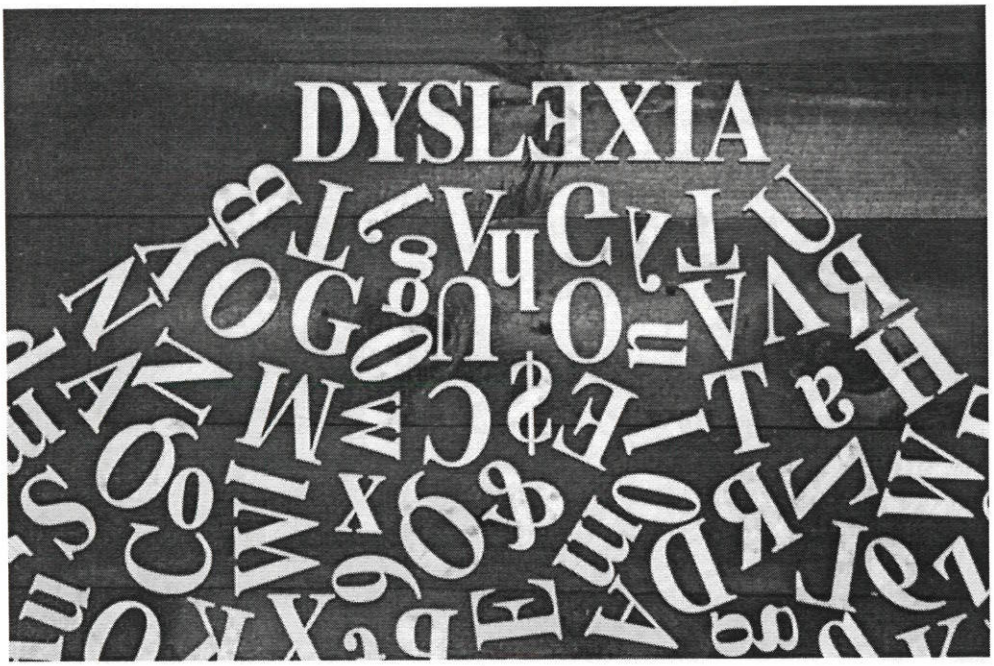
MIT News
ON CAMPUS AND AROUND THE WORLD



Researchers have discovered that in people with dyslexia the brain has a diminished ability to acclimate to a repeated input -- a trait known as neural adaptation.

Distinctive brain pattern may underlie dyslexia

Study suggests reduced plasticity could account for reading difficulties.

Anne Trafton | MIT News Office
December 21, 2016

A distinctive neural signature found in the brains of people with dyslexia may explain why these individuals have difficulty learning to read, according to a new study from MIT neuroscientists.

The researchers discovered that in people with dyslexia, the brain has a diminished ability to acclimate to a repeated input -- a trait known as neural adaptation. For example, when dyslexic students see the same word repeatedly, brain regions involved in reading do not show the same adaptation seen in typical readers.

This suggests that the brain's plasticity, which underpins its ability to learn new things, is reduced, says John Gabrieli, the Grover M. Hermann Professor in Health Sciences and Technology, a professor of brain and cognitive sciences, and a member of MIT's McGovern Institute for Brain Research.

"It's a difference in the brain that's not about reading per se, but it's a difference in perceptual learning that's pretty broad," says Gabrieli, who is the study's senior author. "This is a path by which a brain difference could influence learning to read, which involves so many demands on plasticity."

Former MIT graduate student Tyler Perrachione, who is now an assistant professor at Boston

PRESS MENTIONS

MIT researchers have found that reduced plasticity in the brains of people with dyslexia may explain why they experience difficulties with reading and with processing spoken speech, writes Kevin Murnane of *Forbes*. Murnane explains that the findings "indicate that dyslexia is not just about reading. It involves a reduction in neural adaptation to a variety of perceptual stimuli."

Forbes

University, is the lead author of the study, which appears in the Dec. 21 issue of *Neuron*.

Reduced plasticity

The MIT team used magnetic resonance imaging (MRI) to scan the brains of young adults with and without reading difficulties as they performed a variety of tasks. In the first experiment, the subjects listened to a series of words read by either four different speakers or a single speaker.

The MRI scans revealed distinctive patterns of activity in each group of subjects. In nondyslexic people, areas of the brain that are involved in language showed neural adaption after hearing words said by the same speaker, but not when different speakers said the words. However, the dyslexic subjects showed much less adaptation to hearing words said by a single speaker.

Neurons that respond to a particular sensory input usually react strongly at first, but their response becomes muted as the input continues. This neural adaptation reflects chemical changes in neurons that make it easier for them to respond to a familiar stimulus, Gabrieli says. This phenomenon, known as plasticity, is key to learning new skills.

"You learn something upon the initial presentation that makes you better able to do it the second time, and the ease is marked by reduced neural activity," Gabrieli says. "Because you've done something before, it's easier to do it again."

The researchers then ran a series of experiments to test how broad this effect might be. They asked subjects to look at series of the same word or different words; pictures of the same object or different objects; and pictures of the same face or different faces. In each case, they found that in people with dyslexia, brain regions devoted to interpreting words, objects, and faces, respectively, did not show neural adaptation when the same stimuli were repeated multiple times.

"The brain location changed depending on the nature of the content that was being perceived, but the reduced adaptation was consistent across very different domains," Gabrieli says.

He was surprised to see that this effect was so widespread, appearing even during tasks that have nothing to do with reading; people with dyslexia have no documented difficulties in recognizing objects or faces.

He hypothesizes that the impairment shows up primarily in reading because deciphering letters and mapping them to sounds is such a demanding cognitive task. "There are probably few tasks people undertake that require as much plasticity as reading," Gabrieli says.

Early appearance

In their final experiment, the researchers tested first and second graders with and without reading difficulties, and they found the same disparity in neural adaptation.

"We got almost the identical reduction in plasticity, which suggests that this is occurring quite

TIME reporter Alice Park writes about a study by Prof. John Gabrieli that shows that the difficulty people with dyslexia experience when reading could be caused by reduced plasticity in the brain. "We need to figure out a curriculum or approach that matches the differences they have," explains Gabrieli.

TIME

A new study co-authored by Prof. John Gabrieli shows that the brains of people with dyslexia respond differently not only to words, but also objects and faces, reports Felice Freyer for *The Boston Globe*. The findings point to "the core biological difference in the brains of people with dyslexia," explains Prof. John Gabrieli.

The Boston Globe

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early in learning to read," Gabrieli says. "It's not a consequence of a different learning experience over the years in struggling to read."

Guinevere Eden, a professor of pediatrics and director of the Center for the Study of Learning at Georgetown University Medical Center, described the study as "groundbreaking."

"For children with dyslexia, we know that the brain looks different in terms of anatomy and function, but we have not been able to establish why," says Eden, who was not involved in the research. "This study makes an important step in that direction: It gets to the true characteristics of the properties of the neurons in these brain regions, not just their outward appearance."

Gabrieli's lab now plans to study younger children to see if these differences might be apparent even before children begin to learn to read. They also hope to use other types of brain measurements such as magnetoencephalography (MEG) to follow the time course of the neural adaptation more closely.

The research was funded by the Ellison Medical Foundation, the National Institutes of Health, and a National Science Foundation Graduate Research Fellowship.

Topics: Research Brain and cognitive sciences Health sciences and technology McGovern Institute School of Science National Science Foundation (NSF) National Institutes of Health (NIH) Learning

EDUCATION WEEK TEACHER

FIRST PERSON

Unidentified Dyslexia Takes Heavy Toll

By Kyle Redford

May 24, 2017

Back to Story

Unidentified dyslexia is more common than one might think. The prevalence numbers vary, but research tells us that there are too many unidentified and quietly struggling dyslexic students in our K-12 classrooms and schools. The National Institutes of Health estimates that between **6 percent and 17 percent of school-age children have some form of dyslexia**, although not all of those students may have been identified by their schools. Some unidentified students may present as lazy, disruptive, or lacking in academic potential, while others manage to deploy enough energy and intellectual ability to hide their difficulties and pass along with their disability undetected. However, without effective support, neither group of students can achieve their full potential.

Anyone who has taught a dyslexic student has observed that dyslexia, typically considered a reading disability, affects other areas of learning. It makes spelling difficult. It makes writing difficult. It can even make memorizing math facts difficult. It simply makes *school* difficult—every day and in every way.

A 2016 **study by neuroscientists** at the Massachusetts Institute of Technology may help to explain why dyslexia, typically considered a reading disorder, also creates learning obstacles in other academic areas. The MIT researchers discovered that the part of the brain that is used to learn new things is diminished in the dyslexic brain. Using MRI scans, researchers observed that people with reading difficulties struggled to recognize objects and faces too—tasks that have nothing to do with reading.

The researchers hypothesize that we associate this struggle only with reading because reading is a particularly difficult thing to learn to do. Consequently, that weakness is more easily observed. But weakness in reading may actually serve as a detection system for a more generalized processing difference.

Given the practical school challenges related to dyslexia, early identification of the issue is

important so that children can access and qualify for critical interventions, tools, and accommodations to aid in their learning. Concrete supports such as specialized reading instruction, extra time on standardized tests, or the use of programs that allow students to combine both text and audio when they read (such as **Learning Ally** and **Bookshare**) can go a long way in helping dyslexics access content and information. Additionally, dictation and predictive spelling software can help them effectively show what they know.

However, the value and urgency of early identification is driven by an additional, more profound threat: Unidentified dyslexic children often privately think they are "stupid" or have diminished potential. They spend much of their school day focused on learning how to use basic mechanical skills with which they typically struggle. Worse yet, they look around the classroom and see their peers having a much easier time with these same skills, triggering confusion, frustration, anxiety, and humiliation.

After expending tremendous effort to achieve results, many dyslexics eventually avoid school work. It seems more appealing to skip the work than to struggle with it and possibly risk drawing attention to their challenges. To "save face," students may adopt a low-effort or minimal-investment posture. Students fear of their struggles being "found out" also prompts them to spend much of their mental energy trying to avoid detection. They don't *want* their teachers and classmates to know how hard it is for them to perform certain tasks because they worry that it will reflect negatively on their intelligence.

And yet, none of the learning skills they struggle with are any indication of their thinking abilities.

On the contrary, dyslexics are often exceptional thinkers. Outside of school, one does not have to look far to find examples of dyslexics as leaders in diverse fields such as science, politics, medicine, business, law, and the arts. More often than not, those professional success stories come with an equally exceptional story of school struggle. Even dyslexic superstars report that their early years of failing and feeling stupid in school left psychological scars too deep to be vanquished by their adult success. Yet, many also confirm that identifying dyslexia as the root cause of their learning struggles was transformational and liberating.

In order to identify dyslexics, teachers have to know the clues. Dyslexics are slow and effortful readers, but they are often the students who demonstrate a sophisticated understanding of content or story. They often have sloppy handwriting and struggle with spelling, but they have amazing ideas. In math, they may be the student who cannot retain their math facts, but readily offer creative ways to solve the problems. They struggle with written tests, but may lead class discussion. Overall, their weak mechanical skills shouldn't be any indication of their intellectual abilities.

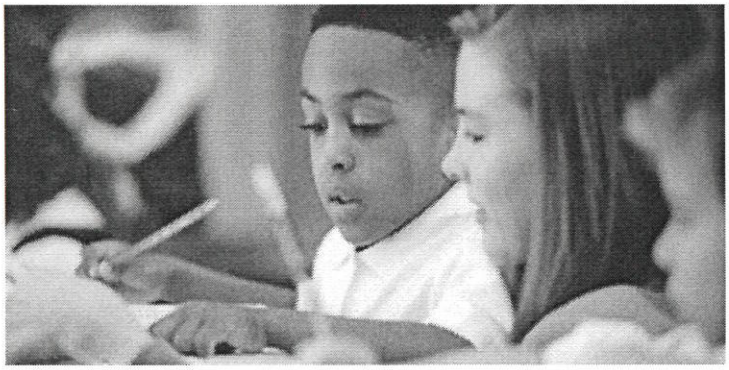
As Frederick Douglass wisely warned, it is "easier to build strong children than repair broken men." In the case of dyslexia, the earlier we can intervene in a dyslexic student's life, the less of a toll it will take on his or her sense of confidence and competency. Identification is the first step in explaining the struggles and securing necessary supports. Additionally, understanding that dyslexia is a mechanical disability, not a thinking disability, goes a long way in dispelling the silent shame that can potentially haunt a student for life. This clarity is critical because students have a much better chance of inhabiting their potential if they (and their parents and teachers) believe in it.

Launching young readers!
Reading Rockets

Menu

Dyslexia and the Brain: What Does Current Research Tell Us?

By: **Roxanne F. Hudson**, **Leslie High**, **Stephanie Al Otaiba**



The identification of a child with dyslexia is a difficult process, but there are ways that parents and teachers can learn more about the reading difficulty and support the child's learning.

Developmental dyslexia and how it relates to brain function are complicated topics that researchers have been studying since dyslexia was first described over a hundred years ago.

W. Pringle Morgan (cited in Shaywitz, 1996), a doctor in Sussex, England, described the puzzling case of a boy in the British Medical Journal: "Percy aged 14 has always been a bright and intelligent boy, quick at games, and in no way inferior to others of his age. His great difficulty has been – and is now – his inability to read" (p. 98).

Almost every teacher in the United States has at least one student who could fit the same description written so many years ago. This situation leads many school personnel to wonder why their articulate, clearly bright student has so many problems with what appears to be a simple task – reading a text that everyone else seems to easily comprehend.

Having information about the likely explanation for and potential cause of the student's difficulties often relieves teachers' fears and uncertainties about how to teach the student and how to think about providing instruction that is relevant and effective.

Current research on dyslexia and the brain provide the most up-to-date information available about the problems faced by over 2.8 million school-aged children.

When talking with teachers about their students who struggle with reading, we have encountered similar types of questions from teachers. They often wonder, What is dyslexia? What does brain research tell us about reading problems and what does this information mean for classroom instruction?

The purpose of this article is to explain the answers to these questions and provide foundational knowledge that will lead to a firmer understanding of the underlying characteristics of students with dyslexia. A greater understanding of the current brain research and how it relates to students with dyslexia is important in education and will help teachers understand and evaluate possible instructional interventions to help their students succeed in the classroom.

What is dyslexia?

Dyslexia is an often-misunderstood, confusing term for reading problems. The word dyslexia is made up of two different parts: *dys* meaning not or difficult, and *lexia* meaning words, reading, or language. So quite literally, dyslexia means difficulty with words (Catts & Kamhi, 2005).

Despite the many confusions and misunderstandings, the term dyslexia is commonly used by medical personnel, researchers, and clinicians. One of the most common misunderstandings about this condition is that dyslexia is a problem of letter or word reversals (*b/d*, *was/saw*) or of letters, words, or sentences "dancing around" on the page (Rayner, Foorman, Perfetti, Pesetsky, & Seidenberg, 2001).

In fact, writing and reading letters and words backwards are common in the early stages of learning to read and write among average and dyslexic children alike, and the presence of reversals may or may not indicate an underlying reading problem. See Table 1 for explanations of this and other common misunderstandings.

One of the most complete definitions of dyslexia comes from over 20 years of research:

> *Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. (Lyon, Shaywitz, & Shaywitz, 2003, p. 2)*

Dyslexia is a specific learning disability in reading that often affects spelling as well. In fact, reading disability is the most widely known and most carefully studied of the

learning disabilities, affecting 80% of all those designated as learning disabled. Because of this, we will use the terms dyslexia and reading disabilities (RD) interchangeably in this article to describe the students of interest.

It is neurobiological in origin, meaning that the problem is located physically in the brain. Dyslexia is not caused by poverty, developmental delay, speech or hearing impairments, or learning a second language, although those conditions may put a child more at risk for developing a reading disability (Snow, Burns, & Griffin, 1998).

Children with dyslexia will often show two obvious difficulties when asked to read text at their grade level. First, they will not be able to read as many of the words in a text by sight as average readers. There will be many words on which they stumble, guess at, or attempt to "sound out." This is the problem with "fluent word recognition" identified in the previous definition.

Second, they will often show decoding difficulties, meaning that their attempts to identify words they do not know will produce many errors. They will not be very accurate in using letter-sound relationships in combination with context to identify unknown words.

These problems in word recognition are due to an underlying deficit in the sound component of language that makes it very difficult for readers to connect letters and sounds in order to decode. People with dyslexia often have trouble comprehending what they read because of the great difficulty they experience in accessing the printed words.

TABLE 1: Common misunderstandings about students with reading disabilities

Writing letters and words backwards are symptoms of dyslexia.

Writing letters and words backwards are common in the early stages of learning to read and write among average and dyslexic children alike. It is a sign that orthographic representations (i.e., letter forms and spellings of words) have not been firmly established, not that a child necessarily has a reading disability (Adams, 1990).

Reading disabilities are caused by visual perception problems.

The current consensus based on a large body of research (e.g., Lyon et al., 2003; Morris et al., 1998; Rayner et al., 2001; Wagner & Torgesen, 1987) is that dyslexia is best characterized as a problem with language processing at the phoneme level, not a problem with visual processing.

If you just give them enough time, children will outgrow dyslexia.

There is no evidence that dyslexia is a problem that can be outgrown. There is, however, strong evidence that children with reading problems show a continuing persistent deficit in their reading rather than just developing later than average children (Francis, Shaywitz, Stuebing, Shaywitz, & Fletcher, 1996). More strong

evidence shows that children with dyslexia continue to experience reading problems into adolescence and adulthood (Shaywitz et al., 1999, 2003).

More boys than girls have dyslexia.

Longitudinal research shows that as many girls as boys are affected by dyslexia (Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). There are many possible reasons for the overidentification of males by schools, including greater behavioral acting out and a smaller ability to compensate among boys. More research is needed to determine why.

Dyslexia only affects people who speak English.

Dyslexia appears in all cultures and languages in the world with written language, including those that do not use an alphabetic script such as Korean and Hebrew. In English, the primary difficulty is accurate decoding of unknown words. In consistent orthographies such as German or Italian, dyslexia appears more often as a problem with fluent reading – readers may be accurate, but very slow (Ziegler & Goswami, 2005).

People with dyslexia will benefit from colored text overlays or lenses.

There is no strong research evidence that intervention using colored overlays or special lenses has any effect on the word reading or comprehension of children with dyslexia (American Optometric Association, 2004; Iovino, Fletcher, Breitmeyer, & Foorman, 1998).

A person with dyslexia can never learn to read.

This is simply not true. The earlier children who struggle are identified and provided systematic, intense instruction, the less severe their problems are likely to be (National Institute of Child Health and Human Development, 2000; Torgesen, 2002). With adequately intensive instruction, however, even older children with dyslexia can become accurate, albeit slow readers (Torgesen et al., 2001).

What areas of the brain relate to language and reading?

The human brain is a complex organ that has many different functions. It controls the body and receives, analyzes, and stores information.

The brain can be divided down the middle lengthwise into a right and a left hemisphere. Most of the areas responsible for speech, language processing, and reading are in the left hemisphere, and for this reason we will focus all of our descriptions and figures on the left side of the brain. Within each hemisphere, we find the following four brain lobes (see Figure 1).

- The **frontal lobe** is the largest and responsible for controlling speech, reasoning, planning, regulating emotions, and consciousness.

In the 19th century, Paul Broca was exploring areas of the brain used for language and noticed a particular part of the brain that was impaired in a man whose speech became limited after a stroke. This area received more and more attention, and today we know that Broca's area, located here in the frontal lobe, is important for the organization, production, and manipulation of language and speech (Joseph, Noble, & Eden, 2001). Areas of the frontal lobe are also important for silent reading proficiency (Shaywitz et al., 2002).

- The **parietal lobe** is located farther back in the brain and controls sensory perceptions as well as linking spoken and written language to memory to give it meaning so we can understand what we hear and read.
- The **occipital lobe**, found at the back of the head, is where the primary visual cortex is located. Among other types of visual perception, the visual cortex is important in the identification of letters.
- The **temporal lobe** is located in the lower part of the brain, parallel with the ears, and is involved in verbal memory.

  Wernicke's area, long known to be important in understanding language (Joseph et al., 2001), is located here. This region, identified by Carl Wernicke at about the same time and using the same methods as Broca, is critical in language processing and reading.

In addition, converging evidence suggests that two other systems, which process language within and between lobes, are important for reading (see Figure 2).

The first is the **left parietotemporal system** (Area A in Figure 2) that appears to be involved in word analysis – the conscious, effortful decoding of words (Shaywitz et al., 2002). This region is critical in the process of mapping letters and written words onto their sound correspondences – letter sounds and spoken words (Heim & Keil, 2004). This area is also important for comprehending written and spoken language (Joseph et al., 2001).

The second system that is important for reading is the **left occipitotemporal area** (Area B in Figure 2). This system seems to be involved in automatic, rapid access to whole words and is a critical area for skilled, fluent reading (Shaywitz et al., 2002, 2004).

What does brain imaging research tell us about dyslexia?

Structural brain differences

Studies of structural differences in the brains of people of all ages show differences between people with and without reading disabilities.

The brain is chiefly made up of two types of material: gray matter and white matter. Gray matter is what we see when we look at a brain and is mostly composed of nerve cells. Its primary function is processing information.

White matter is found within the deeper parts of the brain, and is composed of connective fibers covered in myelin, the coating designed to facilitate communication between nerves. White matter is primarily responsible for information transfer around the brain.

Booth and Burman (2001) found that people with dyslexia have less gray matter in the left parietotemporal area (Area A in Figure 2) than nondyslexic individuals. Having less gray matter in this region of the brain could lead to problems processing the sound structure of language (phonological awareness).

Many people with dyslexia also have less white matter in this same area than average readers, which is important because more white matter is correlated with increased reading skill (Deutsch, Dougherty, Bammer, Siok, Gabrieli, & Wandell, 2005). Having less white matter could lessen the ability or efficiency of the regions of the brain to communicate with one another.

Other structural analyses of the brains of people with and without RD have found differences in hemispherical asymmetry. Specifically, most brains of right-handed, nondyslexic people are asymmetrical with the left hemisphere being larger than the same area on the right.

In contrast, Heim and Keil (2004) found that right-handed people with dyslexia show a pattern of symmetry (right equals left) or asymmetry in the other direction (right larger than left). The exact cause of these size differences is the subject of ongoing research, but they seem to be implicated in the reading and spelling problems of people with dyslexia.

Functional brain differences

We lack space here for a detailed explanation of imaging techniques. For excellent descriptions of several techniques, readers are directed to Papanicolaou, Pugh, Simos, and Mencl (2004) and Richards (2001).

One commonly used method for imaging brain function is functional magnetic resonance imaging (fMRI), a noninvasive, relatively new method that measures physiological signs of neural activation using a strong magnet to pinpoint blood flow. This technique is called "functional" because participants perform tasks while in (or under) the magnet, allowing measurement of the functioning brain rather than the activity of the brain at rest.

Several studies using functional imaging techniques that compared the brain activation patterns of readers with and without dyslexia show potentially important patterns of differences. We might expect that readers with RD would show underactivation in areas where they are weaker and overactivation in other areas in order to compensate, and that is exactly what many researchers have found (e.g., Shaywitz et al., 1998).

This type of functional imaging research has just begun to be used with children. This is in part because of the challenges involved in imaging children, including the absolute need for the participant's head to remain motionless during the scanning.

We will present the largest, best-specified study as an example of these new findings with children. Shaywitz et al. (2002) studied 144 righthanded children with and without RD on a variety of in- and out-of-magnet tasks. They compared brain activation between the two groups of children on tasks designed to tap several component processes of reading:

- identifying the names or sounds of letters
- sounding out nonsense words
- sounding out and comparing meanings of real words

The nonimpaired readers had more activation in all of the areas known to be important for reading than the children with dyslexia.

Shaywitz et al. (2002) also found that the children who were good decoders had more activation in the areas important for reading in the left hemisphere and less in the right hemisphere than the children with RD.

They suggested that for children with RD, disruption in the rear reading systems in the left hemisphere that are critical for skilled, fluent reading (Area B in Figure 2) leads the children to try and compensate by using other, less efficient systems (Area A in Figure 2 and systems in the right hemisphere).

This finding could explain the common experience in school that even as children with dyslexia develop into accurate readers, their reading in grade-level text is often still slow and labored without any fluency (e.g., Torgesen, Rashotte, & Alexander, 2001).

In summary, the brain of a person with dyslexia has a different distribution of metabolic activation than the brain of a person without reading problems when accomplishing the same language task. There is a failure of the left hemisphere rear brain systems to function properly during reading.

Furthermore, many people with dyslexia often show greater activation in the lower frontal areas of the brain. This leads to the conclusion that neural systems in frontal regions may compensate for the disruption in the posterior area (Shaywitz et al., 2003). This information often leads educators to wonder whether brain imaging can be used as a diagnostic tool to identify children with reading disabilities in school.

Can we screen everyone who has reading difficulties?

Not yet. It is an appealing vision of putting a child we are concerned about in an fMRI machine to quickly and accurately identify his or her problem, but research has not taken us that far.

There are several reasons why a clinical or school-based use of imaging techniques to

identify children with dyslexia is not currently feasible. One is the enormous cost of fMRI machines, the computers, and the software needed to run them. Another part of the cost is the staff that is needed to run and interpret the results.

Also, in order for this technology to be used for diagnosis, it needs to be accurate for individuals. Currently, results are reliable and reported for groups of participants, but not necessarily for individuals within each group (Richards, 2001; Shaywitz et al., 2002).

The number of children who would be identified as being average when they really have a problem (false negatives) or as having a problem when they are average (false positives) would need to be significantly lower for imaging techniques to be used for diagnosis of individual children.

Can dyslexia be cured?

In a word, no. Dyslexia is a lifelong condition that affects people into old age. However, that does not mean that instruction cannot remediate some of the difficulties people with dyslexia have with written language. A large body of evidence shows what types of instruction struggling readers need to be successful (e.g., National Institute of Child Health and Human Development, 2000; Snow et al., 1998; Torgesen, 2000).

Now researchers can also "look" inside the brains of children before and after an intensive intervention and see for the first time the effects of the intervention on the brain activity of children with RD. The following are two such studies.

Aylward et al. (2003) imaged 10 children with dyslexia and 11 average readers before and after a 28-hour intervention that only the students with dyslexia received. They compared the two groups of students on out-of-magnet reading tests as well as the level of activation during tasks of identifying letter sounds.

They found that while the control children showed no differences between the two imagings, the students who received the treatment showed a significant increase in activation in the areas important for reading and language during the phonological task. Before the intervention, the children with RD showed significant underactivation in these areas as compared to the control children, and after the treatment their profiles were very similar.

These results must be viewed with caution because of several limitations. One limitation is the lack of specificity about the intervention that was provided, another is the small sample size, and the last is the lack of an experimental control group (i.e., a group of children with RD who did not receive the treatment). Without an experimental control group, we cannot be certain that the intervention caused the changes found in the brain activation because of so many other possible explanations.

Shaywitz et al. (2004) addressed these limitations in their investigation of brain activation changes before and after an intervention. They studied 78 second and third

graders with reading disabilities who were randomly assigned to three groups:

- the experimental intervention
- school-based remedial programs
- control

A summary of the instructional intervention is provided in Table 2 and a full and detailed description of the intervention and out-of-magnet reading assessments can be found in Blachman et al. (2004).

TABLE 2: Summary of intervention used in brain imaging study of students with RD

Duration
The individual tutoring intervention occurred daily for 50 minutes from September to June, which yielded an average of 126 sessions or 105 tutoring hours per student.

Instruction
Each session consisted of a framework of five steps that the tutors followed with each student. This framework was not scripted, but was individualized based on the student's progress.

- **Step 1:** Brief and quick-paced review of sound-symbol relationships from previous lessons and introduction of new correspondences.
- **Step 2:** Word work practice of phonemic segmentation and blending with letter cards or tiles, which occurred in a very systematic and explicit fashion.
- **Step 3:** Fluency building with sight words and phonetically regular words made up of previously taught sound-symbol correspondences.
- **Step 4:** Oral reading practice in phonetically controlled text, uncontrolled trade books, and nonfiction texts.
- **Step 5:** Writing words with previously taught patterns from dictation.

Content
The intervention consisted of six levels that began with simple closed syllable words (e.g., *cat*) and ended with multisyllabic words consisting of all six syllable types.

For a complete description of the instructional intervention, see Blachman et al. (2004).

Before the intervention, all groups looked similar in their brain activity, but immediately after the intervention the experimental and control groups had increased activation in the left hemispheric regions important for reading.

One year after intervention, the experimental group showed increased activity in the occipito-temporal region important for automatic, fluent reading (Area B in Figure 2), while at both time points the level of compensatory activation in the right hemisphere decreased.

Shaywitz et al. (2002) concluded, "These findings indicate that the use of an

evidence-based phonologic reading intervention facilitates the development of those fast-paced neural systems that underlie skilled reading" (p. 931).

Important considerations to keep in mind about the brain research

While research advances have allowed us to look more closely within the brain for the first time and revealed important information about how and where we think during reading, there are important considerations that must be remembered.

One is that with the exception of the research by B.E. Shaywitz, S. Shaywitz, and their colleagues, the sample sizes in each study are very small. The evidence from these small studies is converging into results that are reliable, but the results may change as more and more participants are included in the research base. This is especially true with children where both the number of studies and the sample sizes are quite small.

Second, we must consider the type of task being used in the magnet. Because of the requirement that the person's head not move during the imaging, researchers are not able to study people actually reading aloud. Instead, they give tasks that require the person to read silently and then make a decision that he or she indicates with a push button (e.g., Do the letters *t* and *v* rhyme? Do *leat* and *jete* rhyme?).

Because the researchers have worked carefully on these tasks and have specified the particular process that is being measured, we can trust their conclusions about what the activation levels mean; however, the tasks are quite removed from natural classroom reading and should not be interpreted as if they were the same. The area of brain research is developing rapidly; technological advances are being made that will address these issues as time goes on.

Recommendations for teachers

What does all of this information mean for school personnel and their students? Once teachers understand the underlying processes and causes of reading disabilities, they can use this information as they work with students and their families. The following are specific recommendations based on the neurological research:

- Adequate assessment of language processing is important in determining why students struggle to learn to read.

  Dyslexia, or reading disability, is a disorder of the language processing systems in the brain. Specific information about exactly what sorts of weaknesses are present is needed in order to determine the appropriate instruction to meet each student's needs.

- Imaging research confirms that simple tasks can more reliably be interpreted as "red flags" suggesting that a young child may be at risk for dyslexia.

  It is vital to begin using screening and progress monitoring procedures early on

to measure children's understanding of sounds in speech, letter sounds in words, and fluent word recognition. Using such assessment in an ongoing way throughout a child's school career can help teachers know what skills to teach and whether a child is developing these skills.

- Explicit, intense, systematic instruction in the sound structure of language (phonemic awareness) and in how sounds relate to letters (phonics) is needed for readers with dyslexia.

  Imaging research confirmed that instruction in the alphabetic principle caused distinct differences in brain activation patterns in the students with RD (Shaywitz et al., 2004). Keep in mind that the intervention was explicit, intense, long term, and specifically focused on phonological processing, phonics, and fluency.

- The roles of motivation and fear of failing are important when discussing reading problems.

  Students do not struggle simply because they are not trying hard enough. They may have a brain difference that requires them to be taught in a more intense fashion than their peers. Without intense intervention, low motivation may develop as students try to avoid a difficult and painful task.

- School personnel can use their knowledge of the neurological characteristics and basis of dyslexia to help their students understand their strengths and weaknesses around reading and language.

  Understanding a possible reason why they find something difficult that no one else seems to struggle with may help relieve some of the mystery and negative feelings that many people with a disability feel. Sharing our knowledge of brain research may demystify dyslexia and help students and their parents realize that language processing is only one of many talents that they have and that they are not "stupid," they simply process language differently than their peers.

Recommendations for parents

The identification of a child with dyslexia is a difficult time for parents and teachers. We suggest that teachers can help parents learn more about their child's difficulty in the following ways:

- Teachers can share information about the student's specific areas of weakness and strength and help parents realize the underlying causes of their child's difficulty.

  This conversation can also include information about how to help their child use areas of strength to support areas of weakness.

- It is critical to help parents get clear about what dyslexia is and is not.

Sharing the common misconceptions and the correct information found in Table 1 with parents may help clear up any confusion that may exist.

- Early intervention with intense, explicit instruction is critical for helping students avoid the lifelong consequences of poor reading.

  Engaging parents early in the process of identifying what programs and services are best for their child will ensure greater levels of success and cooperation between home and school.

- There are many organizations devoted to supporting individuals with RD and their families.

  Accessing the knowledge, support, and advocacy of these organizations is critical for many families. A list of several large organizations to share with parents can be found in Table 3.

- Finally, teachers can often best help families by simply listening to the parents and their concerns for their children.

  Understanding a disability label and what that means for the future of their child is a very emotional process for parents and many times teachers can help by providing a sympathetic ear as well as information.

TABLE 3: Informational resources about dyslexia for parents and teachers

The Council for Exceptional Children, Division for Learning Disabilities
*1110 North Glebe Rd., Suite 300, Arlington, VA 22201-5704, USA Phone: 1-888-CEC-SPED URL: **www.teachingld.org(http://www.teachingld.org/)***
The Division for Learning Disabilities (DLD) is a division of the Council for Exceptional Children (CEC), an international professional organization dedicated to improving educational outcomes for individuals with exceptionalities and students with disabilities. DLD works on behalf of students with learning disabilities and the professionals who serve them.

The International Dyslexia Association
*Chester Building, Suite 382, 8600 LaSalle Road, Baltimore, MD 21286-2044, USA Phone: 1-410-296-0232 URL: **www.interdys.org(http://www.interdys.org/)***
The International Dyslexia Association (IDA) is a scientific and educational organization dedicated to the study and treatment of dyslexia. IDA focuses its resources in four major areas: information and referral services, research, advocacy, and direct services to professionals in the field of learning disabilities.

Learning Disabilities Association of America
*4156 Library Road, Pittsburgh, PA 15234-1349, USA Phone: 1-412-341-1515 URL: **www.ldaamerica.org(http://www.ldaamerica.org/)***
The Learning Disabilities Association of America (LDA) is an organization founded by parents of children with learning disabilities. The LDA works to provide education,

encourage research into learning disabilities, create a climate of public awareness, and provide advocacy information and training.

LD OnLine
WETA Public Television, 2775 Quincy Street, Arlington, VA 22206, USA URL: ***www.ldonline.org(http://www.ldonline.org/)***
LD OnLine is an educational service of public television station WETA in association with the Coordinated Campaign for Learning Disabilities. It features thousands of articles on learning and reading disabilities, monthly columns by experts, a free question-and-answer service, and a directory of professionals and services.

National Center for Learning Disabilities
381 Park Avenue S., Suite 1401, New York, NY 10016, USA Phone: 1-888-575-7373 URL: ***www.ncld.org(http://www.ncld.org/)***
The National Center for Learning Disabilities (NCLD) is an organization devoted to working with individuals with LD, their families, educators, and researchers. NCLD provides essential information, promotes research and programs to foster effective learning, and advocates for policies to protect and strengthen educational rights and opportunities.

Imaging research has demonstrated that the brains of people with dyslexia show different, less efficient, patterns of processing (including under and over activation) during tasks involving sounds in speech and letter sounds in words. Understanding this has the potential to increase the confidence teachers feel when designing and carrying out instruction for their students with dyslexia.

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Endnotes

Endnotes

Click the "Endnotes" link above to hide these endnotes.

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Nov 03, 2015 10:01 AM EST

Dyslexia: Could An Early Intervention Narrow The Achievement Gap?

Dyslexia is a learning disorder characterized by difficulties reading from problems identifying both speech sounds and learning how to properly relate to letters and words. Though there is no cure for the problem, detecting the problem as early as first grade can narrow or even close the achievement gap with typical readers.

A new study by researchers at the University of California, Davis, and Yale University indicates that it's important to address the learning disability as soon as possible--not waiting until a child is in third grade or later to undertake efforts that would further help out.

Researchers focused on a longitudinal study of reading from first grade to 12th grade and beyond. The findings revealed that dyslexic readers showed lower reading scores when compared to early first graders. Furthermore, their trajectories over time never converged with those of typical readers, the study authors said.

"If the persistent achievement gap between dyslexic and typical readers is to be narrowed, or even closed, reading interventions must be implemented early, when children are still developing the basic foundation for reading acquisition," said Emilio Ferrer, a UC Davis psychology professor, in a news release.

The findings reveal that such differences are not so much a function of increasing disparities over time, but more so reflect marked differences already present in first grade between typical and dyslexic readers.

Implementing effective reading programs early during kindergarten or even preschool can offer the potential to close this achievement gap, researchers say.

The study is published in The Journal of Pediatrics.

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Dyslexia

A new model of this reading disorder emphasizes defects in the language-processing rather than the visual system. It explains why some very smart people have trouble learning to read

by Sally E. Shaywitz

One hundred years ago, in November 1896, a doctor in Sussex, England, published the first description of the learning disorder that would come to be known as developmental dyslexia. "Percy F.,... aged 14,... has always been a bright and intelligent boy," wrote W. Pringle Morgan in the *British Medical Journal,* "quick at games, and in no way inferior to others of his age. His great difficulty has been—and is now—his inability to learn to read."

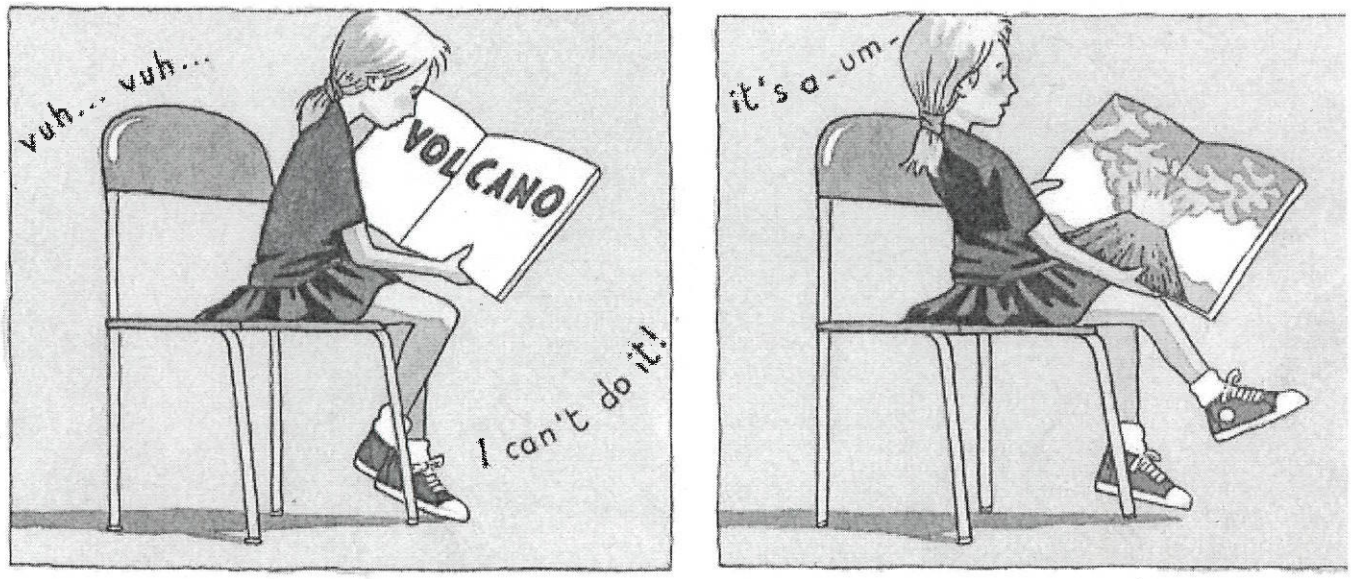
In that brief introduction, Morgan captured the paradox that has intrigued and frustrated scientists for a century since: the profound and persistent difficulties some very bright people face in learning to read. In 1996 as in 1896, reading ability is taken as a proxy for intelligence; most people assume that if someone is smart, motivated and schooled, he or she will learn to read. But the experience of millions of dyslexics like Percy F. has shown that assumption to be false. In dyslexia, the seemingly invariant relation between intelligence and reading ability breaks down.

Early explanations of dyslexia, put forth in the 1920s, held that defects in the visual system were to blame for the reversals of letters and words thought to typify dyslexic reading. Eye training was often prescribed to overcome these alleged visual defects. Subsequent research has shown, however, that children with dyslexia are not unusually prone to reversing letters or words and that the cognitive deficit responsible for the disorder is related to the language system. In particular, dyslexia reflects a deficiency in the processing of the distinctive linguistic units, called phonemes, that make up all spoken and written words. Current linguistic models of reading and dyslexia now provide an explanation of why some very intelligent people have trouble learning to read and performing other language-related tasks.

In the course of our work, my colleagues and I at the Yale Center for the Study of Learning and Attention have evaluated hundreds of children and scores of men and women for reading disabilities. Many are students and faculty at our university's undergraduate, graduate and professional schools. One of these, a medical student named Gregory, came to see us after undergoing a series of problems in his first-year courses. He was quite discouraged.

Although he had been diagnosed as dyslexic in grade school, Gregory had also been placed in a program for gifted students. His native intelligence, together with extensive support and tutoring, had allowed him to graduate from high school with honors and gain admission to an Ivy League college. In college,

The Paradox of Dyslexia



Gregory had worked extremely hard and eventually received offers from several top medical schools. Now, however, he was beginning to doubt his own competence. He had no trouble comprehending the intricate relations among physiological systems or the complex mechanisms of disease; indeed, he excelled in those areas requiring reasoning skills. More problematic for him was the simple act of pronouncing long words or novel terms (such as labels used in anatomic descriptions); perhaps his least well-developed skill was rote memorization.

Both Gregory and his professors were perplexed by the inconsistencies in his performance. How could someone who understood difficult concepts so well have trouble with the smaller and simpler details? Could Gregory's dyslexia—he was still a slow reader—account for his inability to name body parts and tissue types in the face of his excellent reasoning skills?

It could, I explained. Gregory's history fit the clinical picture of dyslexia as it has been traditionally defined: an unexpected difficulty learning to read despite intelligence, motivation and education. Furthermore, I was able to reassure Gregory that scientists now understand the basic nature of dyslexia.

Over the past two decades, a coherent model of dyslexia has emerged that is based on phonological processing. The phonological model is consistent both with the clinical symptoms of dyslexia and with what neuroscientists know about brain organization and function. Investigators from many laboratories, including my colleagues and I at the Yale Center, have had the opportunity to test and refine this model through 10 years of cognitive and, more recently, neurobiological studies.

The Phonological Model

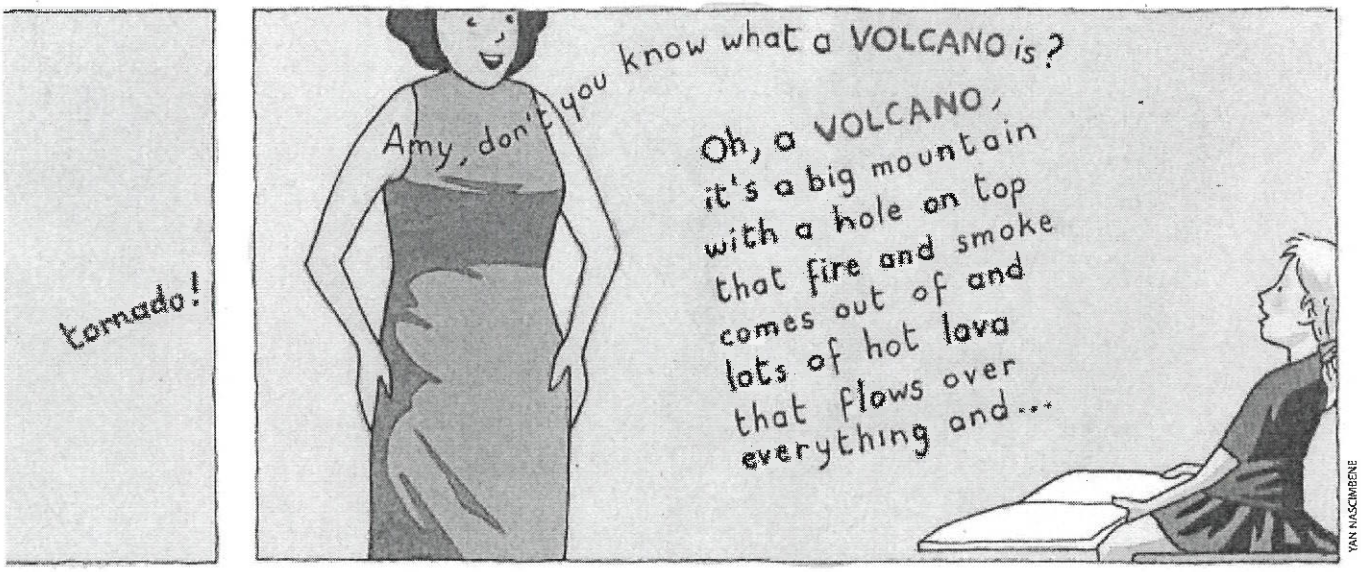
To understand how the phonological model works, one has first to consider the way in which language is processed in the brain. Researchers conceptualize the language system as a hierarchical series of modules or components, each devoted to a particular aspect of language. At the upper levels of the hierarchy are components involved with semantics (vocabulary or word meaning), syntax (grammatical structure) and discourse (connected sentences). At the lowest level of the hierarchy is the phonological module, which is dedicated to processing the distinctive sound elements that constitute language.

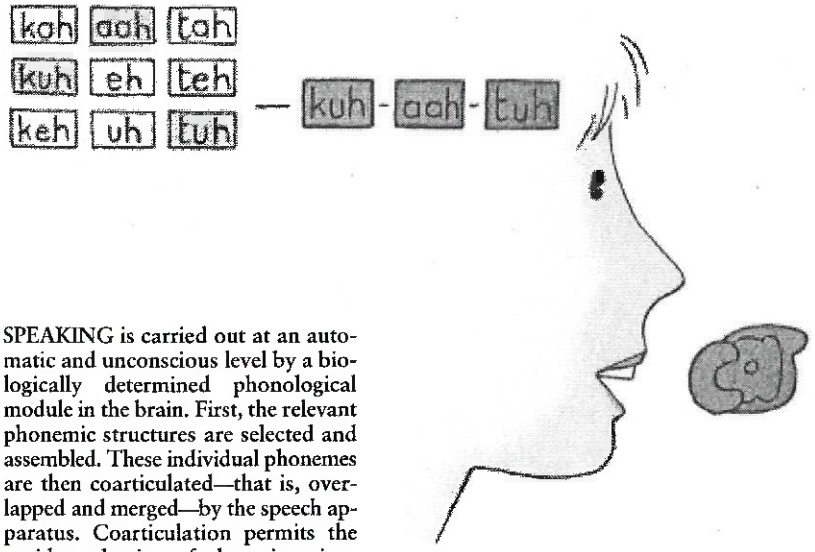
The phoneme, defined as the smallest meaningful segment of language, is the fundamental element of the linguistic system. Different combinations of just 44 phonemes produce every word in the English language. The word "cat," for example, consists of three phonemes: "kuh," "aah," and "tuh." (Linguists indicate these sounds as /k/, /æ/ and /t/.) Before words can be identified, understood, stored in memory or retrieved from it, they must first be broken down, or parsed, into their phonetic units by the phonological module of the brain.

In spoken language, this process occurs automatically, at a preconscious level. As Noam Chomsky and, more recently, Steven Pinker of the Massachusetts Institute of Technology have convincingly argued, language is instinctive—all that is necessary is for humans to be exposed to it. A genetically determined phonological module automatically assembles the phonemes into words for the speaker and parses the spoken word back into its underlying phonological components for the listener.

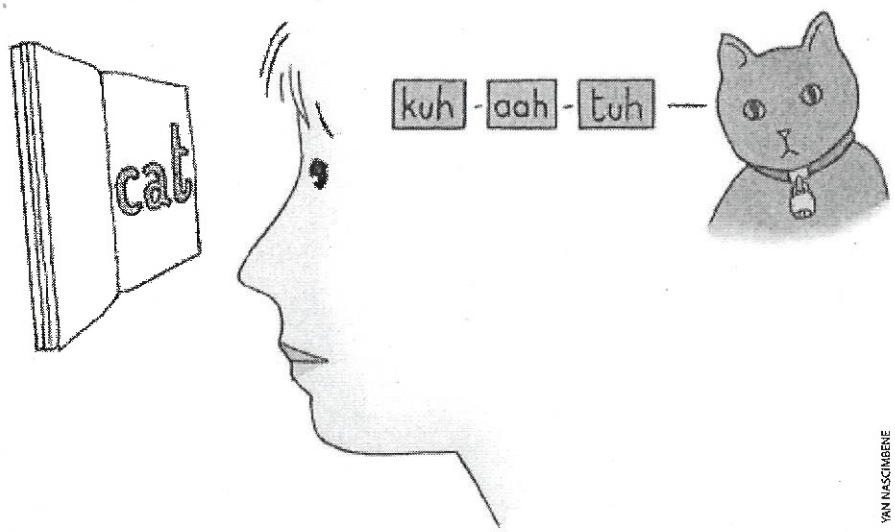
In producing a word, the human speech apparatus—the larynx, palate, tongue and lips—automatically compresses and merges the phonemes. As a result, information from several phonemes is folded into a single unit of sound. Because there is no overt clue to the underlying segmental nature of speech, spoken language appears to be seamless. Hence, an oscilloscope would register the word "cat" as a single burst of sound; only the human language system is capable of distinguishing the three phonemes embedded in the word.

Reading reflects spoken language, as my colleague Alvin M. Liberman of Haskins Laboratories in New Haven, Conn., points out, but it is a much harder skill to master. Why? Although both speaking and reading rely on phonological processing, there is a significant difference: speaking is natural, and reading is not. Reading is an invention and must be learned at a conscious level. The task of the reader is to transform the visual





SPEAKING is carried out at an automatic and unconscious level by a biologically determined phonological module in the brain. First, the relevant phonemic structures are selected and assembled. These individual phonemes are then coarticulated—that is, overlapped and merged—by the speech apparatus. Coarticulation permits the rapid production of phonetic strings but obscures the underlying segmental nature of speech.



YAN NASCIMBENE

READING is not automatic but must be learned. The reader must develop a conscious awareness that the letters on the page represent the sounds of the spoken word. To read the word "cat," the reader must parse, or segment, the word into its underlying phonological elements. Once the word is in its phonological form, it can be identified and understood. In dyslexia, an inefficient phonological module produces representations that are less clear and hence more difficult to bring to awareness.

percepts of alphabetic script into linguistic ones—that is, to recode graphemes (letters) into their corresponding phonemes. To accomplish this, the beginning reader must first come to a conscious awareness of the internal phonological structure of spoken words. Then he or she must realize that the orthography—the sequence of letters on the page—represents this phonology. That is precisely what happens when a child learns to read.

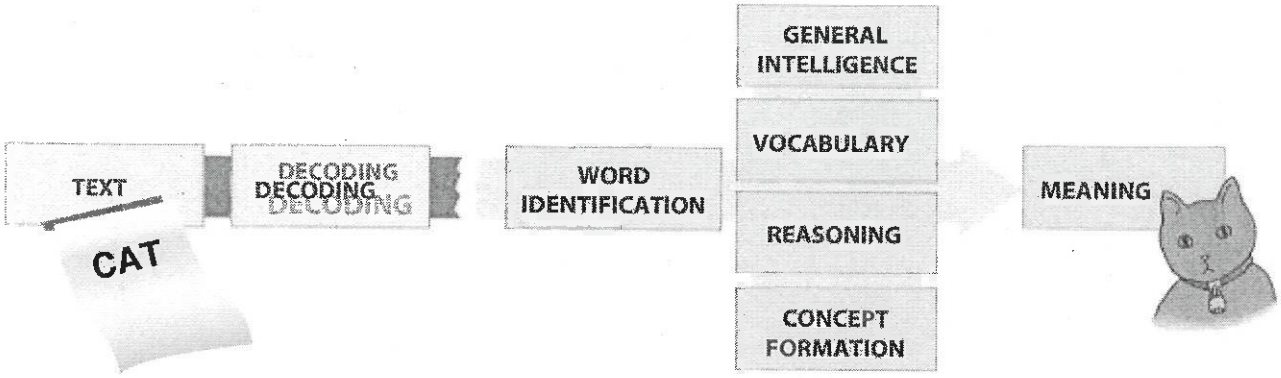
In contrast, when a child is dyslexic, a deficit within the language system at the level of the phonological module impairs his or her ability to segment the written word into its underlying phonological components. This explanation of dyslexia is referred to as the phonological model, or sometimes as the phonological deficit hypothesis.

According to this hypothesis, a circumscribed deficit in phonological processing impairs decoding, preventing word identification. This basic deficit in what is essentially a lower-order linguistic function blocks access to higher-order linguistic processes and to gaining meaning from text. Thus, although the language processes involved in comprehension and meaning are intact, they cannot be called into play, because they can be accessed only after a word has been identified. The impact of the phonological deficit is most obvious in reading, but it can also affect speech in predictable ways. Gregory's dilemma with long or novel words, for example, is entirely consistent with the body of evidence that supports a phonological model of dyslexia.

That evidence began accumulating more than two decades ago. One of the earliest experiments, carried out by the late Isabelle Y. Liberman of Haskins Laboratories, showed that young children become aware between four and six years of age of the phonological structure of spoken words. In the experiment, children were asked how many sounds they heard in a series of words. None of the four-year-olds could correctly identify the number of phonemes, but 17 percent of the five-year-olds did, and by age six, 70 percent of the children demonstrated phonological awareness.

By age six, most children have also had at least one full year of schooling, including instruction in reading. The development of phonological awareness, then, parallels the acquisition of reading skills. This correspondence suggested that the two processes are related. These findings also converge with data from the Connecticut Longitudinal Study, a project my colleagues and I began in 1983 with 445 randomly selected kindergartners; the study continues in 1996 when these children are age 19 and out of high school. Testing the youngsters yearly, we found that dyslexia affects a full 20 percent of schoolchildren—a figure that agrees roughly with the proportion of Liberman's six-year-olds who could not identify the phonological structure of words. These data further support a connection between phonological awareness and reading.

During the 1980s, researchers began to address that connection explicitly. The groundbreaking work of Lynette Bradley and Peter E. Bryant of the University of Oxford indicated that a pre-



YAN NASCIMBENE (cat); JANA BRENNING

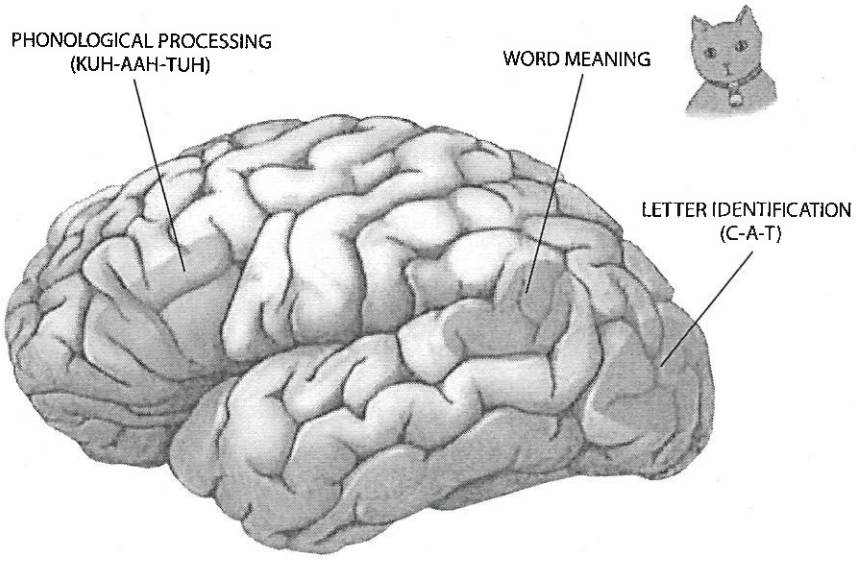
IN READING, the word (here, "cat") is first decoded into its phonological form ("kuh, aah, tuh") and identified. Once it is identified, higher-level cognitive functions such as intelligence and vocabulary are applied to understand the word's meaning ("small furry mammal that purrs"). In people who have dyslexia, a phonological deficit impairs decoding, thus preventing the reader from using his or her intelligence and vocabulary to get to the word's meaning.

schooler's phonological aptitude predicts future skill at reading. Bradley and Bryant also found that training in phonological awareness significantly improves a child's ability to read. In these studies, one group of children received training in phonological processing, while another received language training that did not emphasize the sound structure of words. For example, the first group might work on categorizing words by their sound, and the second group would focus on categorizing words according to their meaning. These studies, together with more recent work by Benita A. Blachman of Syracuse University, Joseph E. Torgesen of Florida State University and Barbara Foorman of the University of Houston, clearly demonstrate that phonological training in particular—rather than general language instruction—is responsible for the improvements in reading.

Such findings set the stage for our own study, in the early 1990s, of the cognitive skills of dyslexic and nondyslexic children. Along with Jack M. Fletcher of the University of Texas–Houston and Donald P. Shankweiler and Leonard Katz of Haskins Laboratories, I examined 378 children from seven to nine years old on a battery of tests that assessed both linguistic and nonlinguistic abilities. Our results as well as those of Keith E. Stanovich and Linda S. Siegel of the Ontario Institute for Studies in Education made it clear that phonological deficits are the most significant and consistent cognitive marker of dyslexic children.

One test in particular seemed quite sensitive to dyslexia: the Auditory Analysis Test, which asks a child to segment words into their underlying phonological units and then to delete specific phonemes from the words. For example, the child must say the word "block" without the "buh" sound or say the word "sour" without the "s" sound. This measure was most related to a child's ability to decode single words in standardized tests and was independent of his or her intelligence, vocabulary and reasoning skills. When we gave this and other tests of phonemic awareness to a group of 15-year-olds in our Connecticut Longitudinal Study, the results were the same: even in high school students, phonological awareness was the best predictor of reading ability.

If dyslexia is the result of an insufficiently developed phonological specialization, other consequences of impaired phonological functioning should also be apparent—and they are. Ten years ago the work of Robert B. Katz of Haskins Laboratories documented the problems



YAN NASCIMBENE (cat); CAROL DONNER (brain); from *Brain, Mind and Behavior*, by F. E. Bloom and A. Lazerson, W. H. Freeman, 1988

NEURAL ARCHITECTURE for reading has been suggested by functional magnetic resonance imaging. Letter identification activates the extrastriate cortex in the occipital lobe; phonological processing activates the inferior frontal gyrus (Broca's area); and accessing meaning activates primarily the superior temporal gyrus and parts of the middle temporal and supramarginal gyri.

poor readers have in naming objects shown in pictures. Katz showed that when dyslexics misname objects, the incorrect responses tend to share phonological characteristics with the correct response. Furthermore, the misnaming is not the result of a lack of knowledge. For example, a girl shown a picture of a volcano calls it a tornado. When given the opportunity to elaborate, she demonstrates that she knows what the pictured object is—she can describe the attributes and activities of a volcano in great detail and point to other pictures related to volcanoes. She simply cannot summon the word "volcano."

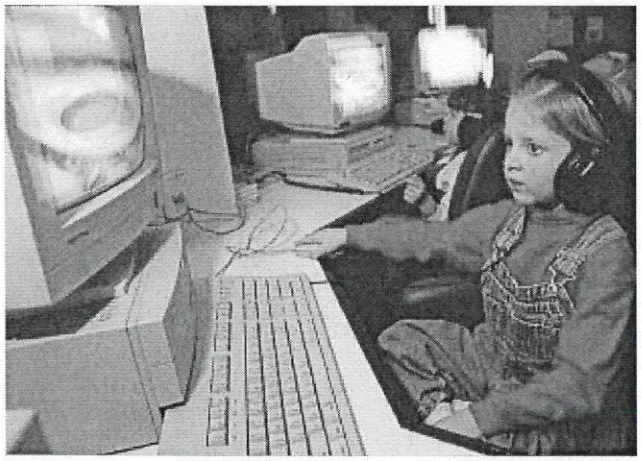
This finding converges with other evidence in suggesting that whereas the phonological component of the language system is impaired in dyslexia, the higher-level components remain intact. Linguistic processes involved in word meaning, grammar and discourse—what, collectively, underlies comprehension—seem to be fully operational, but their activity is blocked by the deficit in the lower-order function of phonological processing. In one of our studies, Jennifer, a very bright young woman with a reading disability, told us all about the word "apocalypse." She knew its meaning, its connotations and its correct usage; she could not, however, recognize the word on a printed page. Because she could not decode and identify the written word, she could not access her fund of knowledge about its meaning when she came across it in reading.

Of course, many dyslexics, like Gregory, do learn to read and even to excel in academics despite their disability. These so-called compensated dyslexics perform as well as nondyslexics on tests of word accuracy—they have learned how to decode or identify words, thereby gaining entry to the higher levels of the language system. But they do so at a cost. Timed tests reveal that decoding remains very laborious for compensated dyslexics; they are neither automatic nor fluent in their ability to identify

Playing Past Learning Disabilities

Dyslexia is the most common of the learning disorders, conditions that interfere with a normally intelligent child's ability to acquire speech, reading or other cognitive skills. Children with learning disabilities have become the basis of a thriving industry since 1968, when federal education officials first earmarked funds to help them. The number of children identified as having learning disabilities soared from 780,000 in 1976 to 2.3 million in 1993. An estimated $15 billion is spent annually on the diagnosis, treatment and study of such disorders.

The definitions and diagnostic criteria for learning disorders are often subjective or ambiguous; their causes are typically obscure or controversial. For example, psychologist Gerald Coles of the University of Rochester challenges the claim that 20 percent of children are dyslexic, and not all researchers and educators accept a phonological (or even biological) explanation for dyslexia. Treatment is another area that has been fraught with controversy and, often, disappointment. Over the years, educators and parents have subscribed to many techniques that promised to help children overcome their learning disabilities, despite the absence of independent research to back up those claims. Nevertheless, ongoing research holds out prospects for some real progress.



FIVE-YEAR-OLD KEILLAN LECKY interacts with a language-learning program at Rutgers University in Newark, N.J.

NINA BERMAN *Sipa Press*

One of the most lauded treatments for learning disabilities to emerge in recent years has been developed by a group led by Paula Tallal, co-director of the Center for Molecular and Behavioral Neuroscience at Rutgers University in Newark, N.J., and Michael M. Merzenich of the Keck Center for Integrative Neuroscience at the University of California at San Francisco. Their research has not focused on dyslexics per se but on "language-impaired" children who have difficulty understanding speech. Not all language-impaired children are dyslexic, Tallal notes, and not all dyslexics are language-impaired, but there is nonetheless broad overlap between the two groups. Studies have suggested that as many as 8 percent of all children may be language-impaired; of this group, more than 85 percent also exhibit dyslexia.

Tallal, who began studying language impairment in the late 1970s, has long suspected that this problem stems from an inability to process auditory information rapidly enough. Whereas most children can process phonemes lasting less than 40 milliseconds, the language-impaired may require as much as 500 milliseconds. To them, the word "bat" may be indistinguishable from "pat." This hypothesis, Tallal says, is "compatible" with the phonological-deficit model of dyslexia but places more emphasis on the role of timing in neural processing.

Language impairment, Tallal believes, usually stems from an organic deficit rather than from environmental factors. Magnetic resonance scans and other imaging studies, she states, have turned up distinct neural differences between people with normal language skills and the language-impaired. "But just because something is biologically based doesn't mean it's irremediable," Tallal adds.

Two years ago she teamed up with Merzenich and several other scientists to develop a computer-based therapy—an animated video game, essentially—for training language-impaired children. The core of the therapy is a speech-processing program that enables the researchers to alter the amplitude and duration of recorded sounds.

In one of the programs, which has a circus motif, a clown utters two closely related phonemes, such as "pa" and "da," that have been "stretched out" to a length that the children can easily comprehend. When the children correctly distinguish between the sounds, the clown congratulates them; progress is also represented by a bear moving along a tightrope.

words. Many dyslexics have told us how tiring reading is for them, reflecting the enormous resources and energy they must expend on the task. In fact, extreme slowness in making phonologically based decisions is typical of the group of compensated dyslexics we have assembled as part of a new approach to understanding dyslexia: our neuroimaging program.

The Neurobiology of Reading

The phonological model incorporates a modular scheme of cognitive processing in which each of the component processes used in word identification is carried out by a specific network of brain cells. Until recently, however, researchers have had no firm indication of how that scheme maps onto the actual functional organization of the human brain. Unlike many other functions, reading cannot be studied in animals; indeed, for many years the cerebral localization of all higher cognitive processes could be inferred only from the effects of brain injuries on the people who survived them. Such an approach offered little to illuminate the phenomena my colleagues and I were interested in. What we needed was a way to identify the regions of the brain that are engaged when healthy subjects are reading or trying to read.

Our group became quite excited, then, with the advent in the late 1980s of functional magnetic resonance imaging (fMRI). Using the same scanning machine that has revolutionized clinical imaging, fMRI can measure changes in the metabolic activity of the brain while an individual performs a cognitive task. Hence, it is ideally suited to mapping the brain's response to stimuli such as reading. Because it is noninvasive and uses no radioisotopes, fMRI is also excellent for work involving children.

Since 1994, I have worked with several Yale colleagues to use fMRI in studying the neurobiology of reading. Bennett A. Shaywitz, Kenneth R. Pugh, R. Todd Constable, Robert K. Fulbright, John C. Gore and I have used the technique with more than 200 dyslexic and nondyslexic children and adults. As a result of this program, we can now suggest a tentative neural architecture for reading a printed word. In particular, the identification of letters activates sites in the extrastriate cortex within the occipital lobe; phonological processing takes place within the inferior frontal gyrus; and access to meaning calls on areas within the middle and superior temporal gyri of the brain.

Our investigation has already revealed a surprising difference between men and women in the locus of phonological representation for reading. It turns out that in men phonological processing engages the left inferior frontal gyrus, whereas in women it activates not only the left but the right inferior frontal gyrus as well. These differences in lateralization had been suggested by behavioral studies, but they had never before been demonstrated unequivocally. Indeed, our findings constitute the first concrete proof of gender differences in brain organization for any cognitive function. The fact that women's brains tend to have bilateral representation for phonological processing explains several formerly puzzling observations: why, for example, after a stroke involving the left side of the brain, women are less likely than men to have significant decrements in their language skills, and why women tend more often than men to compensate for dyslexia.

As investigators who have spent our entire professional lives trying to understand dyslexia, we find the identification of brain sites dedicated to phonological processing in reading very exciting—it means that we now have a possible neurobiological "signature" for read-

Once the children have mastered phonemes of a given duration—say, 400 milliseconds—they can move on to more rapid, realistic phonemes. The youngsters also listen to stretched recordings of whole words, sentences and stories, such as *The Cat in the Hat*. Tallal and Merzenich reported in *Science* this past January that 11 children trained with these methods had acquired two years' worth of language skills in only one month. A control group given identical therapy, but without the stretched speech, progressed only one quarter as much.

This year Tallal, Merzenich and two colleagues founded a company called Scientific Learning Principles, based in San Francisco, to develop and market an interactive CD-ROM containing their learning program. They plan to test prototypes in 25 or more special education schools and clinics in the U.S. and Canada over the next year. As many as 500 children are expected to participate.

The studies will include not only language-impaired children but also those diagnosed with dyslexia, attention-deficit disorder and other common learning disabilities. "We want to determine the generalizability of this technique," Tallal notes. If all goes well, she says, the CD-ROMs will be made available to certified learning centers beginning next year.

Since the media first reported on this research a year ago, Tallal and her colleagues have been inundated with queries from the press and parents. In part to satisfy these demands, they have created a World Wide Web site (http://www.scilearn.com).

Tallal emphasizes that the questions raised by Coles and other skeptics about the causes and frequency of learning disabilities are important. She nonetheless thinks "it is a mistake to focus on all these differences in definition." Real progress, she says, will come about only through empirical research.

—John Horgan, staff writer

The Myths of Dyslexia

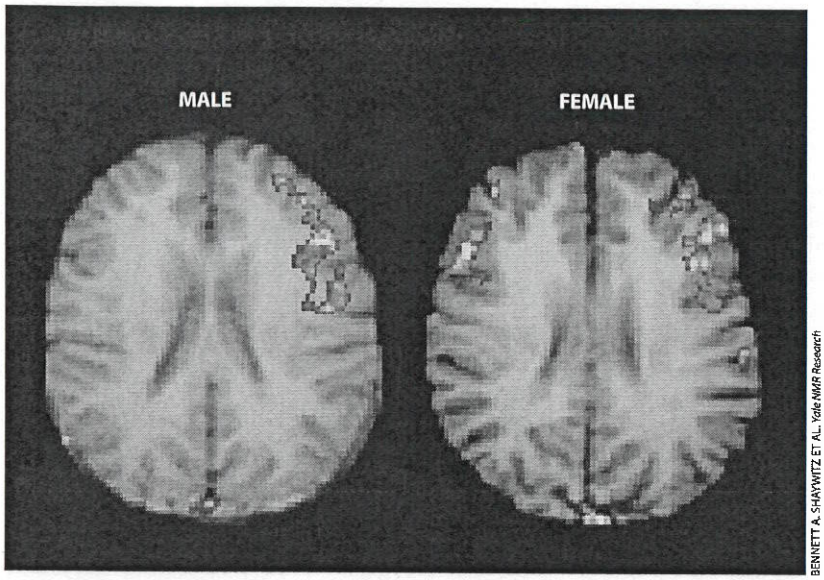
Mirror writing is a symptom of dyslexia.
In fact, backwards writing and reversals of letters and words are common in the early stages of writing development among dyslexic and nondyslexic children alike. Dyslexic children have problems in naming letters but not in copying letters.

Eye training is a treatment for dyslexia.
More than two decades of research have shown that dyslexia reflects a linguistic deficit. There is no evidence that eye training alleviates the disorder.

More boys than girls are dyslexic.
Boys' reading disabilities are indeed identified more often than girls', but studies indicate that such identification is biased. The actual prevalence of the disorder is nearly identical in the two sexes.

Dyslexia can be outgrown.
Yearly monitoring of phonological skills from first through 12th grade shows that the disability persists into adulthood. Even though many dyslexics learn to read accurately, they continue to read slowly and not automatically.

Smart people cannot be dyslexic.
Intelligence is in no way related to phonological processing, as scores of brilliant and accomplished dyslexics—among them William Butler Yeats, Albert Einstein, George Patton, John Irving, Charles Schwab and Nicholas Negroponte—attest.



BENNETT A. SHAYWITZ ET AL., Yale NMR Research

BRAIN ACTIVATION PATTERNS during reading, as revealed in these functional magnetic resonance images, differ in men and women. During phonological processing, men show primarily unilateral activation, in the left inferior frontal gyrus. In women, phonological processing activates both the left and the right inferior frontal gyri.

ing. The isolation of such a signature brings with it the future promise of more precise diagnosis of dyslexia. It is possible, for example, that the neural signature for phonological processing may provide the most sensitive measure of the disorder. Furthermore, the discovery of a biological signature for reading offers an unprecedented opportunity to assess the effects of interventions on the neuroanatomic systems serving the reading process itself.

Putting It in Context

The phonological model crystallizes exactly what we mean by dyslexia: an encapsulated deficit often surrounded by significant strengths in reasoning, problem solving, concept formation, critical thinking and vocabulary. Indeed, compensated dyslexics such as Gregory may use the "big picture" of theories, models and ideas to help them remember specific details. It is true that when details are not unified by associated ideas or theoretical frameworks—when, for example, Gregory must commit to memory long lists of unfamiliar names—dyslexics can be at a real disadvantage. Even if Gregory succeeds in memorizing such lists, he has trouble producing the names on demand, as he must when he is questioned on rounds by an attending physician. The phonological model predicts, and experimentation has shown, that rote memorization and rapid word retrieval are particularly difficult for dyslexics.

Even when the individual knows the information, needing to retrieve it rapidly and present it orally often results in calling up a related phoneme or incorrectly ordering the retrieved phonemes. Under such circumstances, dyslexics will pepper their speech with many um's, ah's and other hesitations. On the other hand, when not pressured to provide instant responses, the dyslexic can deliver an excellent oral presentation. Similarly, in reading, whereas nonimpaired readers can decode words automatically, individuals such as Gregory frequently need to resort to the use of context to help them identify specific words. This strategy slows them further and is another reason that the provision of extra time is necessary if dyslexics are to show what they actually know. Multiple-choice examinations, too, by their lack of sufficient context, as well as by their wording and response format, excessively penalize dyslexics.

But our experience at the Yale Center suggests that many compensated dyslexics have a distinct advantage over nondyslexics in their ability to reason and conceptualize and that the phonological deficit masks what are often excellent comprehension skills. Many schools and universities now appreciate the circumscribed nature of dyslexia and offer to evaluate the achievement of their dyslexic students with essays and prepared oral presentations rather than tests of rote memorization or multiple choices. Just as researchers have begun to understand the neural substrate of dyslexia, educators are beginning to recognize the practical implications of the disorder. A century after W. Pringle Morgan first described dyslexia in Percy F., society may at last understand the paradox of the disorder.

The Author

SALLY E. SHAYWITZ is, along with Bennett A. Shaywitz, co-director of the Yale Center for the Study of Learning and Attention and professor of pediatrics at the Yale University School of Medicine. She received her M.D. from the Albert Einstein College of Medicine in Bronx, N.Y., and has spent her entire professional career at Yale, where, since 1983, she has directed the Connecticut Longitudinal Study. Currently she is using functional magnetic resonance imaging to study the neurobiology of dyslexia in children and young adults. A pediatrician and neuroscientist, she received the impetus to study dyslexia from the many very bright dyslexics she came to know as patients, students and, often, colleagues. She acknowledges the helpful comments of the Shaywitz tribe—Adam, Jon and David—in preparing this article.

Further Reading

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JUST THE FACTS... Information provided by The International DYSLEXIA Association®

Attention-Deficit/Hyperactivity Disorder (AD/HD) and Dyslexia

AD/HD and dyslexia are distinct conditions that frequently overlap, thereby causing some confusion about the nature of these two conditions. AD/HD is one of the most common developmental problems, affecting 3–5% of the school population. It is characterized by inattention, distractibility, hyperactivity and impulsivity. It is estimated that 30% of those with dyslexia have coexisting AD/HD. Coexisting means the two conditions, AD/HD and dyslexia, can occur together, but they do not cause each other. Dyslexia is a language-based learning disability characterized by difficulties with accurate and fluent word recognition, spelling, and reading decoding. People with dyslexia have problems discriminating sounds within a word or phonemes, a key factor in their reading and spelling difficulties. (See IDA fact sheets "Definition of Dyslexia" and "Dyslexia Basics.")

How are AD/HD and dyslexia diagnosed?

AD/HD and dyslexia are diagnosed differently. An evaluation for AD/HD is carried out by a physician or a psychologist. This evaluation should include the following:

1. complete medical and family history
2. physical examination
3. interviews with parents and child
4. behavior rating scales completed by parents and teachers
5. observation of the child
6. psychological tests to measure intellectual potential, social and emotional adjustment, as well as to assess for the presence of learning disabilities, such as dyslexia.

Although AD/HD has been given numerous names since it was first identified in 1902, the Diagnostic and Statistical Manual, 4th Edition (DSM-IV) identified three primary subtypes. These subtypes are

1. *AD/HD predominantly inattentive type* is characterized by distractibility and difficulty sustaining mental effort and attention.
2. *AD/HD predominantly hyperactive-impulsive type* is characterized by fidgeting with hands and feet, squirming in one's chair, acting as if driven by a motor, interrupting and intruding upon others.
3. *AD/HD combined type* meets both sets of inattention and hyperactive/impulsive criteria.

Dyslexia is diagnosed through a psycho-educational evaluation. (See IDA fact sheet: "Testing and Evaluation.")

Is AD/HD overdiagnosed?

The American Medical Association and the Centers for Disease Control and Prevention have concluded that AD/HD is not overdiagnosed; however, increased awareness has resulted in an increase in the number of individuals diagnosed with AD/HD. Girls and gifted children are actually underdiagnosed or may be diagnosed late. Girls often have *AD/HD predominantly inattentive type* where the essential feature is inattention. This subtype of AD/HD can easily be overlooked because the more obvious characteristics of hyperactivity and impulsivity are not present. Gifted children may be identified late because their strong intellectual abilities help them to compensate for these weaknesses in attention.

Can individuals inherit AD/HD and dyslexia?

Both AD/HD and dyslexia run in families. Genetics play a role in about half of the children diagnosed with AD/HD. For the other half, research has yet to identify a cause. Regarding dyslexia, about one third of the children born to a dyslexic parent will also likely be dyslexic.

Are there characteristics that individuals with AD/HD and dyslexia have in common?

Dyslexic children and children with AD/HD have some similar characteristics. Dyslexic children, like children with AD/HD, may have difficulty paying attention because reading is so demanding that it causes them to fatigue easily, limiting the ability to sustain concentration. People with dyslexia and those with AD/HD both have difficulty with reading. The dyslexic person's reading is typically dysfluent, with major problems with accuracy, misreading both large and small words. The person with AD/HD may also be a dysfluent reader, but his or her reading is not characterized by misreading words. The AD/HD reader may skip over punctuation, leave off endings, and lose his or her place. The dysfluency of both the ADHD person and the dyslexic reader may negatively impact comprehension. Both may avoid reading and derive little pleasure from it. Both the person with dyslexia and the person with AD/HD typically have trouble with writing. The typical dyslexic writer has significant problems with spelling, grammar, proofreading, and organization. The AD/HD writer often has difficulty with organization and proofreading. Both the dyslexic writer and the AD/HD writer may have handwriting difficulties.

Individuals with dyslexia and AD/HD may be underachieving in school even though they are often bright and motivated. The goal for them, as it is for all children, is to meet their potential. It is critical that children with these disorders be carefully evaluated because treatment for one disorder is different from the other. Inaccurate diagnosis can lead to inappropriate intervention and a delay in timely, effective intervention.

Have neurological studies shown functional and/or anatomical differences in the brains of people with AD/HD as compared to dyslexia?

The scientific community has been attempting to define the exact changes in the human brain that lead to AD/HD and dyslexia. There have been pathologic studies of a few brains from people with dyslexia after they died. While some changes in the brain have been found between the brains of people with dyslexia and people who do not have dyslexia, no consistent pattern has emerged that allows the exact "dyslexic center" to be determined. More promising techniques have been developed, which can be performed in living persons. These include imaging studies, as well as physiologic studies. Once again, interesting leads have been found, but none has given us a definitive answer regarding the underlying mechanisms of these disorders. It should also be mentioned that these tests are research tools. There are currently no biologic tests routinely available that allow an objective diagnosis of dyslexia or AD/HD.

What is the outlook for children with dyslexia and AD/HD?

If dyslexia and AD/HD are identified and treated early, children with these disorders are more likely to learn to overcome their difficulties while maintaining a positive self-image. Even though children with dyslexia do not outgrow their disability, they can learn to adapt and improve their weak skills. With proper remediation and needed accommodations, students with dyslexia can go on to be very successful students in colleges and universities, as well as in professional and adult life. After puberty, about 40–50% of children with AD/HD will improve

and develop enough coping skills so that their symptoms no longer have a negative impact on their quality of life; however, the other 50–60% will continue to exhibit symptoms of AD/HD through adolescence and adulthood that will negatively affect their lives. It is important to remember that many students with AD/HD with appropriate support and accommodations can be very successful with higher level academic work and in their professional lives. It is never too late to diagnose these disorders. It is not uncommon for a gifted person in college or graduate school to be diagnosed with dyslexia or AD/HD. Such individuals can learn to develop their personal strengths and become not only successful students, but happy and productive adults, as well.

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The International Dyslexia Association (IDA) thanks Karen E. Dakin, M.Ed., and Gerald Erenberg, M.D., for their assistance in the preparation of this fact sheet.

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By Joyce S. Pickering, Hum.D., Executive Director Emerita

Current Knowledge on ADHD

Research continues to increase our knowledge about Learning Differences. In ADHD, a Booklet for Parents by Larry B. Silver, M.D., he states, "Between 10 and 20 percent of all school-aged children have learning disabilities. Of those with LD, about 20 to 25 percent will also have ADHD. LD and ADHD are two separate problems; however, they occur together so frequently that it is useful to consider them related. In addition, most children and adolescents with LD and/or ADHD develop emotional social, and family difficulties. These are the result of frustrations and failures experienced with family and peers and at school."

Many questions come to the staff of Shelton about ADHD.

- Does it exist?
- What causes it? Is it genetic?
- What are the academic challenges?
- What are the co-existing conditions?
- What about medication?
- Do children "outgrow" ADHD?

Does ADHD really exist?

Yes, There are individuals who are unable to sustain attention, focus, and concentration. Without sustained attention, information given by a parent or teacher cannot be stored consistently in memory. This, of course, causes difficulty in making academic progress. Technically, the "prevalence estimates for ADHD vary widely. . . Nationwide estimates of prevalence suggest that between 3% and 9% of children are affected (e.g. American Psychiatric Association, 1987, 1994) . . . . .The core clinical features of ADHD, many of which can be detected as early as 3 years of age (Campbell, et al., 1986; Palfrey et al., 1985) and persist through the school years, include developmentally inappropriate activity levels, low frustration tolerance, impulsivity, poor organization of behavior, distractibility, and an inability to sustain attention and concentration (Pelham, 1982). . . Unfortunately, the core clinical symptoms of ADHD (inattention, impulsiveness, and hyperactivity) reflect impairment in precisely the domains of functioning that are central to mastery of the major developmental tasks of childhood." (Journal of American Academy of Child and Adolescent Psychiatry, 34.8, August 1995)

The Developmental Statistical Manual of the American Psychiatric Association indicates three types of ADHD:

1. ADHD Distractible Type
2. ADHD Hyperactive Type
3. Combined Type

The areas of academic difficulty most frequently seen in students with ADHD are math, comprehension and written expression. Social skills are frequently an area of weakness.

What causes it? Is it genetic?

ADHD can be hereditary or the result of insult or injury. In many families there is a history of a number of family members with ADHD through generations. According to Dr. Gerald J.

LaHoste and his colleagues at The University of California at Irvine, and the University of Toronto, "hyperactivity has long been known to run in families; but Dr. LaHoste's work is the first to purport to show why. His group focused on the dopamine D4 receptor, one of five types of dopamine receptors in the brain. . . Dopamine is a hormone used by brain cells to transmit messages among themselves . . .The researchers found that about half of the ADHD children had a D4 gene containing a unique segment that repeats itself seven times. This aberrant form of the gene was found in only 21 percent of children in the control group. . . The new findings shed light on the activity of Ritalin, which is known to stimulate dopamine release in the brain." (Gene linked to hyperactivity disorder in children, The Dallas Morning News, May 1, 1996)

What are the academic challenges?

Abstractions are the challenge for many with ADHD. Math and inferential comprehension require reasoning in the abstract. Many ADHD individuals, though intelligent, are very concrete and literal in their thinking. Abstraction in math can be made more understandable if manipulatives are consistently used. Reading comprehension requires literal comprehension (Who discovered America?) and inferential comprehension (As the result of the Industrial Revolution, how did life change in America?). Implied messages, innuendo, even sarcasm, require higher-level skills for abstraction. Many, but by no means all, individuals with ADHD have difficulty with abstractions.

What are co-existing conditions?

Individuals with ADHD may also have depression, anxiety, oppositional defiant disorder, obsessive-compulsive disorder. These disorders can occur alone or in any combination.

Depression or anxiety may be mistaken for ADHD. Bipolar Disorder is sometimes missed, and a diagnosis of ADHD is given.

The Excite.Health with WebMD describes conditions with similar symptoms of ADHD.

Oppositional Defiant Disorder

About half the children diagnosed with ADHD also have oppositional defiant disorder (ODD). The most common symptom for this disorder is the child's refusal to follow any or all instructions or directives. In addition to displaying inattentive and impulsive behavior, these children demonstrate aggression, have frequent temper tantrums, and display antisocial behavior. Up to 25% of children with ODD have phobias and other anxiety disorders, which should be treated separately.

Pervasive Developmental Disorder

Pervasive development disorder (PDD) is rare and usually marked by autistic-type behavior – hand-flapping, repetitive statements, slow social development, and speech and motor problems. If a child who has been diagnosed with ADHD does not respond to treatment, the parents might inquire about PDD, which often responds to antidepressants.

Primary Disorder of Vigilance

Primary disorder of vigilance is a term for a syndrome that includes poor attention and concentration as well as difficulties staying awake. People with vigilance disorder tend to fidget, yawn and stretch, and appear to be hyperactive in order to stay alert; they typically have kind and

affectionate temperaments. The condition is inherited and gets worse with age, but is treatable with stimulants.

Bipolar Disorder (Manic Depression)
A recent study found that as many as 25% of children diagnosed with attention deficit disorder may also have bipolar disorder, commonly called manic depression. Indications of this problem include episodes of depression and mania (with symptoms of irritability, rapid speech, and disconnected thoughts), sometimes occurring at the same time.

What about medication?

"There are billions of nerve cells in the brain; most inter-connect with the others. Electric impulses pass from nerve to nerve throughout the brain. The impulse goes from one nerve to another across microscopic space called a synapse. Chemical substances called neurotransmitters are present in the synapse. The medications used for psychiatric disorders alter the quantity of neurotransmitters in the synapses. This alters the electrical flow, which may then affect the way a person thinks, feels, and/or reacts. When psychoactive medication is given, it affects the neurotransmitters in all the brain's synapses. Some medications have partial selectivity for specific areas of the brain. For example, stimulants seem to have the greatest effect in the area of the brain controlling motor activity and attention span. However, stimulants will also affect the mood, appetite and sleep centers of the brain. Researchers are continually trying to develop drugs that are so specific they affect only the area of the brain that is malfunctioning." (Psychoactive medications used for children, Dan A. Myers, M.D, F.A.P.A, November 2003)

Is medication the only treatment?

"It's an important aspect of treatment. We find that most parents and children with ADHD (adults and their spouses as well) benefit for attention and behavior management counseling. There are also a number of important school (or on the job) interventions that help. New forms of treatment (like Biofeedback) are also proving to be helpful. Of course, any additional problems need to be addressed as well. However, in many cases, medication is needed." (All you ever wanted to know about Attention Deficits but didn't know whom to ask, Corman, Clifford L. M.D., et al., Universal Attention Disorders, Inc., 1997)

The American Academy of Pediatrics estimates that nearly 9% of school-age children are handicapped by ADD, which can be diagnosed to 95% confidence using the Conners scales. More than 200 controlled studies, involving more than 6,000 subjects, clearly indicate the safety and effectiveness of stimulants as a primary treatment modality for ADD. A vast clinical experience over more than 40 years supports this research. Stimulants do not "dope" kids, they enable certain young people to overcome serious handicaps and perform up to their potential both academically and sociality. The National Institute of Mental Health (NIMH) recently published its Multimodel Treatment Study of ADD, showing that stimulants alone are a better treatment for ADD than the best behavioral management programs that have yet been developed." (John M. Rathbun, M.D., Aboite Behavioral Health Services, Fort Wayne, Indiana, The Wall Street Journal, February 8, 2001)

Do children "outgrow" ADHD?

"Most do not. Clinicians used to believe that ADHD was "outgrown" in the early teen years because the hyperactivity component generally "drops out" or lessens considerably by then. Since the incidence studies relied on behavior ratings that stressed the hyperactivity component, it's easy to see why we used to think that ADHD just disappeared. In reality, we now know that less than half of the children with ADHD will "outgrow" it. (All you ever wanted to know about Attention Deficits but didn't know whom to ask, Corman, Clifford L. M.D., et al., Universal Attention Disorders, Inc., 1997)

Dr. Edward Hallowell in his books Driven to Distraction and Answers to Distraction discusses five factors which are important to managing ADHD. These include:

- Adequate sleep
- Nutritionally balanced diet
- Regular exercise
- Prayer or meditation
- Medication, if necessary

"The treatment of ADD varies considerably from person to person. Depending on the severity and complexity of the situation, the treatment may last from a few sessions to several years. Sometimes the treatment consists just in making the diagnosis and providing some education. Sometimes the treatment becomes very involved, requiring years of individual and family therapy, various medications, and much persistence and patience. Sometimes there is spectacular improvement; sometimes the change is so slow that it is difficult to recognize. There is no one recipe for the treatment of ADD." (Driven to Distraction, Hallowell, M. Edward, M.D., Simon & Schuster, 1995, p 262)

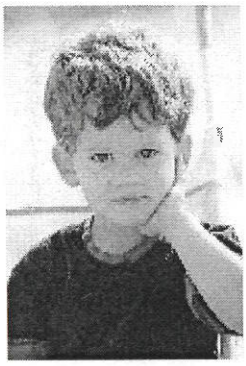
URL of this page: https://www.nlm.nih.gov/medlineplus/news/fullstory_154463.html

HealthDay

One-Third of U.S. Kids With ADHD Diagnosed Before Age 6: Report

But researchers add that few valid tests exist to support diagnosis in children that young

(*this news item will not be available after 12/02/2015)
Thursday, September 3, 2015



THURSDAY, Sept. 3, 2015 (HealthDay News) -- Almost a third of U.S. children with attention deficit hyperactivity disorder (ADHD) were diagnosed before the age of 6, even though there aren't many valid tests to support diagnosis in children that young, a new federal government report shows.

It's difficult to determine whether the results show overdiagnosis of ADHD or not, said Joel Nigg, director of the division of psychology at Oregon Health & Science University in Portland.

"Although guidelines and instrumentation for diagnosing preschool children, for example, are weaker, the condition itself is developmental and expected to exist in preschool," said Nigg, who was not involved in the study. "So, many of those young diagnoses may be valid."

Symptoms of the common disorder include inattention, hyperactivity and impulsive behavior, which can affect a child's ability to learn.

The study was done by Susanna Visser, a researcher at the U.S. National Center on Birth Defects and Developmental Disabilities, and published in a Sept. 3 report from the U.S. Centers for Disease Control and Prevention.

The researchers interviewed nearly 3,000 parents of children ever diagnosed with ADHD and 115 parents of children diagnosed with Tourette's syndrome. About half the children with ADHD had been diagnosed before age 7, and 31 percent had been diagnosed before age 6.

Among the children diagnosed before age 6, a parent or other family member was the first one to become concerned about the child's attention or behavior in three of every four cases, the

researchers found.

Just over half the children with ADHD received their diagnosis from a general pediatrician or family doctor. Only a quarter of the children diagnosed before age 6 had seen a psychiatrist for their diagnosis, but children were even less likely to get their diagnosis from a psychiatrist as they grew older.

"One of the most striking things is that most providers are, in fact, trying to follow the guidelines -- trying to use rating scales and get information from multiple informants, like teachers, in addition to parents," Nigg said.

If doctors are using information from teachers in making a diagnosis, that suggests doctors are not making quick decisions in 15 or 30 minutes based only on a parent's description of their child's behavior, Nigg added.

Yet overdiagnosis may still be occurring, based on the report, said Dr. Danelle Fisher, vice chair of pediatrics at Providence Saint John's Health Center in Santa Monica, Calif.

"Overdiagnosis presents a number of problems, including being improperly labeled as ADHD if, in fact, another behavioral or psychiatric problem is the cause of the symptom," Fisher said. "This could also lead to overmedication of such children."

Both Fisher and Nigg suggested it is unwise to rush to a judgment of ADHD if a preschool child seems particularly boisterous or difficult to manage.

"Children are developing rapidly at that age, and many 4-year-olds who seem excessively hyperactive tend to stabilize during the major development shift from 4 to 6 years old," Nigg said. But he added that the situation can become too severe to wait it out sometimes.

"In cases where the child is unable to learn, unable to participate in group or preschool activities, or where a negative relationship is developing between parent and child, then a professional evaluation and intervention are likely indicated," Nigg added.

Several options may be available for parents, Fisher said.

"Firstly, parents should look into parenting classes in order to help them manage difficult or unruly behavior," Fisher said. "Secondly, if there is a family history of ADHD or other childhood behavior disorders, neuropsychological testing should be performed by a qualified professional, including a psychologist, psychiatrist or neurologist."

A key aspect of an ADHD diagnosis, she added, is that the symptoms occur across multiple settings, such as at home and at school.

"Parents should be wary of an ADHD diagnosis made on the observation of symptoms in only one

setting," Fisher said.

SOURCES: Joel Nigg, Ph.D., director, division of psychology, and professor, psychiatry, pediatrics and behavioral neuroscience, Oregon Health & Science University, Portland, Ore.; Danelle Fisher, M.D., vice chair, pediatrics, Providence Saint John's Health Center, Santa Monica, Calif.; Sept. 3, 2015, *National Health Statistics Report Number 81*

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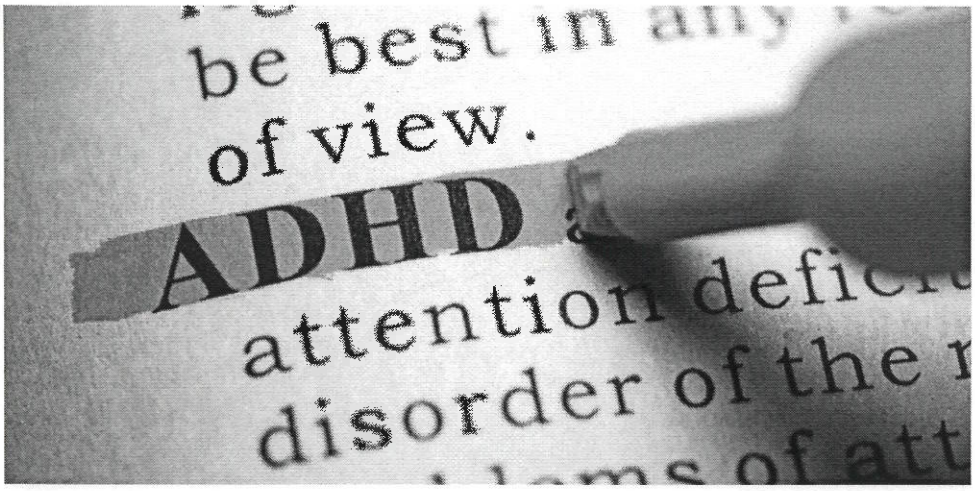
ADHD MYTHS: GET THE REAL FACTS

by The Jenny Evolution
The Jenny Evolution blog post, May 2017

When it comes to understanding Attention-Deficit/Hyperactivity Disorder, there are a LOT of ADHD myths out there!
The problem with a lot of these myths is it can easily mislead people into how they manage and approach the children with ADHD in their lives, not to mention getting the proper diagnosis and treatment!
Personally, I find the worst is when people judge my family and spout off these myths to me about my own child. Grrr.

ADHD MYTHS: GET THE REAL FACTS

When we first uncovered that my son has ADHD, one thing I noticed was there are a lot of myths and misinformation floating around. Seriously… what is a mom to believe?
In fact, the first time I ever told someone my son had ADHD, she casually commented that it seemed everyone was getting diagnosed with ADHD… basically implying that I was making this up or something!
"ADHD is a very real neurodevelopmental disorder that affects people of every age, gender, IQ, religion and socioeconomic background. It's characterized by a persistent pattern of inattention and/or hyperactivity and impulsivity that interferes with daily functioning and life's achievements, and can have potentially devastating consequences when not properly identified, diagnosed and treated."
— David W. Goodman, MD, FAPA, Assistant Professor of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine
The next time someone shoots off a judgmental comment to dismiss the real things you are facing with your child, keep in mind the most common ADHD myths and the facts debunking those myths.



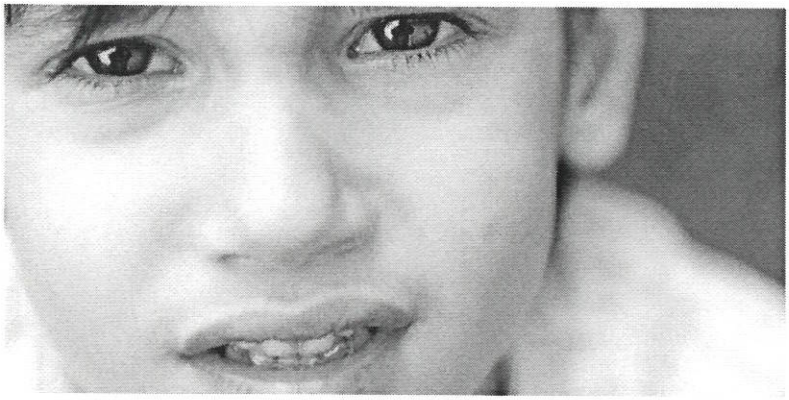
TOP 10 ADHD MYTHS

MYTH #1: ADHD ISN'T REAL.
Fact: Some may claim that only Americans are falsely "diagnosed" with ADHD; however, ADHD is recognized by the World Health Organization (WHO) as a neurodevelopmental disorder of international proportions, with scientific research conducted on every continent.

MYTH #2: BAD PARENTING IS THE CAUSE OF ADHD IN CHILDREN.
Fact: ADHD is found around the world in a diverse range of cultures, economies, social and educational systems. It is not the result of bad parenting.

MYTH #3: THERE IS NO CLEAR MEDICAL PROOF FOR ADHD.
Fact: Thirty years of medical imaging proves that there are multiple differences in the ADHD brain versus the normal brain.

MYTH #4: CHILDREN OUTGROW ADHD.
Fact: At least 60 percent of children with ADHD will continue to exhibit symptoms of the disorder to an impairing degree during adulthood.



MYTH #5: ADHD AFFECTS ONLY BOYS.
Fact: Girls are just as likely to have ADHD as are boys, and gender makes no difference in the symptoms caused by the disorder. But because this myth persists, boys are more likely to be diagnosed than girls.

MYTH #6: IF YOU WEREN'T DIAGNOSED WITH ADHD AS A CHILD, YOU CANNOT HAVE ADHD AS AN ADULT.
Fact: In the largest U.S. study of psychiatric disorders among the general population, 75 percent of adults with ADHD were never diagnosed as children.

MYTH #7: ADHD IS NOT PASSED DOWN THROUGH GENETICS.
Fact: Current research shows that 75 percent of ADHD diagnoses are linked to genetic causes.

MYTH #8: ADHD DOESN'T CAUSE SEVERE PROBLEMS.
Fact: ADHD life can be riddled with difficulties in functioning, interpersonal, social, academic and professional skills. It can lead to significant issues at school and work, relationship problems, anxiety, depression, financial struggles and legal difficulties, which is why proper diagnosis and treatment are key to supporting children and adults with ADHD.

MYTH #9: MEDICATIONS ARE TOXIC AND THERAPY DOESN'T WORK.
Fact: ADHD is highly manageable with an individualized, multimodal treatment that can include behavioral interventions, parent and patient training, educational support and medication. Also, ADHD medications have been proven safe and effective during more than 50 years of use. These drugs don't cure ADHD, but they are highly effective at easing symptoms of the disorder.

MYTH #10: ADHD IS OVER DIAGNOSED.
Fact: It is estimated that 17 million children and adults in the United States alone have ADHD. In many populations, ADHD is actually under-diagnosed. For example, studies show that black and Hispanic students in grades one through eight are significantly less likely to receive an accurate diagnosis, and when diagnosed, are less likely to receive medication.
The fact remains that many children and adults remain undiagnosed, while many who have been diagnosed are not receiving the proper treatment.

A special thanks to CHADD (Children and Adults with Attention-Deficit/Hyperactivity Disorder), for providing materials used to create this post. CHADD serves as home to the National Resource Center on ADHD, funded by the U.S. Centers for Disease Control and Prevention and is a leading resource on ADHD, providing support, training, education and advocacy for families, adults, educators and healthcare professionals impacted by ADHD.

EDUCATION WEEK
TEACHER

FIRST PERSON

10 Tips for a Smooth School Year for Students With ADHD

By Thomas Armstrong

August 30, 2017

It's a new school year, and many of the **6.4 million U.S. children ages 4-17** who've been diagnosed with attention deficit hyperactivity disorder are coming back to the classroom in varying states of readiness for the rigors of academic life.

The big question is: Are you ready for them?

ADHD is considered to be a neurobiological condition that has three primary symptoms: hyperactivity, impulsivity, and distractibility. Students diagnosed with ADHD may have difficulty focusing on classroom tasks, organizing their assignments, and even staying in their seats at school. I worked for five years as a special education teacher, and know that teaching kids with ADHD can be quite a challenge. While medications may help many students cope with the stress of coming back to the classroom, drugs alone often aren't enough. Here are 10 strategies to help students with ADHD have a smooth transition into the school year:

1. Let them fidget. **Fidgeting helps ADHD-diagnosed students focus better**, research shows. Naturally, you'll need to help them find a way to fidget without disturbing other students. Some teachers give students squeeze balls, while **others make use of elastic Bouncy Bands** stretched across the bottom of a desk or chair, so that kids can quietly bounce their legs as they do classwork.

2. Engage them in active learning. Studies suggest that when kids with ADHD are involved in passive learning, such as listening to a lecture or silently reading a book, **their symptoms become more pronounced.** But when they are *actively* involved in learning—through spirited class discussions, reading out loud, or writing activities—their behaviors become indistinguishable from those students without ADHD. Add collaborative, hands-on, and project-based learning to the mix, and you'll go a long way toward providing the extra stimulation ADHD-diagnosed students need.

3. Provide physical activity breaks. One of the reasons for the **skyrocketing rates of ADHD** (up 11 percent from 2003 to 2011, according to the Centers for Disease Control and Prevention) has to do with the decline in moderate to vigorous physical activity in the classroom. Plan on having an exercise break

every 20 to 30 minutes between lectures and textbook or worksheet learning. Some teachers play a video of aerobic exercises set to music that students can follow. Others use exercises from books such as Sarah Longhi's *Classroom Fitness Breaks to Help Kids Focus* (Scholastic).

4. Integrate the arts into lessons. Students with ADHD are burgeoning fountains of energy, and the creative arts help provide a channel for directing that energy toward constructive, rather than loose, ends. Have students put on an improvised play or puppet show to act out the plot of a story. Allow students to keep a sketch diary to record the visual thinking required in their math or science lessons. Permit students to work on history or social studies projects that integrate music or dance with words and numbers.

5. Take your teaching outdoors. When students diagnosed with ADHD are in natural environments such as gardens, parks, or woods, **their symptoms decrease**—often substantially. Some teachers take their students on walks through nature while reading aloud from a piece of literature. Others allow their students to do fieldwork outdoors when doing science observations, or carry on class discussions outside.

6. Allow students to make choices. Giving all of your students meaningful choices to make in the classroom will expand their repertoire of social and emotional skills while also empowering ADHD-diagnosed students with rewarding activities that can lessen their symptoms. Let them choose their own books to read, their own math problems to work on, their own homework assignment to complete, or their own long-term project to engage in.

7. Bring novelty into your lesson plan. Students with ADHD **get bored more easily** than typically developing students. Spice up your next lesson plan with a little something extra to grab students' interest. Wear a costume that goes with the lesson, such as an Einstein wig for science class. Draw pictures to go along with math problems. Find a few minutes during your history lecture to sing a song from the Civil War. Bring in an animal skeleton for an anatomy lesson.

8. Use interactive technology. With the development of new learning technologies—from virtual and augmented reality to video games that help develop focus and working memory—there is now a cornucopia of apps and programs for teachers to reach every kind of learner. Students with an ADHD diagnosis respond well to strong stimulation, so choose apps for them that include vivid colors and sound effects, frequent feedback on performance, and highly interactive lessons.

9. Share stress-management techniques. Give students strategies for remaining composed in situations when they're more likely to become stressed or hyper, including during testing or at the end of the school day. Have them practice deep breathing. Show them how to stiffen their muscles (like a robot) and then relax them (like a rag doll). Ask them to visualize their most peaceful image or scene (For some kids with an ADHD diagnosis, it might involve a monster truck rally.).

10. Promote positive teacher-student rapport. Kids with ADHD often have had previously difficult experiences with their teachers. Work hard to make sure that this doesn't happen in your own relationship. Greet them when they come into the classroom. Find out as much as you can about their strengths and abilities (you can ask parents about this during parent-teacher conferences), and let them know you see the best in them. Finally, short-circuit difficulties by having 1-on-1 student-teacher conferences to work out misunderstandings and mistakes.

Having kids with ADHD in your classroom doesn't need to add to your teaching burden. By recognizing what students are best at and capitalizing on their strengths, you can transform difficulties into opportunities and provide these students with a successful school year.

CAREERS

The 5 Best Jobs for People With ADD and ADHD

Kristen Bahler
Sep 11, 2017

A common scapegoat for the bored, forgetful, and disorganized, Attention Deficit Hyperactivity Disorder (ADHD) and Attention Deficit Disorder (ADD) are referenced so frequently (and often flippantly) that a diagnosis can seem more colloquial than medical. But for roughly 4% of adults, it's a serious neurological condition. And the poor concentration, restlessness, and impulsivity that accompanies it can easily derail a career.

"People are struggling with this," says David Ballard, Ph.D., assistant executive director of the American Psychological Association's Center for Organizational Excellence. "Research suggests that people with ADHD are often underutilized, underemployed, and in jobs that are below their actual capabilities. Often, how they're functioning may not reflect how smart and capable they actually are."

Certain accommodations, like organizational systems that manage workflow and desk spaces designed to minimize distractions, can help some employees with ADHD function effectively, Ballard says. But like every other group of people, this is a diverse bunch — there's no job, industry, or task that will resonate with all of them.

There are some jobs, however, that attract more ADHD employees than others. If you (or your kid) has been diagnosed, here's a mini-career guide to the big ones.

Entrepreneur

Roles that are challenging, rewarding, and ever-changing offer an escape from the usual office drudgery. ADHD employees tend to gravitate towards these jobs and research suggests they may be uniquely positioned to succeed in them.

A report published last year in the *Journal of Business Venturing Insights* suggests that for entrepreneurs with ADHD, symptoms like hyperfocus and impulsivity could actually give them an edge.

The study, led by Johan Wiklund, Ph.D., of Syracuse University, tapped a group of entrepreneurs who had been previously diagnosed with the condition.

"For people with ADHD, what is appropriate is to act, not think or wait; to seek novelty," it says. "Our results suggest that ADHD symptoms—despite their otherwise negative connotation—convey a different logic, which seems better attuned to entrepreneurial action."

Jim Fowler, founder and CEO of the business insight platform Owler, says this isn't a secret in the business world.

"You don't meet many entrepreneurs who are good at focusing on one thing for a long time," he says. "In this business, you wake up in the morning, look in the mirror, and see the person to blame if things don't work. That solves a lot of the potential boredom issues. I wear a lot of hats, and I jump from department to department. I have ADD, so it's perfect for me. "

Sales

"There's a certain adrenaline rush that comes with sales," Fowler says. "It's constantly changing, every sale has a new

process. I came up through the tech industry in sales, and I loved it."

In a column for ADDitude magazine, clinical psychologist and ADHD specialist Russell Barkley writes that sales positions have indeed provided a successful career path for some of his adult patients.

"These jobs involve freedom of movement, changes in setting, a flexible schedule, frequent meetings with new contacts, opportunities for talking and social interaction, and passion for the product," he writes. "Adults with ADD/ADHD may need assistance back at the home office with completing reports and paperwork, but they do well in the field."

Food Industry

Cooking, bartending and serving gigs offer a mix of creativity, instant gratification, and quick, manageable tasks — a good combination for some people with ADHD, according to Barkley.

"Unusual or flexible hours, with sporadic ebb-and-flow pacing, add just the right touch of excitement to keep you alert and focused on the work at hand," he writes in the ADDitude column.

There are some wild success stories in the ADHD-culinary arts word. In interviews earlier this year, California's Jeremy Fox and London's Gizzie Erskine spoken candidly about their diagnosis.

Last year, the UK-based chef Heston Blumenthal told the education news site TES that he struggles "quite severely" with the condition.

"But I wouldn't change it for the world," he says. "I have a very busy head."

Medical work

Medical professionals like nurses and emergency room staff are constantly on their toes, leaving little room for the redundancies that tend to make ADHD employees cringe.

"In the medical field you truly do not know what to expect every time you step into your place of work," says Joel Klein, a New York-based business coach and producer of *BizTank*. "There are so many new faces that you see every day, new circumstances, different results. And making a difference in other people's lives gives you the drive and energy to keep going and not get bored."

In a recent Reddit thread for people with ADHD, users made a long list of the jobs they've found amenable to their condition. Hospital escorts, X-ray technicians, and therapy assistants were among the many medical professions that made the cut.

Teaching

Teaching requires self-direction, ample preparation, and lightning-quick reactions — a good fit for some ADHD minds.

"It's a job that does not require you to sit at a desk, read through emails and have the same type of experience every day," Klein says. "You hardly will teach the same thing twice, and when you do, it's to a different audience. No two days are the same, especially when you work with small children."

Tulsa-based career coach Mike Whitaker, author of *The Decision Makeover*, says that for ADHD employees who fear the mundane, teaching and other "interactive positions," (career coach, waitress, personal assistant, physical therapist) are the

best career bet.

"You don't know how your day is going to go, and that is interesting and challenging," he says. "You respond to the needs, questions, requests and urgency of other people. It is less predictable and more varied in what is asked of you."

http://time.com/money/4935349/best-jobs-attention-deficit-hyperactivity-disorder-add/?utm_source=time.com&utm_medium=email&utm_campaign=the-brief&utm_content=2017091211am&xid=newsletter-brief

ADHD May Have Different Effects on Brains of Boys and Girls

Study findings might explain different behaviors seen in genders, experts say

By Tara Haelle
HealthDay Reporter

THURSDAY, Oct. 22, 2015 (HealthDay News) -- Attention-deficit/hyperactivity disorder (ADHD) manifests itself differently in the brains of girls than in the brains of boys, new research suggests.

The results may help scientists better understand how ADHD affects boys and girls in unique ways, the researchers said.

"The findings showed differences in the white matter microstructure between boys and girls," said study co-author Lisa Jacobson, a pediatric neuropsychologist at the Kennedy Krieger Institute, in Baltimore. White matter helps different regions of the brain communicate with each other.

"These structural differences were associated with observed behavioral differences," Jacobson said. "Taken together, our findings provide preliminary evidence for unique differences in the brain's white matter structure and function between boys and girls with ADHD."

Kathryn Moore, a psychologist at Providence Saint John's Child and Family Development Center in Santa Monica, Calif., said, "Females are more likely to present with the inattentive symptoms of ADHD, while males are more likely to present with hyperactive and impulsive features of ADHD."

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Moore, who was not involved with the new research, noted that the study authors could not explain the reasons for their findings. ADHD is also diagnosed in boys at about twice the rate as in girls, she said, but this study does not necessarily explain why that is.

"The most striking finding in this study is that there are differences in brain functioning between boys and girls with ADHD," Moore added. "Perhaps the disorder of ADHD is caused by these neurological differences, or perhaps ADHD causes these neurological differences."

For the study, 120 children between the ages of 8 and 12 had a type of MRI called diffusion tensor imaging, which allows researchers to see neurological differences in the brain. Half of the children had been diagnosed with ADHD. The children without ADHD were matched to the children with ADHD, based on age, IQ and handedness (being left- or right-handed). Each of the groups, with and without ADHD, had 30 boys and 30 girls.

The researchers found several differences in the white matter of children with ADHD compared to those without ADHD, but the variations showed up in different parts of the brain based on gender.

In boys with ADHD, the differences showed up in the primary motor cortex, a part of the brain responsible for controlling basic motor functions. In girls with ADHD, the differences appeared in the prefrontal regions of the brain, which control motivation and ability to regulate emotions, the study authors said.

It's possible that the differences seen relate to how the different sexes mature, suggested Dr. Glen Elliott, chief psychiatrist and medical director of Children's Health Council in Palo Alto, Calif.

"Boys and girls differ in a number of different ways, obviously including rates of maturation," Elliott said. He added that differences in the brains of males and females are present even during fetal development.

"Certainly some aspects of these findings might be reflective of previous studies done by other researchers showing that ADHD is associated with a delay in maturation, especially of frontal brain structure," Elliott said.

Moore explained that the differences seen in the brain functioning of people with ADHD, regardless of sex, is generally in the same larger region of the brain, the frontal lobe. The frontal lobe controls executive functioning, which involves "impulse control, decision-making, cognitive flexibility and planning," she said.

Elliott said: "Possibly more relevant are the findings that, as they move through their teens into adulthood, boys with ADHD tend to get into trouble with externalizing problems, such as conduct disorder and reckless behaviors, while girls with ADHD have, in general, a more internalizing presentation, with depression, anxiety, eating disorders and self-harm."

But none of this might make a difference in how the disorder is treated, Elliott said.

"The 'why' of these differences remains unclear and could well be associated with quite distant other parts of the brain that connect to the regions being studied," Elliott said. "Similarly, the findings do not really suggest unique treatment options."

The primary first-line treatment for ADHD is still medication, usually stimulants, Moore said.

"Most psychologists would also advocate for additional interventions, such as using rewards and consequences to shape behavior, learning better problem-solving skills and increasing effective communication between parents and the child," Moore added.

The study findings were published Oct. 22 in the *Journal of the American Academy of Child and Adolescent Psychiatry*.

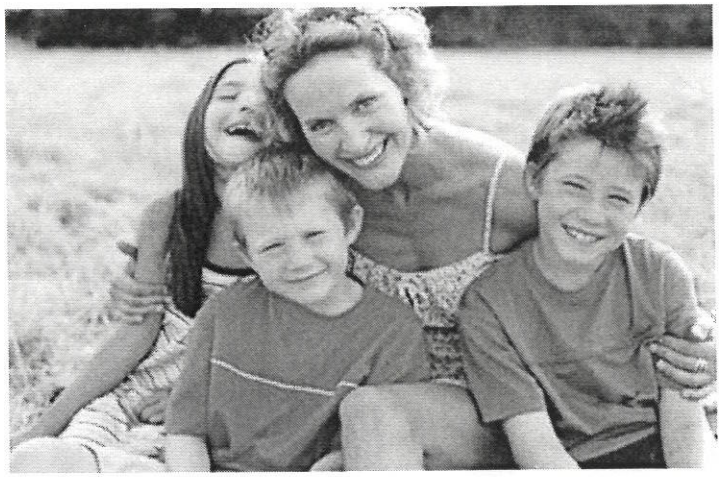
More information

For more about ADHD, visit the U.S. Centers for Disease Control and Prevention.

SOURCES: Lisa Jacobson, Ph.D., psychologist and pediatric neuropsychologist, department of neuropsychology, Kennedy Krieger Institute, Baltimore; Kathryn Moore, Ph.D., psychologist, Providence Saint John's Child and Family Development Center, Santa Monica, Calif.; Glen Elliott, Ph.D., M.D., chief psychiatrist and medical director, Children's Health Council, Palo Alto, Calif.; Oct. 22, 2015, *Journal of the American Academy of Child and Adolescent Psychiatry*

Parenting Children with Learning Disabilities, ADHD, and Related Disorders

ldaamerica.org/what-do-parents-of-children-with-learning-disabilities-adhd-and-related-disorders-deal-with/



Children with learning disabilities, attention deficit/hyperactivity disorder (ADHD), and related disorders puzzle parents because of their many abilities and disabilities. It can also be difficult to understand how much of their behavior is the nature of the condition and how much is oppositional. It is all too easy for parents to sense a child's feelings of inadequacy and then feel bad as a parent. Parenting approaches that include clear, concise instructions; structure without rigidity; nurturing a child's gifts and interests; and constant approval of positive behavior help parents feel better and help children feel safe. It takes time for both children and parents to embrace the concept that being different does not mean being inferior and, in fact, can be a good thing. Parents need to be nurtured and praised to help them nurture and praise their children. Most parents use almost every resource they have to help their children flourish, and still, they worry they are not doing a good enough job. Usually they are!

Introduction

Few people realize how difficult it is to be a parent… until they become a parent. Parents are totally responsible for the safety, welfare, and education of a tiny infant who quickly becomes a growing, ever-changing, maturing child. Parents have to set their own rules, develop their own routines, and form their own expectations. When parents are married, differences of opinions have to be worked out with the greater good of the child held aloft. If it is difficult to be a parent, it is even more difficult to be a parent of a child with special needs.

Discovering the Problem

Discovering a child's special needs is often a confusing and painful process for parents. First of all, because learning difficulties can be subtle, multiple, and difficult to pinpoint, it can be hard for parents to know whether things are normal or not. Especially with a first child, parents may not know when to expect vocalizing, playing with sounds, and learning to speak. It is also difficult to distinguish between a healthy, very active toddler and a hyperactive toddler with ADHD. What is the difference between the child who is a little clumsy (which will be outgrown) and a child having significant motor skills problems? What are the indications of children being off course in their ability to listen and follow directions? It may take some time for parents to recognize and articulate concerns.

Even after a diagnosis, parents often face a whole gamut of emotions before they can grapple effectively with the stark truth that their child has learning disabilities. Parents may move through emotions like Kubler-Ross' (

1980) stages of grief, initially denying there is a problem and rationalizing why it's not a problem, then having to deal with the fear, the anger, and the guilt of having a child who experiences many difficulties. It is normal for parents to want to blame somebody – anybody – and to bargain in the sense of thinking that changing neighborhoods, schools, or doctors might make the problems go away. Grieving for what might have been follows, and finally parents can come to accept the child's strengths and weaknesses and try to figure out a helpful plan of action (Kubler-Ross, 1980; Smith, 1995).

Neurologic Basis

Parents often feel guilty because they feel their child's learning disabilities, ADHD, and related disorders are somehow their fault. But, that is not true. Parents may tend to feel that if they had been stricter, demanded more, forced more practice, it would have changed the situation. That would not have changed the situation.

Children and adults with learning disabilities often have clusters of difficulties that lead to academic failure or low achievement. These disabilities emanate from a neurophysiological base. It is as though the switchboard of the brain short circuits some of the information coming in, scrambles it, and then loose wires interfere with the ability to get that information out. This neurological dysfunction contributes to disorder, disorganization, and problems with communication. Parents can be reassured that these problems are organic and are not caused by external factors (Smith, 1991; 1995).

For years there have been nay-sayers who claim that there is no such thing as learning disabilities – that there are lazy children and motivated students, that there are stupid children and bright students. However, technological advances over the last 5-10 years have laid those issues to rest. Brain researchers using magnetic resonance imaging (MRI) have shown differences between the brains of individuals with learning disabilities and those without (Dr. Martha Denckla, personal communication). Researchers have also found images of ADHD in the central nervous system (Dr. Xavier Castellanos, personal communication). The architecture of the brain of the child with learning disabilities is different.

Brain researchers also point out that neuronal links in the brain typically travel in particular patterns, but in individuals with learning disabilities, they are scattershot all over the brain, resulting in unusual linkages (Dr. Gordon Sherman, quoted in The Doctor is In, 1988). Consequently, exceptional disabilities are often linked with exceptional abilities. As an example, for over 35 years, graduates of the Lab School of Washington have become very successful in the arts as graphic artists, film makers, fashion designers, jewelry makers, actors, architects, photographers, musicians, dancers, and computer graphic specialists. A number of the graduates have also become highly successful entrepreneurs and business executives. Parents can take reassurance in the fact that many abilities usually accompany the constellation of problems or cluster of difficulties that constitute learning disabilities.

Understanding Behaviors

It is often confusing to parent children with learning disabilities, ADHD, and related disorders. One of the biggest confusions and challenges parents face is the large hiatus between what the children can do and what they cannot do. Often they are very smart, know a great deal, and reason well, yet cannot read or write. School teachers and family may be telling them to try harder, and they are usually trying their hearts out. They tend to work 10 times harder than everyone else does, but still they may be called lazy.

Another aspect of the confusion for parents lies in how hard it can be to distinguish between a child who can't do something and a child who won't do something. For parents, it can be vexing not to be able to control a 5 or 6-year-old or to know whether to push an adolescent or reduce expectations. In this confusion, parents tend

to ask, What is wrong with me? rather than What challenges is my child having to face? Shifting this focus can be therapeutic for parents and children.

Children may seem to be having behavior problems when, in fact, they are confronting difficulties in accomplishing a task. Children tend to withdraw or act out when a task is too demanding. It can help parents to know that when children say they hate something that usually serves as a wonderful diagnostic tool, indicating what is difficult or impossible for them. For example, when a child loves dance, art, and music but hates drama, it could be that the child has a speech/language problem. When a child hates math or reading, these are likely areas of difficulty. Conversely, what children like and want to do usually serve as indicators of their strengths.

While a diagnosis will help to some extent, the job of sorting out these issues on a day-to-day basis is no small task. On a planning level, confusion occurs because teachers, doctors, psychologists, and social workers may disagree not only on diagnosis but on the best treatments or programs for a child. This can be frustrating and anxiety-provoking for parents who have to pull all the information together and decide what to do, right or wrong. Additionally, at home and elsewhere, parents must anticipate problems and sense when their children are tired, or frustrated, or about to explode. Parents must trust their guts as to how long the child can last at a party, or sit in a restaurant, or be pleasant with visitors. While parents have to do this with all children, it is much more challenging with this population.

Parents of children with special needs are constantly trying to puzzle out what's working, what's not working, what causes the child's frustration, and what brings the child pleasure. Parents have to analyze everything, think carefully, reflect on activities of each day, and problem solve to recognize the child's strengths, interests, and areas of difficulty, and come up with plans for managing the child's behavior and supporting the child's development.

The Family with the Child with Special Needs

Learning disabilities can be hard on a family. One parent, often the mother, may recognize and face the problem sooner or more readily than the other. Misunderstanding and conflict can result. Brothers and sisters often resent the amount of attention given to a child with special needs and may proclaim knowingly that the child is a spoiled brat who is perfectly capable. Grandparents tend to blame parents for not doing enough, not being disciplined enough, organized enough, or not giving enough direct help to the child. Neighbors can be intolerant if the child is very hyperactive or has low frustration tolerance and tends to explode or cry at each hurdle.

On a daily basis, children with special needs typically raise the irritant factor in family life. They tend to leave everyone on edge because their behavior is unpredictable, erratic, inconsistent and full of ups-and-downs. Children with learning disabilities and ADHD are usually very disorganized. They have trouble dealing with sequences and order, so they don't plan well. They are distracted easily and often impulsive. Just getting washed and dressed in the morning can be an arduous task. Sometimes resulting in explosions on the part of the children, their parents, or both. Clashes frequently emanate from a child's misunderstanding of instructions or going off on a tangent. To complicate the problem, when wrong or criticized, children with learning disabilities tend to fall apart, withdraw into day dreaming, or strike out in one form or another.

Emotionally this population is very immature and fragile. These children tend to personalize things that have nothing to do with them. For example, when family members are laughing at something, children with special needs are often convinced that they are being laughed at, and, as a result, they get very upset. Furthermore, their moods swing widely, and a child may be laughing one moment, crying the next (Smith, 1995). This emotional lability is hard to live with. Children with learning disabilities and ADHD are prone to depression

(Smith, 1991). Their sense of defeat and failure is contagious and, sometimes, the whole family feels their helplessness and despair. Often adults, otherwise incredibly competent in their daily lives, feel incredibly incompetent when with these children. This can take a toll on parents, and support and education may be necessary to bolster parents' sense of confidence and competence in effectively parenting the child with learning disabilities.

Parenting Strategies

Addressing difficulties with time and space. Space and time are organizing systems involved in every task, every performance and every aspect of life. Yet, because of central nervous system dysfunction, neural immaturity that tends to disorder, and poor organization, many children with learning disabilities are very disorganized – unable to keep their rooms anything but a complete mess, unable to accomplish even the simplest task in a timely fashion, unable to follow instructions, likely to lose belongings frequently, and appearing lost in time and space. Problems with sequencing explain why they have trouble remembering the days of the week, seasons, the alphabet, counting, and the order of tasks and instructions. These problems are why they have trouble beginning projects, sustaining them, and finishing them. Poor organization not only affects home life and relationships with friends, who will take only a certain amount of forgetting and lateness, but also academic life. Poor organization means forgetting to bring home the homework or not having the time management skills to meet deadlines. It affects being able to establish priorities -what is most important to study, what is less so. Often this disorganized behavior looks oppositional and hostile, when actually it stems from the very nature of the learning disability.

Parents and teachers of children with learning disabilities can help them by providing clear structuring of time and space. To help children with structuring space, visual aids can be useful. For example, shelves can be used instead of drawers so children can see where things belong and how to put them back. The use of other visual cues, such as lists or labels, can augment efforts to help children organize tasks and belongings.

Developing understandable and reinforced routines can help with structuring time. Breaking routines and other tasks into manageable chunks and communicating what must be done first, next, and last is important. A large number of children with learning disabilities have language learning disabilities, which means they have trouble deciphering language, listening, and following instructions. Because of this, it is also helpful if parents and teachers limit the number of words used in giving directions, using simple phrases such as. Go upstairs. Close the window. Come down.

Parents can also assist their children by engaging them in planning activities. Examples include planning celebrations, planning a garden, organizing what needs to be done to collect food for the homeless, or any other kind of planning that involves developing lists, going shopping, checking off the lists, and then charting the tasks still to be done (which can then in turn be checked off). All of these projects are useful, engaging, and have the hidden agenda of working on organization skills.

Addressing relationship difficulties. While children with learning disabilities face challenges academically, a problem that many parents find more troubling than difficulties with the 3 R's (reading, writing, `rithmetic) is the 4th R: relationships. Many children with learning disabilities cannot play successfully with even one child and certainly not two. They don't read social signals: facial expressions, gestures, or tones of voice any more than they read letters or words. Additionally, many of these children are literal and concrete; they cannot deal with subtleties, nuances, inferences, or multiple meanings. This affects family life and peer relationships because they often cannot understand jokes, subtle teasing, or sarcasm. One of the consequences of this is that they have to be taught explicitly how to relate to others. Parents have to work with them on reading faces, reading gestures and movements, and learning what is and is not appropriate to say. Parents may have to coach them

through common social situations until they develop appropriate interpersonal behaviors.

Parents can provide their children with practice in anticipating what might happen in various social situations. They can role-play with their children about what to do or say when they want to join a game that their cousins or friends are playing, or when grandparents say, "Read this to me." Some parents have found it useful to show the wrong way of handling a situation and then to have their children critique them. The process of acting situations out, problem solving, and talking about the situations, helps many children with learning disabilities and ADHD think through various options.

Promoting self-esteem. Early on, children with learning disabilities begin to notice that others can do tasks easily that are intensely difficult for them, and they begin to feel bad about themselves. They may receive frequent criticism or, at best, global praise such as "You are doing better" (better than what?), "You are doing fine" (what is fine?), "You are making progress" (what is progress?). Criticism damages self-esteem, and global praise is often too abstract to be meaningful to concrete thinkers.

By training themselves to comment on the positive as much as possible, by offering concrete comments on what their child is doing well, and by using very specific praise, parents will cultivate desired behaviors and boost their children's self-esteem (Smith, 2001). Examples of specific praise include phrases such as: You finished the assignment, You are listening carefully, You are sitting properly and looking at me, You remembered to bring home the work you have do, You cleaned the table after dinner, You picked up the bag the lady dropped. Thank you. With specific praise, a child can be very clear on what behaviors are liked and expected.

Visual, concrete proof of progress also helps children notice and feel confident about their progress and accomplishments. Home made certificates, gold stars, stickers, charts, and check lists with lots of checks can be used when children work hard on tasks at home, such as remembering to take out the garbage, shopping without forgetting, setting the table correctly, making their beds, and putting the toilet paper into the holder when the last piece has gone.

Parents and teachers also boost children's self-esteem by seeking out what they can do well and fostering and supporting these areas to the hilt. Whether it is an art form, science, nature, photography, computer work, selling things, inventing, or telling stories, children with learning disabilities need parental support to become the best in this area at home and to bring their talent into school. It won't help them feel better about their academic performance, but it will help them feel better about themselves.

Teaching children that many people have overcome difficulties to become successful is another valuable parenting strategy. One way to do this is to read or play tapes of biographies in which children or adults have had to struggle to achieve their goals -adventures where the characters got lost or had to fight sharks or other beasts; stories of achieving despite illness or disability; or stories of fighting prejudice or unfairness. Children enjoy and benefit from discussing these kinds of challenges. Additionally, when parents can introduce their children to highly effective members of society who struggle with disabilities, particularly disabilities similar to those the child faces, children can hold their heads higher. All members of society who are functioning well with learning disabilities and ADHD – firemen, policemen, plumbers, day care center workers, business executives, park rangers, recreation coaches, athletes, and celebrities can serve as role models and inspiration for children with learning disabilities.

When parents learn to cherish diversity, their children learn there are many different ways to celebrate birthdays, get married, raise children, and so forth (Smith, 1994). These children feel better about themselves when they understand that doing things differently, learning differently, being different is OK, and that differences can enrich our lives. Artist Chuck Close said, *I think accomplishment is figuring out your own*

idiosyncratic solutions. Accomplishment is being able to do what you want to do even if you don't do it the way everybody else does it. (Smith, 1991, p. 703, and personal communication).

Empowerment. Children with learning disabilities and ADHD often feel powerless and inadequate. They tend to be passive learners and need to be totally involved in activities to make them active learners. Parents can encourage hands-on activities, such as cooking, cleaning, shopping, and running errands to show children that they can make things happen. These learning activities have the additional benefit of resulting in tangible, visible products appreciated by the whole family.

Parents must beware of doing too much for children with learning disabilities because that does not empower them. The effects of active engagement are in fact neurological. California neurobiologist Marion Diamond's research (Diamond & Hopson, 1998) shows that the sights and sounds of enriched environments cause dendrites to form neural pathways that she calls *magic trees of the mind.* Her data demonstrate that the curious mind, stimulated to further inquiry, makes the central cortex thicker, activating the brain to further enhance learning (Smith, 1995).

Parents can also empower their children to view obstacles as challenges and to know that they have a lot going for them and a team behind them. It helps children with learning disabilities when parents can adopt a problem-solving mode rather than always providing the answers. It helps to say. *What can we do about this? What options do we have? Let's figure out where we can find the information we need instead of doling out the right answer much of the time.* Parenting children with learning disabilities and ADHD demands enormous amount of problem solving, and on top of that, parents need to help turn their children into outstanding problem solvers. Grappling with adversity, figuring out strategies that work for them, and learning when to ask for help and who to ask are crucial life skills that these children must learn and will hold them in good stead.

Parents can foster curiosity in their children and lay the framework for thinking and questioning. When children's minds are questioning everything, their bodies are active, and their hands are into things, children are helped to achieve the highest cognitive development possible. Parents work with their children to develop critical thinking skills when they have them look at photos or drawings and piece together what could be going on; when the family watches a TV show and the children are asked what the big message was; when a mystery story has been read and the children guess who did it; or when a family plays games like chess, checkers, Clue,® and Stratego™. Children often can teach their parents how to work computers, and programs like HyperStudio® allow children to draw, to photograph, to speak, to scan objects from the Internet, and to make rewarding, satisfying multimedia presentations that simultaneously use and develop many skills.

Cultivating Parental Optimism

Because it can be frustrating to parent children with learning disabilities and behavioral challenges, it is encouraging for parents to know that some of the negative behaviors of their children very often become positive attributes in adulthood. For example, the most stubborn children often turn out to have fierce determination. The most manipulative children often turn out to be fabulous entrepreneurs, leaders, or politicians. The children who argue all the time like jail house lawyers actually become lawyers, and those who doodle and draw all through school may well become artists in adulthood. In 35 years of experience at the Lab School in Washington, DC, this pattern has been evidenced again and again. The boy who sold his mother's jewelry for 25 cents apiece grew up to be a real estate mogul. The boys who were tinkerers, taking everything apart, became mechanical engineers. The girl who tried to help her classmates avoid arguing, who was teased because she was always trying to make peace and never projected any opinion of her own, became a mediator – and a good one at that! Numbers of very hyperactive youngsters have turned out to be very energetic, productive entrepreneurs. The inflexible one way kids have often become scientists who study one

problem in depth for many years or airplane controllers who focus intensely on the task at hand. Many bright children with ADHD, who were impulsive, very distractible, and had poor attention spans, have grown up to be outstanding emergency health care specialists, paramedics, and firemen. In an emergency, their adrenaline is apparently stimulated, so they become highly focused, able to put their excellent analytic abilities to use while doing many tasks.

Self-care should be a priority for parents of children with learning disabilities. Parents themselves need nurturing to help nurture their child with special needs. They need to go out and have fun regularly. They need more sleep than other parents, for these children sap their energy, and their condition demands help from parents constantly. Finding supportive friends or relatives, or locating a support group or an online parent support community can provide a place for parents to vent frustrations and obtain valuable suggestions, strategies, and support. Laughter is also important for parents and the whole family. Children with learning disabilities and ADHD need to feel that it is not the end of the world that they have these disabilities – nuisances – and they need to laugh at some of the nonsense they go through. Parents, too, need lightness and humor. When parents can have fun with their children – even being silly and laughing – and can enjoy life as much as possible together, everyone benefits.

It is hard to be a grownup, difficult to be a parent, even more challenging to be a parent of a child with special needs when the parent must become the analyst, the interpreter, the problem solver, the cheerleader, the lawyer, the psychiatrist, the spiritual advisor, the organizer, the notetaker, the friend, companion, advocate, and disciplinarian. Most parents use every resource they have to help their child flourish, and yet, they worry they are not doing enough or a good enough job. Chances are parents are doing an incredibly fine job under difficult circumstances. Professionals need to realize and appreciate the heavy load carried by parents of children with learning disabilities, ADHD, and other related disorders.

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By Erica Patino

What You'll Learn

Many people think of "learning disabilities" as issues with verbal skills such as reading or writing. But what if your child has strong verbal skills and a big vocabulary, but doesn't understand when somebody is being sarcastic? What if he reads at an advanced level but can't tell you the most important parts of the story?

These are classic signs of nonverbal learning disabilities (NVLD). NVLD is a brain-based condition that affects skills like abstract thinking and spatial relationships. While NVLD can affect your child's learning in many ways, it creates an even bigger challenge when it comes to your child's social life. Read more about the signs of NVLD, possible treatments and ways you can help your child at home.

What are nonverbal learning disabilities?

Many learning and attention issues create social challenges. But these are the main symptoms of NVLD. NVLD affects a child's social skills, but not his speech or writing skills.

Children with NVLD tend to talk a lot, but they don't always share in a socially appropriate way. Or they might not relay the most important information. They often miss social cues, so making and keeping friends is a big challenge. There can also be misunderstandings with teachers, parents and other adults.[1]

Unlike kids with language-based learning disabilities like dyslexia, kids with NVLD have trouble understanding communication that *isn't* verbal. That includes body language, tone of voice and facial expressions.

When a classmate says something in a teasing voice, a child with NVLD may think it's serious. He may also laugh at something serious if the speaker is smiling a little. Not getting the subtle, unspoken messages people send out makes it hard to form friendships and fit in with other kids.[2]

To better understand what nonverbal learning disabilities are, it helps to know more about language-based learning disabilities. Kids with those issues have trouble with reading, writing and spoken language. Their speech and language skills tend to be weak; they struggle with accuracy and speed in their work.[1]

Some children with NVLD have good language skills, but they have trouble sorting through information and understanding bigger concepts. They may not have issues with written or spoken language. But they may think in literal terms and miss subtle, nonverbal cues.[3]

Researchers don't know the exact cause of NVLD. But they believe it's related to differences in various brain processes located in the left and right regions of the brain.[4]

Although there's growing awareness of the condition, NVLD is controversial in medical circles. It does not appear in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), the latest update of the guide used by doctors and therapists to diagnose learning disabilities.[5]

Also, NVLD is not recognized as a disability covered by the Individuals with Disabilities Education Act (IDEA). Children with NVLD-related symptoms may still be eligible for special education services if they're found to have a specific learning disability that's interfering with educational progress.

NVLD can make learning difficult, but that doesn't mean a child with NVLD isn't bright. Like most kids with learning disabilities, kids with NVLD typically have average or above-average intelligence.[1] It's also important to know that NVLD is not the same as Asperger's syndrome or autism, though each can affect social skills and social interaction.

How common are nonverbal learning disabilities?

It's hard to know exactly how many kids have NVLD. That's because there's no clear definition of what this category of learning disabilities includes.[1] Studies estimate that around 1 in 100, or 1 percent, of kids in the United States may have NVLD.[6] It tends to affect boys and girls about equally. It doesn't seem to run in families the way attention issues and language-based learning disabilities do.[7]

NVLD often coexists with Asperger's syndrome. In fact, studies suggest that up to 80 percent of kids with Asperger's also have NVLD-related symptoms.[8] NVLD symptoms may coexist with ADHD, though statistics aren't available.[9]

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What causes nonverbal learning disabilities?

Experts don't know the exact cause of NVLD-related symptoms. But they are looking into a number of theories involving differences in important brain processes and functions in the left and right sides of the brain.

There's a lack of consensus among experts regarding whether NVLD exists and what could be the underlying causes for NVLD symptoms. For example, some experts think the issues may be caused by damage to the part of the brain that sends signals between the two sides. Others think the problems may lie with the frontal lobe of the brain, an area of the brain that includes executive functioning skills such as working memory, organization and planning.[3,7]

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What are the symptoms of nonverbal learning disabilities?

While symptoms of NVLD may include poor social skills, NVLD may show up in other ways. For example, children with NVLD *may* struggle with math, reading comprehension, writing, and/or physical coordination. Here are some of the symptoms you may be seeing in your child.

- Remembers information but doesn't know why it's important
- Shares information in socially inappropriate ways

- Pays attention to details but misses the big picture
- Struggles with reading comprehension
- Struggles with math, especially word problems
- Is physically awkward and uncoordinated
- Has messy handwriting
- Thinks in literal, concrete terms
- Misses social cues such as verbal and/or nonverbal expressions, which may make your child seem "off" to others
- Has poor social skills
- Stands too close to people
- Is oblivious to people's reactions
- Changes the subject abruptly in conversation
- Is overly dependent on parents
- Is fearful of new situations
- Has trouble adjusting to changes

Kids with NVLD are often misunderstood because of these behaviors. Peers and adults may see them as odd or immature. Without knowing a child has NVLD, a teacher may think he's inattentive or defiant.

Symptoms May Change as Children Get Older

Young children with NVLD may seem bright and precocious because they have good verbal skills. They're like little professors, asking adults lots of questions and spouting off information they've heard. Some children may have good memory, but they also can have trouble interpreting and drawing conclusions from what they read.

But as kids get older, the symptoms of NVLD may become more obvious and create more problems. Kids realize they perceive social situations differently than their peers, but don't know what to do about it.[10] Some develop anxiety, which can lead to compulsive behaviors such as touching a doorknob a certain number of times before opening it.

The earlier you know about your child's issues, the sooner you'll be able to find treatments and strategies that can help build social skills and relieve anxiety.

What skills are affected by nonverbal learning disabilities?

NVLD doesn't affect all kids in the same way or to the same degree. But for most, the condition will have some impact on the following skills:

- **Conceptual skills:** Trouble grasping large concepts, problem-solving and cause-and-effect relationships.
- **Motor skills:** Problems with coordination and movement. This includes gross motor skills (like running and kicking), fine motor skills (like writing and using scissors), and balance (such as riding a bike).
- **Visual-spatial skills:** Has trouble with visual imagery, visual processing, and spatial relations. Kids may remember what they hear, but not what they see.
- **Social skills:** Difficulty picking up on social cues and sharing information in a socially appropriate way. They may not understand sarcasm or teasing, and may interrupt in the middle of conversation.
- **Abstract thinking:** Trouble with reading comprehension and understanding the "big picture." Kids may be good at memorizing details but not at understanding the larger concepts behind them. They may also have trouble organizing their thoughts.[11]

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How are nonverbal learning disabilities diagnosed?

Nonverbal learning disabilities aren't included in the *DSM*, the manual psychologists and other professionals use to make a diagnosis. But you can still have your child evaluated to find out if he has NVLD.

Since there is no single test for NVLD, getting a diagnosis involves a number of steps, including:

Step 1: Get a medical exam. Your child's primary doctor probably isn't an expert in learning issues, but starting here allows you to talk about your concerns and find out if a medical condition could be causing your child's symptoms. The doctor can rule out some conditions, but you may be referred to a specialist such as a neurologist for further evaluation.

Step 2: Get a referral to a mental health professional. After ruling out medical causes, your child's doctor will likely refer you to a mental health professional such as a child neuropsychologist. The specialist will talk to you and your child about your concerns. Then he'll use a variety of tests to evaluate your child's abilities in these areas:

- **Speech and language:** Speech development in younger kids; and verbal skills, understanding of abstract ideas and use of context in older kids
- **Visual-spatial organization:** The ability to connect visual information with abstract concepts, such as telling time and reading a map
- **Motor skills:** Fine motor skills like drawing and writing, and gross motor skills like throwing and catching objects

The specialist will look at how your child performs these skills, and will ask you about the symptoms you see in your child.[4,12]

Step 3: Put the pieces together. After gathering all the information, the specialist will look for a pattern of strengths and weaknesses that are common in kids with NVLD. This will help determine if your child has the condition.[12]

Common Strengths

- Average to above average intelligence
- High verbal scores
- Early language development
- Strong ability to remember and repeat spoken information
- Learns better by hearing information than by seeing it

Common Weaknesses

- Social skills
- Balance, coordination and handwriting
- Understanding cause and effect
- Visualizing information
- Activity level (high when young; low when older)

What conditions are related to nonverbal learning disabilities?

NVLD is the condition most closely associated with social skills issues. However, there are several other conditions that make it hard for kids to connect. These conditions are separate, but they can occur along with NVLD.

- **ADHD:** Kids with NVLD may first be misdiagnosed with ADHD. The two conditions have some similar symptoms, such as excessive talking, poor coordination and interrupting conversations. But ADHD isn't a learning disability. It's a brain-based condition that can make it difficult for kids to concentrate, consider consequences and control their impulses.[9]
- **Language disorders:** These are problems with talking (expressive language disorder) and understanding (receptive language disorder) language. Kids with these conditions may have trouble understanding and using gestures, following directions and knowing how to maintain a conversation.[1] NVLD also may resemble some symptoms of social (pragmatic) communication disorder.
- **Asperger's syndrome:** This is a developmental disorder that affects a child's ability to socialize and communicate clearly with others. It falls on the mild end of the autism spectrum. There is a lot of overlap in the symptoms of Asperger's syndrome and NVLD, and studies suggest that up to 80 percent of kids with Asperger's also have NVLD. But they are separate conditions.[8]

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How can professionals help with nonverbal learning disabilities?

There are a number of therapies and educational strategies that can help your child manage and work around NVLD symptoms. These include:

- **Social skills groups** to teach kids how to handle social situations such as greeting a friend, joining a conversation, and recognizing and responding to teasing.
- **Parent behavioral training,** run by a psychologist, to help parents learn how to collaborate with teachers. It also can teach parents how to help kids with social skills in playdates and extracurricular activities.
- **Occupational therapy** to build tolerance for outside experiences, improve coordination and

enhance fine motor skills.

- **Cognitive therapy** to help deal with anxiety and other mental health issues.
- **Your child's school** to determine what services might be available.

NVLD is not one of the disabilities covered by IDEA. This means having NVLD does not make him eligible for special education services. However, if you and the school think your child needs special education services, the school may test him and identify him as having the most similar disability covered by IDEA. This would allow him to have an Individualized Education Program (IEP).

Another option may be for your child to receive services under Section 504, which is less restrictive in the types of disabilities it covers.

Once your child has an IEP or a 504 plan, you and the school will decide what accommodations and modifications his education plan should include. NVLD and "new" methods for treating it are still considered controversial. For that reason, the school may prefer to use "tried-and-true" methods for helping your child. That should work well as long as the plan addresses your child's specific challenges.

If your child doesn't qualify for either an IEP or a 504 plan, the school may be willing to give him informal accommodations.

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What can be done at home for nonverbal learning disabilities?

Parenting a child with NVLD can be challenging, but there are many things you can do at home to help your child manage symptoms and learn social skills. You can also try some of the strategies from our behavior experts. These steps can help you make positive changes in your child's life and in your family life.

- **Think about how you say things.** Remember that kids with NVLD have trouble sensing sarcasm and tone of voice, and they're likely to take instructions literally. For example, if you say, "Don't let me see you playing with that toy," he might continue playing with the toy but turn his back so you can't see him. Give clear instructions such as, "Please put that toy down and come over here."
- **Help with transitions.** Kids with NVLD tend to dislike change because it's hard for them to understand. They may not have the abstract thinking skills needed to envision what's going to happen next. You can prepare your child for a change in routine by using logical explanations.

Instead of saying, "We're leaving soon to have dinner with Grandma," try "We're going to eat dinner at Grandma's house tonight because it's her birthday. We need to leave in an hour."

- **Keep an eye on your child.** Kids with NVLD can become overwhelmed by too much sensory input, such as noise, smells, sounds and temperature. Try to avoid situations that could trigger those reactions in your child.
- **Encourage playdates.** Help your child find kids who are interested in the same things he enjoys, whether it's comic books or cooking. Set up one-on-one playdates at your home, so your child can get social experience in a familiar setting. Make sure to keep the playdate structured, organizing activities to keep your child and his friend busy. It's also a good idea to plan playdates for a time of day when your child tends to be on his best behavior.

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What can make the journey easier?

Whether you're just starting your journey or are well on your way to understanding NVLD, there are many ways you support your child.

- **Take notes.** Keep track of the behaviors and symptoms you see in your child and when and where they happen. Your observations will provide valuable information for the professionals who can help your child.
- **Take your notes to your child's doctor** to discuss possible next steps. That might include referrals to a psychologist who can conduct a comprehensive evaluation and figure out a treatment plan.
- **Talk with your child's teacher** to see what problems your child is having in the classroom. Ask about what interventions have been used and which, if any, are effective. You also may want to talk to the school about whether your child may need special education services.
- **Connect with other parents.** You can find other parents who are dealing with the same issues you are in our online community.

NVLD can cause both social and academic challenges for your child, and there's no surefire way to treat it. But there are many supports, therapies and strategies that can help your child build social skills and recognize weaknesses. Learning as much as you can will help you make the best choices for your child.

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Key Takeaways

- **The diagnosis of NVLD is controversial among doctors and psychologists.**
- **NVLD isn't recognized as a disability under the Individuals with Disabilities Education Act, but there are still ways kids with NVLD could be eligible for special education services.**
- **There are therapies and strategies that can help kids with NVLD at home and at school.**

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About the Author

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Reviewed by

Linda Reddy, Ph.D., is a professor of school psychology at Rutgers University.

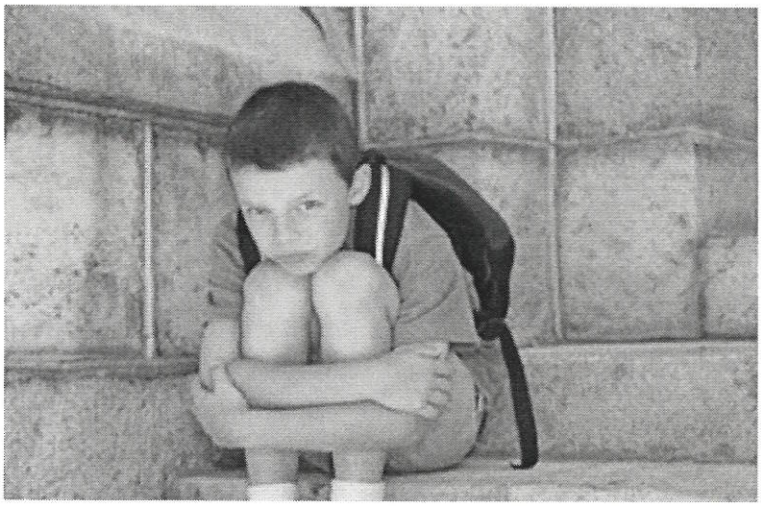
Most Shared

1
The Difference Between Sensory Processing Issues and ADHD

Non-Verbal Learning Disabilities

ldaamerica.org/types-of-learning-disabilities/non-verbal-learning-disabilities/

Has trouble interpreting nonverbal cues like facial expressions or body language and may have poor coordination.



Non-Verbal Learning Disability (NVD or NVLD), is a disorder which is usually characterized by a significant discrepancy between higher verbal skills and weaker motor, visual-spatial and social skills.

Signs and Symptoms

- Has trouble recognizing nonverbal cues such as facial expression or body language
- Shows poor psycho-motor coordination; clumsy; seems to be constantly "getting in the way," bumping into people and objects
- Using fine motor skills a challenge: tying shoes, writing, using scissors
- Needs to verbally label everything that happens to comprehend circumstances, spatial orientation, directional concepts and coordination; often lost or tardy
- Has difficulty coping with changes in routing and transitions
- Has difficulty generalizing previously learned information
- Has difficulty following multi-step instructions
- Make very literal translations
- Asks too many questions, may be repetitive and inappropriately interrupt the flow of a lesson
- Imparts the "illusion of competence" because of the student's strong verbal skills

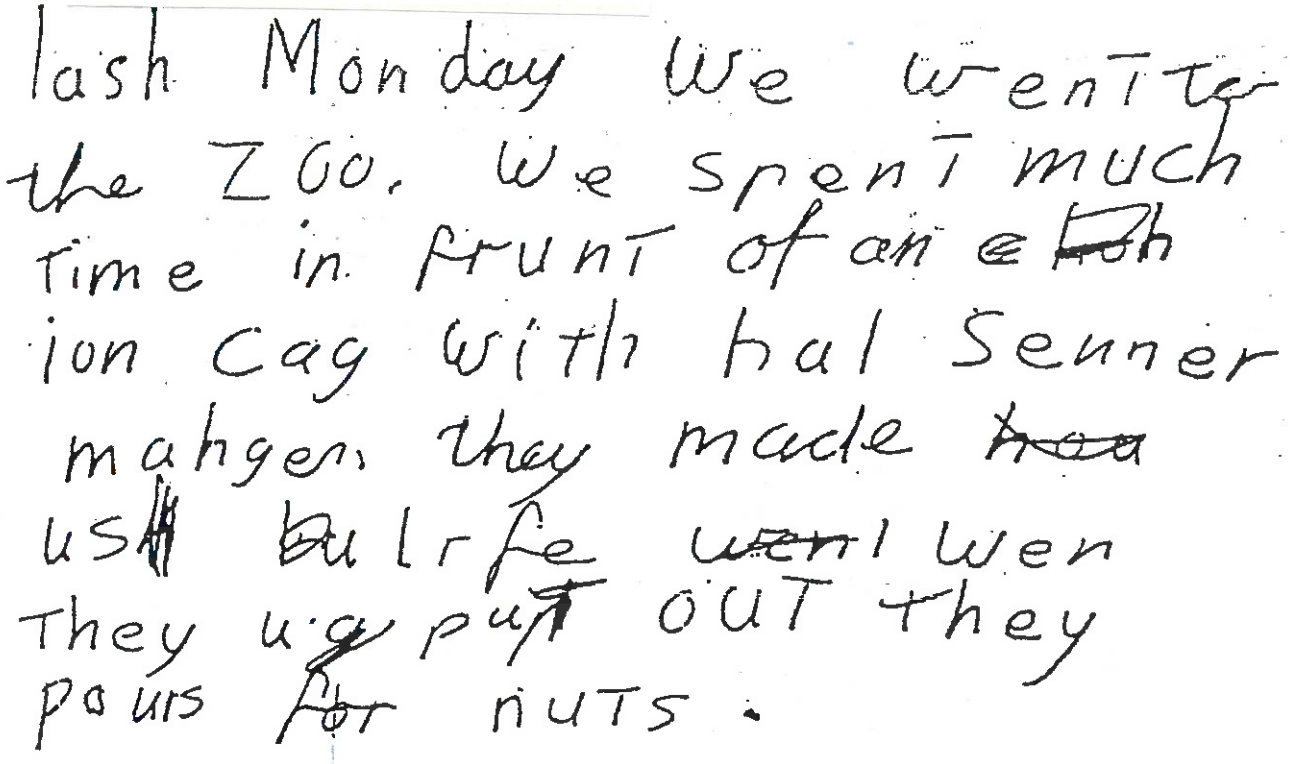
Strategies

- Rehearse getting from place to place
- Minimize transitions and give several verbal cues before transition
- Avoid assuming the student will automatically generalize instructions or concepts
- Verbally point out similarities, differences and connections; number and present instructions in sequence; simplify and break down abstract concepts, explain metaphors, nuances and multiple meanings in reading material
- Answer the student's questions when possible, but let them know a specific number (three vs. a few) and

that you can answer three more at recess, or after school

- Allow the child to abstain from participating in activities at signs of overload
- Thoroughly prepare the child in advance for field trips, or other changes, regardless of how minimal
- Implement a modified schedule or creative programming
- Never assume child understands something because he or she can "parrot back" what you've just said
- Offer added verbal explanations when the child seems lost or registers confusion

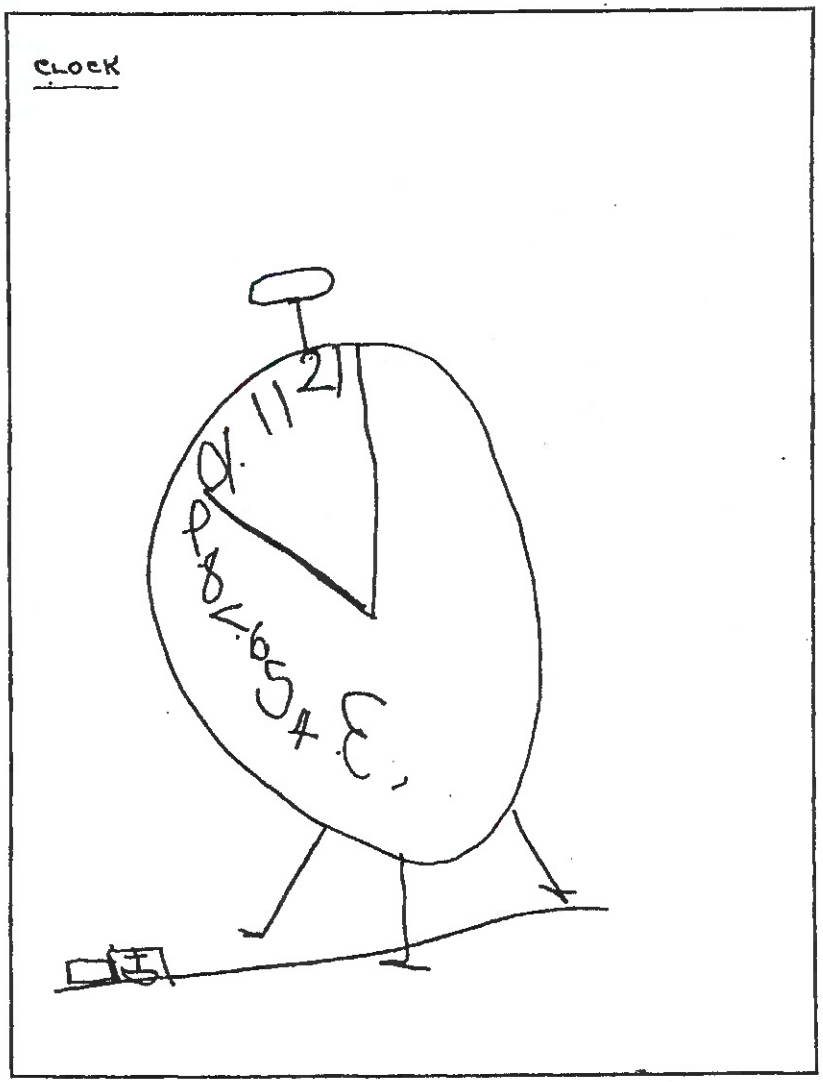
Excerpted from the LDA of California and UC Davis M.I.N.D. Institute "Q.U.I.L.T.S." Calendar 2001-2002



Last Monday we went to the Zoo. We spent much time in front of an iron cage which held seven monkeys. They made us laugh when they put out their paws for nuts.

WRITING TO DICTATION. RG, dyslexic male, age 11 years
MacDonald Critchley. Charles C. Thomas, 1964

Drawings of dyslexic students from The Dyslexic Child. Macdonald Critchley. Charles C. Thomas, 1964.



Drawing of a clock, showing severe spatial difficulties, neglect of the right half of the dial, and various rotations and reversals.

The child was an intelligent boy of 6 years 8 months with a family history of dyslexia. Seen again at the age of 9 years and 1 month, his reading and spelling ages were at a 7-year level. His spontaneous drawing of a clock was then well executed.

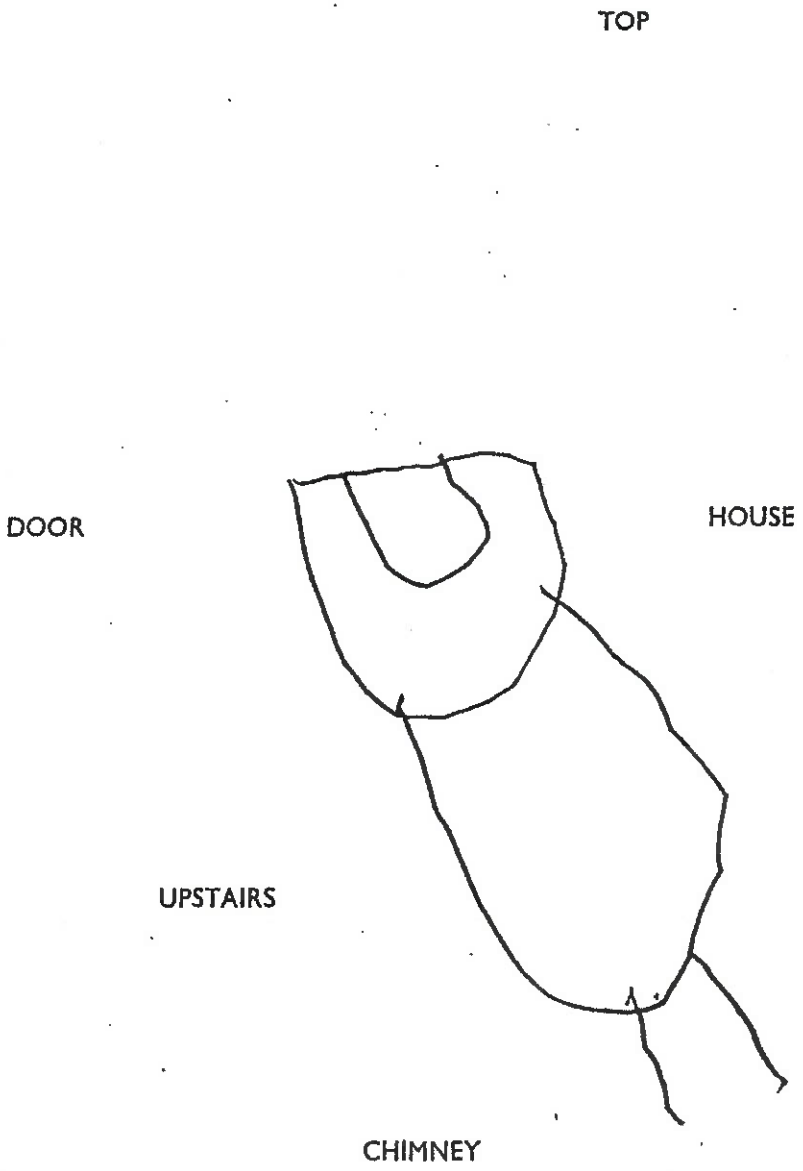
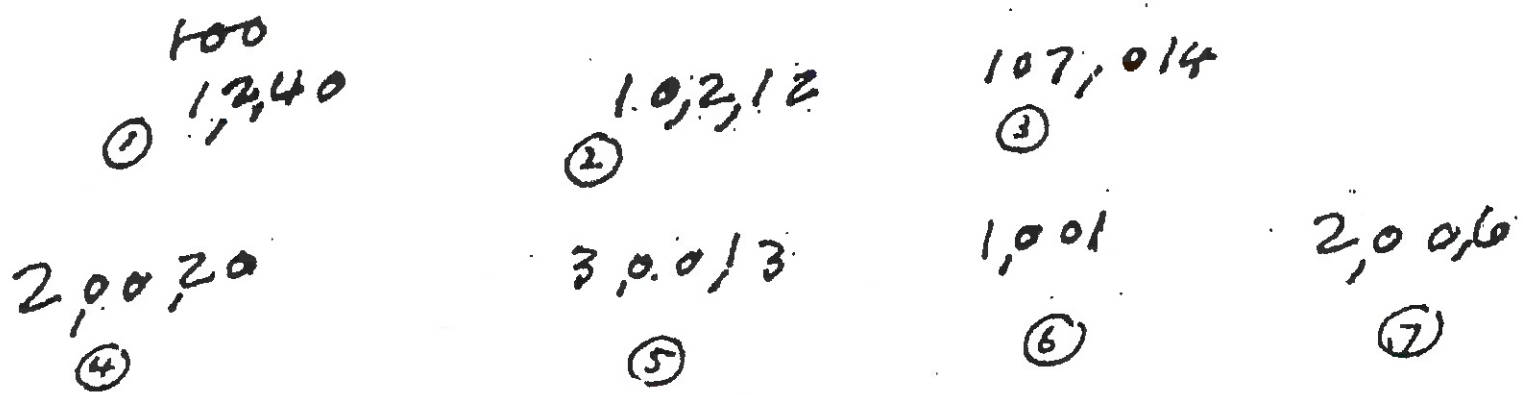


Fig. 31 Drawing of a house executed by a very intelligent boy of 5 years and 1 month, referred to me because of "inverted vision". He would hold a book upside down to look at the illustrations, and would draw in the same manner. There was a strong family history of dyslexia. A follow-up report four years later indicated that this boy too was now obviously dyslexic, but he had lost his "inverted vision".

Today is
Thursday
Yesterday
Was
Tomorrow.
Joseph

jdq
10/20/03



Patient was asked to write down:-

(1) 1,240 (2) 10,212 (3) 107,014

(4) 2,000,020 (5) 3,000,013 (6) 1,001 (7) 200,006

Fig. 25 Dictation of numerals. M.M., female aged 21 years.

BEFORE & AFTER - SAME STUDENT

Jones Spontaneous Writing Sample
Student Response Form

Name ______________ Date 8/30/94

Write Five Sentences:

1. I cot my tme on a trator and got ovcrappl stich
2. Fmunsojgu we wnt to Femlekinx Thya Seh They
3. coh bow It but it wood hert bad so we wint
4. ot Baler hspit and we wah in for 8 wrs Ther
5. They Sek They had a pasergint That.

SPONTANEOUS WRITING SAMPLE
Student Response Form

NAME: ______________ DATE: 1-31-96

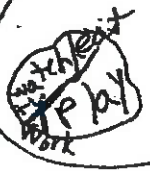
Write Five Sentences:

1. It is a prate day.
2. Have you sean my bike?
3. Can you pley gitare?
4. My dad is like me.
5. I no wat that is.

What goes on in an Add's brain

step 1.

Lets look inside an add brain



step 2.

Lets sea what they thank

and step 3 how they act

The End

From: **Asperger Experts** <hello@aspergerexperts.com>
Date: Wed, Aug 17, 2016 at 11:05 AM
Subject: Getting vs Letting

We've been doing our work here at Asperger Experts for 4 years now. And in that time, we've noticed some patterns that develop in the 50,000+ questions we've gotten.
This is the biggest one.
There are two separate & distinct mindsets that parents usually come to us with. 99% of the time, we can tell where a parent is in their journey through these 2 simple words: **Getting & Letting**.
A lot of the parents that ask us questions end up starting with "How do I get my son/daughter to..."
A lot of other parents that ask us questions start with "How to I help/let/enable my son/daughter to...."
That one difference sheds a TON of light on the 2 different mindsets.
Let's start with the first one:
Getting.
When you are in a mindset of "getting" your child to do something, that usually implies a few things:
#1) You don't trust them to do it on their own
#2) You have to manipulate, force, control, coerce, persuade or convince them to do even basic tasks, because they "won't"
But when we realize that the biggest form of communication is not the words we use, but the actions we take, then this paints a different picture.
What ends up happening is that
A) The manipulation/control tactics break down trust and cause more divides, anger, fighting and stress
B) The behaviors involved with "getting them to" show them that you inherently don't trust or believe in them to do it (whatever activity that may be) on their own.
Thus they retreat into themselves and go further into Defense Mode.
On the other hand, we have "**Letting**".
Letting implies that they CAN do an activity and that you do believe in them, but there may just be some blocks in their way. (Getting implies that they are inherently flawed and cannot do the activity on their own)

That one simple shift changes the entire relationship dynamic.
It is no longer about control, manipulation or lack of trust. When you start with trust, confidence & belief, everything changes.
Just some food for thought.
Talk soon,
Danny Raede
Asperger Experts

Infants, Children, and Adolescents
By Laura E. Berk
Illinois State University
Allyn and Bacon
Boston, London, Toronto, Sydney, Tokyo, Singapore

Due to the difficulty in reading the colored charts on pages 179, 277, 387, 495, and 605 when the pages are copied in black and white, the pages were retyped to assist the reader.

Figure 5.7 – Gross and fine motor skills achieved during the first 2 years. The average age at which each skill is attained is presented, followed by the age range during which 90 percent of infants master the skill. (From Bayley, 1969.)

Head erect and steady	6 weeks; 3 weeks-4 months
Elevates self by arms	2 months; 3 weeks-4 months
Rolls from side to back	2 months; 3 weeks-5 months
Grasps cube	3 months, 3 weeks; 2-7 months
Rolls from back to side	4 1/2 months; 2-7 months
Sits alone	7 months; 5-9 months
Crawls	7 months; 5-11 months
Pulls to stand	8 months; 5-12 months
Plays pat-a-cake	9 months, 3 weeks; 7-15 months
Stands alone	11 months; 9-16 months
Walks alone	11 months, 3 weeks; 9 – 17 months
Builds tower of 2 cubes	13 months, 3 weeks; 10-19 months
Scribbles vigorously	14 months; 10-21 months
Walks up stairs with help	16 months; 12-23 months
Jumps in place	23 months, 2 weeks; 17-30 months
Walks on tiptoe	25 months; 16-30 months

MILESTONES OF DEVELOPMENT IN INFANCY AND TODDLERHOOD				
Age	Physical	Cognitive	Language	Emotional/Social
Birth – 6 months	Rapid height and weight gain. Reflexes decline. Sleep organized into a day/night schedule. Holds head up, rolls over, and reaches for objects. Can be classically and operantly conditioned. Habituates to unchanging stimuli. Hearing well developed. Depth and pattern perception emerge and improve.	Repeats chance behaviors leading to pleasurable and interesting results. Displays object permanence in habituation—dishabituation task. Recognition memory for people, places, and objects improves. Able to categorize simple stimuli.	Cooing and babbling emerge. Establishes joint attention with caregiver, who labels objects and events.	Expresses basic emotions (happiness, interest, surprise, fear, anger, sadness, disgust). Social smile and laughter emerge. Matches adults' emotional expressions. Displays unique temperamental traits.
7-12 months	Sits alone, crawls, and walks. Shows refined pincer grasp. Displays greater sensitivity to speech sounds of own language. Depth and pattern perception improve further.	Combines, sensorimotor schemes. Engages in intentional or goal-directed behavior. Finds object hidden in one place. Capable of deferred imitation. Recall memory for people, places, and objects improve. Groups stimuli into wider range of categories.	Babbling expands to include sounds of spoken languages. Uses preverbal gestures (showing, pointing) to communicate.	Anger and fear increase in frequency and intensity . Stranger anxiety and separation anxiety appear. Uses caregiver as a secure base for exploration. Engages in social referencing. "Clearcut" attachment to caregiver appears.
13-18 months	Height and weight gain rapid, but not as great as in first year. Walking better coordinated. Scribbles with pencil. Builds tower of 2-3 cubes.	Experiments with objects in a trial-and-error fashion. Finds object hidden in more than one place. Actively categorizes objects during play.	Actively joins in turn-taking games, such as pat-a-cake and peekaboo. Says first words. Makes errors of underextension and overextension.	Actively joins in play with siblings. Recognizes images of self in mirrors and on videotape. Shows signs of empathy. Capable of compliance.
19-24 months	Jumps, runs, and climbs. Manipulates objects with good coordination. Builds tower of 4-5 cubes.	Solves sensorimotor problems suddenly. Finds object moved while out of sight. Active categorization of objects during play improves.	Vocabulary increases to 200 words. Combines two words, consistent grammar not yet present.	Complex emotions (shame and embarrassment) emerge. Acquires a vocabulary of emotional terms. Starts to use language to assist with emotional self regulation. Begins to tolerate caregiver absences more easily. Self-recognition well-established. Uses own name or personal pronoun to label image of self. Categorizes the self and others on the basis of ages and sex. Shows sex-typed toy choices. Self-control appears.

Chapter 10: Emotional and Social Development in Early Childhood
Page 387

MILESTONES OF DEVELOPMENT IN EARLY CHILDHOOD				
Age	Physical	Cognitive	Language	Emotional/Social
2 years	Slower gains in height and weight than in toddlerhood. Balance improves, walking becomes better coordinated. Running, jumping, hopping, throwing, and catching appear. Puts on and removes some items of clothing. Uses spoon effectively.	Make-believe becomes less dependent on realistic toys, less self-centered, and more complex. Able to take the perspective of others in simple situations. Recognition memory well developed. Aware of he difference between inner mental and outer physical events.	Vocabulary increases rapidly. Sentences follow basic word order of native language, grammatical markers are added. Shows effective conversational skills, such as turn taking and topic maintenance.	Begins to develop self-concept and self-esteem. Distinguishes intentional from unintentional acts. Peer cooperation and instrumental aggression appear. Understands causes and consequences of basic emotions. Empathy increases. Sex-typed beliefs and behavior increase.
3-4 years	Running, jumping, hopping, throwing, and catching become better coordinated. Galloping and one-foot skipping appear. Rides tricycle. Uses scissors, draws first picture of person. Can tell the difference between writing and non-writing.	Notices transformations, reverses thinking, and has a basic understanding of causality in familiar situations. Classifies familiar objects hierarchically. Uses private speech to guide behavior when working on challenging tasks. Remembers familiar experiences in terms of scripts. Able to generalize remembered information from one situation to another. Understands that people can hold false beliefs. Aware of some meaningful features of written language. Counts small numbers of objects and grasps the cardinality principle.	Overextends grammatical rules to exceptions. Understands many culturally accepted ways of adjusting speech to fit the age, sex, and social status of speakers and listeners.	Emotional self-regulation improves. Complex emotions (shame, embarrassment, guilt, envy, and pride) increase. Nonsocial activity declines and joint, interactive play increases. Instrumental aggressive declines and hostile aggression increases. First friendships form. Distinguishes moral rules and social conventions. Preference for same sex playmates increases.
5-6 years	Body is streamlined and longer-legged with proportions similar to that of adults. First permanent tooth erupts Skipping appears. Gross motor skills increase in speed and endurance. Ties shoes, draws more elaborate pictures, writes name. Able to discriminate more fine-grained visual forms, such as letters of the alphabet.	Ability to distinguish appearance from reality improves. Time spent attending to tasks increases. Recall and scripted memory improve. Understands that letters and sounds are linked in systematic ways. Counts up and down, engaging in simple addition and subtraction.	Vocabulary reaches about 14,000 words. Has mastered many complex grammatical forms.	Bases understanding of people's intentions on wider range of social cues. Ability to interpret, predict, and change others' emotions improves. Relies on language to express empathy. Has acquired many morally relevant rules and behaviors. Grasps genital basis of sex differences and shows gender constancy.

Chapter 13: Emotional and Social Development in Middle Childhood
Page 495

MILESTONES OF DEVELOPMENT IN MIDDLE CHILDHOOD				
Age	Physical	Cognitive	Language	Emotional/Social
6-8 years	Slow gains in height and weight continue until adolescent growth spurt. Gradual replacement of primary teeth by permanent teeth throughout middle childhood. Writing becomes smaller and more legible. Letter reversals decline. Organized games with rules and rough and tumble play become common.	Thought becomes more logical, as shown by the ability to pass Piagetian conservation, class inclusion, and seriation problems. Understanding of spatial concepts and ability to integrate distance, time, and speed improve. Attention becomes more focused, adaptable, and planful. Memory strategies of rehearsal and organization appear. Awareness of importance of memory strategies and psychological factors (attention, motivation) in task performance improves.	Vocabulary continues to increase rapidly throughout childhood. Word definitions are concrete, referring to functions and appearance. Language awareness improves over middle childhood.	Self-esteem differentiates become hierarchically organized, and declines to a more realistic level. Distinguishes ability, effort, and luck in attributions for success and failure. Understands that access to different information often causes people to have different perspectives. Becomes more responsible and independent. Distributive justice reasoning changes from equality to merit to benevolence. Pride and guilt are integrated with personal responsibility.
9-11 years	Adolescent growth spurt begins 2 years earlier for girls than boys. Gross motor skills of running, jumping, throwing, catching, kicking, batting, and dribbling are executed more quickly and with better coordination. Reaction time improves contributing to motor skill development. Depth cues appear in drawings.	Logical thought remains tied to concrete situations until end of middle childhood. Piagetian tasks continue to be mastered in a step-by-step fashion. Memory strategies of rehearsal and organization become more effective. Memory strategy of elaboration appears. Long-term knowledge base grows larger and becomes better organized. Self-regulation of cognitive performance improves.	Word definitions emphasize synonyms and categorical relations. Understanding of complex grammatical forms improves. Grasps double meanings of words, as reflected in comprehension of metaphors and humor. Adapts messages to the needs of listeners in complex communicative situations. Conversational strategies become more refined.	Self-concept includes personality traits and social comparisons. Self-esteem tends to rise. Recognizes that individuals can experience more than one emotion at a time. Emotional self-regulation includes cognitive strategies. Can "step in another's shoes" and view the self from that person's perspective. Later, can view the relationship between self and other from the perspective of a third, impartial party. Appreciates the linkage between moral rules and social conventions. Peer groups emerge. Friendships are defined by mutual trust. Academic subjects and personality traits become sex stereotyped, but children (especially girls) view the capacities of males and females more flexibly. Sibling rivalry tends to increase.

MILESTONES OF DEVELOPMENT IN ADOLESCENCE				
Age	Physical	Cognitive	Language	Emotional/Social
Early adolescence 11-14 years	If a girl, reaches peak of growth spurt. If a girl, adds more body fat than muscle. If a girl, starts to menstruate. If a girl, motor performance gradually increases then levels off. If a boy, begins growth spurt.	Becomes capable of formal operational thought. Can argue more effectively. Becomes more self-conscious and self-focused. Becomes more idealistic and critical. Self-regulation of cognitive performance continues to improve. Evaluates vocational options in terms of interests.	Vocabulary continues to increase as abstract words are added. Grasps irony and sarcasm. Understanding of complex grammatical forms continues to improve. Can make subtle adjustments in speech style, depending on the situation.	Moodiness and parent-child conflict increase. Spends less time with parents and siblings. Spends more time with peers. Friendships are defined by intimacy and loyalty. Peer groups become organized around cliques. Crowds form as interest in the opposite sex increases Peer pressure to conform increases.
Middle adolescence 14-18 years	If a girl, completes growth spurt. If a boy, reaches peak and then completes growth spurt. If a boy, voice deepens. If a boy, adds muscle while body fat declines. If a boy, starts to ejaculate seminal fluid. May have had sexual intercourse. If a boy, motor performance increases dramatically.	Is likely to show formal operational reasoning on familiar tasks. Long-term knowledge base continues to expand. Develops more complex rules for solving problems. Becomes less self-conscious and self-focused. Becomes better at every day planning and decision making. Evaluates vocational options in terms of interests, abilities and values.	Can read and interpret adult literary works.	Combines features of the self into an organized self-concept. Self-esteem differentiates further. Self-esteem tends to rise. Is likely to be searching for an identity. Is likely to engage in societal perspective-taking. Is likely to have a conventional moral orientation. Has probably started dating.
Late adolescence 18-21 years	If a boy, gains in motor performance continue.	Narrows vocational options and settles on a specific career.		Is likely to be identity achieved. May develop a postconventional moral orientation. Is likely to move away from home.