

*OVERVIEW OF NONVERBAL
LEARNING DISORDERS,
ASPERGER'S DISORDER,
Hyperlexia and Mathematics Disorder*

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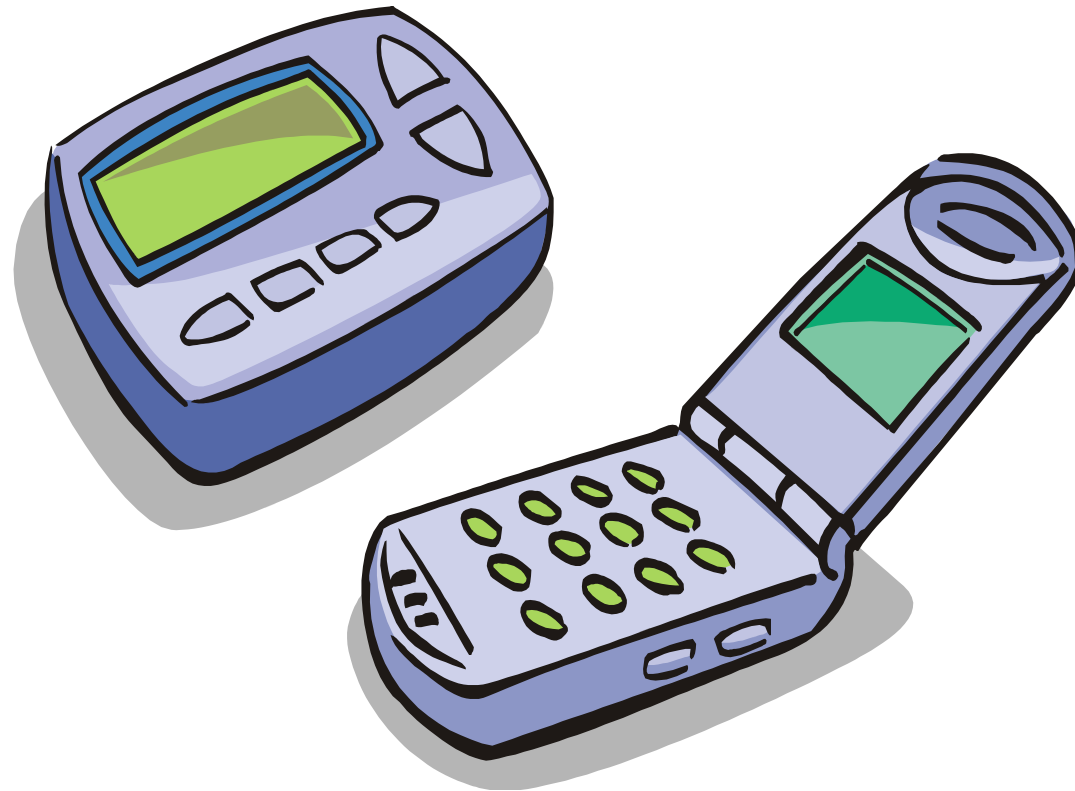


Road Rules: What to expect

- Today's seminar will run from 8:00 to 3:30.
- Lunch will be “on your own” from 11:30 to 12:30.
- Breaks will be 10 minutes at 9:30 and 2:00.
- Please try to hold your questions until Q & A times.



*PLEASE TURN OFF YOUR CELL
PHONES AND PAGERS*



What Is “State Of The Art”?



- What you have in your PowerPoint handouts may not exactly match mine because something new may have come out since your handouts were printed. Oh, by the way these bicycles **ARE NOT** state of the art.

What Is A Disorder?



- A disorder is a ***harmful dysfunction*** of a naturally selected mechanism.

Wakefield, J.C. (1999). Evolutionary Versus Prototype Analysis of the Concept of Disorder. Journal of Abnormal Psychology, 108 (3), pp. 374-399.

- It must cause a dysfunction in a trait every human develops and create impairment in a major life activity.

Barkley, R. A. (2002A-Tape 1). ADHD Symposium: Nature, Diagnosis and Assessment- Nature and Comorbidity and Developmental Course of ADHD. University of Massachusetts, January, Westborough, MA: Stonebridge Seminars.

What Is A Developmental Disorder?

- A disorder characterized by a significant delay in the rate a normal human trait develops in an individual.
- It takes the individual longer to develop this trait than their age peers.

(Barkley, R. A. (2002A-Tape 1). ADHD Symposium: Nature, Diagnosis and Assessment- Nature and Comorbidity and Developmental Course of ADHD. University of Massachusetts, January, Westborough, MA: Stonebridge Seminars.)

What Is A Disability?



- With adults the term disability has become a legal term of art since the passage of the American's with Disability Act (ADA).
- One must be impaired compared to the Average American.
- Highly Controversial

Gordon, M., and Keiser, S. (Eds.) (1998). Accommodations in Higher Education Under the Americans with Disabilities Act: A No-Nonsense Guide for Clinicians, Educators, Administrators, and Lawyers. New York, NY: Guilford.)

What Is A Learning Disability?

Civil Rights Definition

1. Section 504
2. ADA
3. Sutton vs. United Airlines



What Is A Learning Disability?

Civil Rights Definition (Continued)

1. You must be disabled compared to the “Average American” (i.e., I.Q.=100, etc.)
- 2. *ADA is Civil Rights law, NOT entitlement law***
3. “...the Supreme Court has ruled that individuals with impairments, including ADD, learning disabilities and psychiatric disabilities are...

What Is A Learning Disability?

(Continued)

...excluded from coverage under ADA, if medication or compensatory strategies largely eliminate the impact of those impairments.”

Latham, P.S. , and Latham, P. (Friday October 8, 1999). Personal Communication.
Washington, D.C., 11th Annual CHADD International Conference.

Latham, P.H. and Latham, P. (1999). Who has a disability Under ADA? Attention!, 6 (2),
pp. 40-42.

What does Neurobiological mean?

(Continued)

- Stephen Pinker – “The Blank Slate: The Modern Denial of Human Nature”, or better stated, “the Lie of the Blank Slate”.

Pinker, S. (2002). The Blank Slate: The Modern Denial of Human Nature. New York, NY: Viking.

- AD/HD is not caused by child rearing practices or environmental experience.

Barkley, R. A. (2002A-Tape 1). ADHD Symposium: Nature, Diagnosis and Assessment-Nature and Comorbidity and Developmental Course of ADHD. University of Massachusetts, January, Westborough, MA: Stonebridge Seminars.

What Does Neurobiological Mean?

- “At present, however, the existing data argue strongly for a role of the amygdala and its collaborating cortical systems in the pathobiology of autism spectrum conditions” (p. 197).

Schultz, R.T., Romanski, L.M., and Tsatsanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome: Clues from Neuroimaging. In A. Klin, F.R. Volkmar and S.S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 178-209.

- “The field has come a long way since parents were considered to be the cause of autism spectrum disorders” (p. 64).

Ozonoff, S., Dawson, G., and McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY, Guilford.

Social Disorders



- Regarding Nonverbal LD Ozonoff, et.al. (2002) wrote, “Many children with NLD have trouble reading the emotions of others and have other social difficulties...” (p. 162).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Social Disorders



- Klin and Volkmar said of adults with Asperger's Disorder, "Unless issues of social presentation and competence are adequately addressed, including what to do in specific situations such as lunch or free-time periods, the chances of vocational satisfaction are lessened" (p. 351).

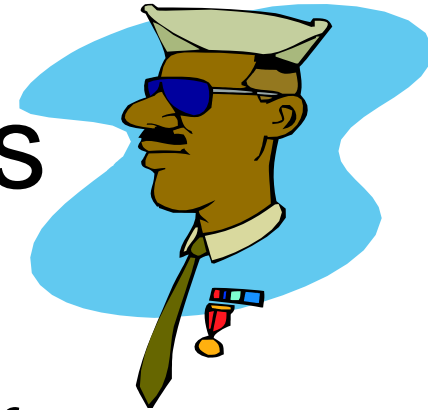
Klin, A. and Volkmar, F.R. (2000). Treatment and Intervention Guidelines for Individuals with Asperger Syndrome. In A. Klin, F. Volkmar and S.S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 340-366.

Cerebellum and Asperger's Disorder

- There is good neuroimaging data that indicates many with Asperger's Disorder and High Functioning Autism have smaller cerebellums than and are more clumsy than the norm.

Attwood, T. (1998). Asperger Syndrome: A Guide for Parents and Professionals. Philadelphia, PA: Jessica Kingsley.

Social Anxiety and Shyness



- Attwood (2002) gave an example of an Australian soldier who fought behind enemy lines as a lone sniper in Vietnam who said his social anxiety is much more pronounced than his PTSD from the war ever was.

Atwood, T. (July, 2002). Social skills for Children with Asperger's and High Functioning Autism. Workshop presented on July 19, 2002 in Scottsdale, AZ: Future Horizons, Inc. 721 West Abram Street, Arlington, TX 76013.

Visual Spatial Processing Disorders



- Nonverbal Learning Disorders:
- Learning Disorders break down into two types:
 1. ***Auditory Verbal Processes:*** Reading and Language Disorders
 2. ***Visual, Perceptual Motor (Nonverbal) Processes:*** Problems in social interaction, math and coordination, etc.

Goldstein, S. (1997). Managing Attention and Learning Disorders in Late Adolescence & Adulthood: A Guide for Practitioners.
New York, NY: John Wiley and Sons, pp. 23-24.

Learning Disorders

- Rourke broke down Learning Disorders into two groups:
 1. Basic Phonological Processing Disorders
 2. Nonverbal Learning Disorders

Rourke, B.P. (2006). Question #1: You refer to NLD as a subtype of Learning Disabilities (LD). How do you define LD? From Website: www.nld-bprourke.ca/BPRA1.html

Rourke's NVLD Syndrome

- Good single word decoding when compared to mechanical arithmetic skills
- Better verbal than non-verbal social interaction
- Before age 4 may appear relatively normal
- As young child may be seen as “hyperactive”
- As older child may be seen as “hypo” or “hyper” active, withdrawn, anxious and depressed
- Atypical behaviors and social skills deficits.

Rourke, B.P. (2006). Question # 1: You refer to NLD as a subtype of Learning Disabilities (LD). How do you define LD? From Website: www.nld-bprouke.ca/BPRA1.html .

NVLD Categories of Dysfunction

- **Motoric:** Slow motor reaction time, problems crossing the midline, left side weakness
- **Visual-Spatial-Organizational:** It is hard enough to cope when they know what to expect; novelty makes it worse.
- **Social:** They have no idea of personal space, when to stop, facial expressions and nonverbal signs of pleasure/displeasure.

Thompson, S. (1997). The Source for Nonverbal Learning Disorders. East Moline, IL: Linguisystems.

NVLD Dysfunctions

- “This child learns little from experience or repetition and is unable to generalize information, so he doesn’t apply past learning to new situations” (p. 13)
- If they cannot learn vicariously, by watching someone model a behavior, and you must directly teach them everything verbally that is a **RED FLAG** something is wrong!

Thompson, S. (1997). The Source for Nonverbal Learning Disorders. East Moline, IL: Linguisystems, p. 13.

NVLD Dysfunctions

“Tossing in a new variable to an already fairly consistent situation (such as a substitute teacher over control of a classroom where the child has previously gained a certain degree of stability with his regular teacher), can totally disrupt this child’s coping strategies and generate an increased level of anxiety for him” (p. 33).

Thompson, S. (1997). The Source for Nonverbal Learning Disorders. East Moline, IL: Linguisystems.

Nonverbal Learning Disorder (NVLD)



- Approximately 80% of those with Learning Disorders have Reading Disorder/Dyslexia (Shaywitz, 2003).
- 1-2% of population have NVLD exclusively and about 30% have “Mixed” language LD and NVLD (Berg and Stockdale, 2000).

Shaywitz, S. (2003). Overcoming Dyslexia. New York, NY: Knoph.

Berg, M., and Stockdale, C. (2000). Teaching the Language of Space & Time. Paper presented at the International Dyslexia Association 51st Annual Conference, November 8-11, 2000, Washington, DC.

Nonverbal Learning Disorder

- Rourke indicated that about 10% of those diagnosed with Learning Disorders have NVLD.
- He stated Dutch research indicated the same.

Rourke, B.P. (2006). Question #1: You refer to NLD as a subtype of Learning Disabilities (LD). How do you define LD? From Website: www.nld-bprouke.ca/BPRA1.html

Nonverbal Learning Disabilities

“The Nonverbal Learning Disabilities (NLD) syndrome...refers to a profile of neurobiological strengths and weaknesses that includes relative preservation of some verbal skills, in the context of deficits in visual-spatial skill and gestural communications. Associated problems of individuals with NLD include poor pragmatics and prosody of speech and significant deficits in social perception, social judgment, and social interaction skills” (p. 177)

Nonverbal Learning Disorders

- Those are poor at analysis and synthesis of information better at serial information processing and rote memory.
- “Rourke...suggests that the common pathogenic mechanism in the NLD syndrome is disturbance in the integrity of white matter fibers, particularly those in the right hemisphere” (p. 177).
- Some see NVLD and Asperger’s Disorder as a Right Hemisphere disorder.

Symptoms of NVLD

- Verbal IQ typically higher than Performance IQ
- Remarkable early language development
- Excellent rote memory
- Hyper-attention to detail
- Often excellent reading skills
- Remarkable verbal expression
- Poor Coordination

Symptoms of NVLD

- Profound balance difficulties
- Fine motor difficulties
- Poor visual imagery
- Poor spatial processing
- Poor nonverbal social communication interpretation
- Poor transition and new situation tolerance
- Poor social judgment and interactions

Thomson, S. (1997). The Source for Nonverbal Learning Disorders. East Moline, IL: Linguisystems, p. 15



Visual-Spatial Problems

- “Spatial relations include qualities like size, distance, volume, order and time” (p.1).
- There are two types of spatial skills. Visual-spatial performance refers to using sight to discriminate differences. Motor-spatial performance refers to making the body move accurately and smoothly. Of course, many activities demand some combination of the visual-spatial and motor-spatial skill” (p. 5).

Stockdale, C., & Possin, C. (2001). Spatial Relations and Learning. Web sight: Newhorizons.org/spneeds_arkspatial.html, pp.1-24.

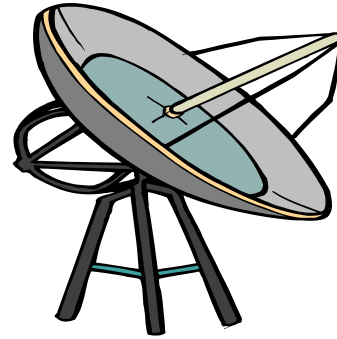
Visual-Spatial Problems



- Difficulties with temporal and spatial relationships are related to problems in the right hemisphere. People with such difficulties have problems with processing information that is nonverbal in nature.

Berg, M., & Stockdale, C. (2001). The language of Space and Time. Paper presented at the 52nd International Dyslexia Association International Conference, Albuquerque, NM, October 24-27, 2001. Convention Recordings, Inc. – www.conventionrecordings.com ; St. Petersburg, FL, Session S-168.

Auditory NVLD?



- Bellis (2002) wrote about how a person with NVLD may experience a subtype of Central Auditory Processing Disorder (CAPD) which causes problems in processing tone of voice and paralanguage and not the discrimination of speech sounds. This is also a right hemisphere problem.

Bellis, T.J. (2002). When the Brain Can't Hear: Unraveling The Mystery of Auditory Processing Disorder. New York, NY: Atria.

1990: My First Exposure to the Term "Asperger's Syndrome"

“These were children of normal intelligence who did not have autism, psychosis, or Asperger’s syndrome” (Barkley, 1990, p. 199).

Barkley, R.A. (1990). Differential Diagnosis. In R.A. Barkley (Ed.), Attention Deficit Hyperactivity Disorder. New York, NY: Guilford, pp. 169-205.

1990: My First Exposure to the Term "Asperger's Syndrome"

“RIGHT-HEMI SYNDROME

These are people who tend to suffer from, ‘prolonged depression’...They frequently are shy without the emotional ‘toughness’ to assert themselves well. They often have poor eye contact that makes it difficult for them to deal openly with others. Sometimes these persons are awkward in their gestures, being unable to communicate well through body language. Occasionally, there is a sing/song pattern (prosody) that attracts criticism or causes...

1990: My First Exposure to the Term "Asperger's Syndrome"

“...them to be labeled ‘weird’. The most unfortunate part...is poor socialization. These individuals have great difficulty maintaining relationships with others...They repeatedly smother objects of their affection...(and) do not interpret feedback from others” (Dale, Jordan, Ph.D., Personal Communication, 1990).

1990: My First Exposure to the Term "Asperger's Syndrome"

ASPERGER'S SYNDROME

“These people tend to speak like they are giving a formal speech. They have great difficulty with small talk. Their body language is still and awkward. They are clumsy, yet they have excellent rote memories. They are often obnoxious and self-centered. They tend to be tenacious, demanding, and insensitive to the needs of others” (Dale Jordan, Ph.D., 1990, Personal Communication).

What's In A Name?

- Clinical Psychologist & Psychiatrist – Asperger's Disorder and/or High Functioning Autism
- Neuropsychologist & Behavioral Neurologist – Nonverbal Learning Disorder and/or Right Hemisphere Disorder (“Right Hemi Disorder”)
- Speech Language Pathologist: Semantic Pragmatic Disorder of Speech
- Occupational Therapist: Sensory Integration Disorder

Berg, M., and Stegleman, T. (November, 1995). Workshops Presented at the International Conference of the Orton Dyslexia Society, Houston, TX.

What's In A Name?

“Asperger’s is mild autism with language”
(Ratey, 1997).

Ratey, J. (May, 1997). Shadow Syndromes. Paper presented at the 3rd Annual National ADDA Adult ADD Conference, May 17, 1997, St. Louis, MO.

Berg and Stegeman (1995) see Asperger’s Disorder and Nonverbal Learning Disorder as two separate types of disorders. They see Asperger’s individuals as having more autistic-like difficulties, and visual-spatial processing problems, where as, those with nonverbal LD have visual-spatial problems alone.

Berg, M., and Stegeman, T. (November, 1995). Workshops Presented at the International Conference of the Orton Dyslexia Society, Houston, TX.

What's In A Name?

Volkmar et al (1996) and Rourke (1995) believe Asperger's Disorder is a subcategory of Nonverbal Learning Disability.

Volkmar, F, Klin, A., Schultz, R., Bronen, R., Marans, W.D., Sparrow, S., and Cohen, D. (1996). Grand Rounds in Child Psychiatry: Asperger Syndrome. Journal of the American Academy of Child and Adolescent Psychiatry, 35 (1), pp. 118-123.

Asperger's Disorder Symptoms (1990's)

- “Paucity of Empathy
- Naïve, inappropriate, one-sided social isolation, little ability to form relationships and social isolation.
- Pedantic monotonous speech
- Poor nonverbal communication
- Intense absorption in circumscribed topics, such as the weather, facts about TV stations...
- “Clumsy, ill-coordinated movements and odd posture” Volkmar and Klin, 1994, p. 8).

Volkmar, F., and Klin, A. (July-August, 1994). Autism and Asperger's Syndrome. LDA Newsbriefs, p. 8.

Issues of Diagnosis

- Voeller (1995) wrote, “Trying to make a diagnosis of right-hemisphere deficit syndrome without neuropsychological data would be akin to making a diagnosis of epilepsy in the absence of electro-encephalographic (EEG) information” (p. S17).
- Voeller (1995) continued that many with Asperger’s Disorder are labeled AD/HD and they may have problems with Obsessive Compulsive Disorder and/or depressive symptoms.

Voeller, K.K.S. (1995). Clinical Neurological Aspects of the Right-Hemisphere Deficit Syndrome. Journal of Child Neurology, 10 (Supplement Number 10), pp. S16-S22.

NVLD VS Asperger's Disorder

“There is strong evidence to suggest that individuals with AS present with virtually all the characteristics of NLD. Most important, this neuropsychological phenotype may offer a basis from which to draw a distinction between AS and HFA” (p. 248-249).

Rourke, B.P., and Tsatsanis, K.D. (2000). Nonverbal Learning Disabilities and Asperger Syndrome. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 231-253.

Your Tax Dollars at Work

National Institutes of Health

National Institute of Child Health and Development (NICHD)

www.nichd.nih.gov/autism/

Alice Kau, Ph.D.

[www.kaua@mail.nih.gov](mailto:kaua@mail.nih.gov)

Autism Research Network

www.autismresearchnetwork.org/AN/default.aspx

- The Collaborative Program of Excellence in Autism
- Studies to Advance Autism Research and Treatment

Attwood's Continuum of the Autism Spectrum

1. Aloof- Child has little or no speech, self-stimulates a lot. Looks like classic autism, child may stay at this level for entire life or move on to next level of continuum. Upset by being close to others.
2. Passive- They interact with others to get what they want. They engage in solitary play have some limited speech. May have internal speech, echolalia. Need external prompt to speak. Interest in symmetry, and collect odd things (e.g., dust bunnies, etc.). Rule following. May stay at this stage or move to level 3.

Attwood's Continuum of the Autism Spectrum (Continued)

3. Active, but odd- These children seek attention, they like it. They do strange repetitive behaviors to get attention, but once they have your attention they don't know what to do. Speech typically repetitive questions know the answer to. Do not interact with peers. Focus on one interest-often transportation.

Attwood, T. (1999). Asperger's Syndrome: A Guide for Parents and Professionals. Videotaped Presentation. Arlington, TX: Future Horizons.

Attwood's Continuum of the Autism Spectrum (Continued)



Attwood, T. (1999). Asperger's Syndrome: A Guide for Parents and Professionals. Videotaped Presentation. Arlington, TX: Future Horizons.

Attwood on Asperger's Disorder and High Functioning Autism

“They are exactly the same. They are just spelled differently” (Tony Attwood, Ph.D.).

Level 1
Kanner's
Autism

Level 2

Level 3
Asperger's/
HFA



Attwood, T. (1999). Asperger's Syndrome: A Guide for Parents and Professionals. Videotaped Presentation. Arlington, TX: Future Horizons.

Ozonoff, Dawson & McPartland on Asperger's Disorder

Autism: the most common of the PDDs, ranging in severity from those who are very handicapped (verbal, totally aloof, and highly repetitive) to those who are only mildly socially awkward, and slightly unusual in their conversational style, and have special interests” (p. 9).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 9.)

Ozonoff, Dawson & McPartland on Asperger's Disorder

“The high-functioning autism spectrum disorders include:

high-functioning autism: The child fits the definition of autism but has normal cognitive and learning abilities. The child may have had difficulty acquiring language, but eventually was able to speak at a level close to what is expected for his or her age” (p. 9)

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 9.)

Ozonoff, Dawson & McPartland on Asperger's Disorder

“Asperger syndrome: The child is similar to those with high-functioning autism, but has fewer symptoms and had little or no difficulty developing language at the normal age” (p. 9).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 9.)

Smith Myles and Simpson on Asperger's Disorder

“Unlike other children with autism, however, they generally had normal intellectual and communication development, leading Asperger to infer that individuals with this disorder represented a distinct and independent diagnostic classification” (p.1).

Smith Myles, B, and Simpson, R.L. (1998). Asperger Syndrome: A Guide for Educators and Parents. Austin, TX: ProED.

Epidemiology of Asperger's Disorder

- 71 out of 10,000 live births will have AD
- “Autism spectrum disorders Affect up to 0.6% of the population, and two-thirds to three quarters of those children appear to be high-functioning” (p. 9).
- AD will occur 2 to 3 times more often in males than females

Gillberg, C. (1993). Autism and Related Disorders. Journal of Intellectual Disability Research, 37, pp. 343-372.

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 9.

Smith Myles, B, and Simpson, R.L. (1998). Asperger Syndrome: A Guide for Educators and Parents. Austin, TX: ProED.

High Functioning Autism

- “This is the term used for children who meet autistic disorder criteria but have relatively normal thinking and learning skills (that is, they are not mentally retarded) and language skills (they can speak close to the level expected for their age)” (p. 29).
- HFA- often have visual-spatial strengths

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 29.

High Functioning Autism

- Often have repetitive movements (i.e., rocking, flapping, etc.)
- Often have PIQ > VIQ

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Asperger's Disorder

- Do not have communication difficulties- language “normal” by age 3
- Have FSIQ over 70
- VIQ > PIQ often
- Fail to meet autism diagnostic criteria
- Better at “**Theory of Mind**” than those with HFA
- Often very clumsy
- Often have “obsessive topics” (i.e., dust bunnies, etc.)

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

HFA VS AD

- The practical significance between the two diagnoses may be minor because the treatment is often the same.

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

HFA VS AD

“We now know that autism is not a narrowly defined condition, but rather a spectrum that varies in severity from the classic picture described by Leo Kanner to the milder varieties associated with good language and cognitive (thinking) skills. For this reason, we now use the term ***autism spectrum disorders***” (p. 5).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 5.

HFA VS AD

- 20 years of research has demonstrated there are few differences between High Functioning Autism and Asperger's Disorder.

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

HFA VS AD: Diagnostics

- Diagnostically regarding DSM-IV, TR criteria Autism take precedence over Asperger's Disorder.
- Those with Asperger's Disorder fail to meet Autism DSM-IV, TR criteria.
- ¼ of the previous diagnoses of AD and HFA are incorrect

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Comorbidity and Autism Spectrum Disorders

- Half of the adults with Autism spectrum disorders have a comorbidity.
- Common comorbidities: Anxiety, Depression, AD/HD, Tourette's Disorder
- 25% of those with Autism Spectrum Disorders have seizures
- Fragile X and other genetic disorders need to be ruled out.

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

What Causes Autism Spectrum Disorders?

“Scientists do not yet have complete answers to these questions, but very strong evidence suggests that autism spectrum disorders are biological in origin and are not caused by parenting or other psychosocial environmental causes. Differences in the size and organization of the brain, as well as how it works, in individuals with autism spectrum disorders versus normal individuals have been found” (p. 56-57).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford, p. 56-57.

What Causes Autism Spectrum Disorders?

- Too many cells in the limbic system: Social-emotional behavior
- Small cerebellar vermis: motor coordination and cognitive activities
- Large ventricles
- Amygdala smaller, cells more densely packed: Emotions and facial recognition
- $\frac{1}{4}$ have brains and heads significantly larger than “normals”: Less pruning

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

What Causes Autism Spectrum Disorders

- Less blood flow and activity in frontal lobes
- Medial Temporal Lobes-
 - Smaller or too densely packed neurons

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Neuro-Imagery of Asperger's Disorder

Father and son with Asperger's Disorder were given an MRI, "Impressively, both relatives had nearly identical areas of dysmorphology of the dorsolateral prefrontal cortex in both hemispheres...There was a region measuring 1 to 2 cm³ of missing tissue in each hemisphere at the point at which the middle frontal gyrus intersects with the precentral sulcus" (p. 179).

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

Continuing, The son who was said to be more seriously impaired by AD also, “...had an area of dysmorphology in the left-anterior-mesial temporal lobe, abutting the amygdala” (p. 178). The authors continued dysfunction of the amygdala is thought to occur in both Autism and AD.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

- Several studies of AS and AD indicate abnormalities in cortical development probably due to prenatal development.
- AD found to have significant thinning of the corpus callosum
- No significant difference found in brainstems and cerebellums of those with AS and PDD-NOS.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

- fMRI studies discovered ventral temporal lobe dysfunction during facial expression discrimination in Autism Spectrum
- Those with AS and AD process faces in their inferior temporal gyrus area; the same area the non-disabled process objects they see.
- Amygdalar lesions create abnormal prosody and social affective difficulty.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

Those with Autism Spectrum Disorders tend to have overly dense amygdalas which may cause a high density of benzodiazepine/GABA-A receptors which may in turn cause problems with high anxiety and arousal problems. The above can come together to cause problems with emotional learning.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

“Without normally functioning limbic structures, persons with autism spectrum disorders would fail to take special notice of faces and emotions expressed on faces and across early development they would be deprived of critical social learning opportunities. These earliest experiences may be necessary precursors for achieving later developmental milestones, including the emergence of theory mind, empathy, and the emotional reaction of ...”

Neuro-Imagery of Asperger's Disorder

“... which fuel the use of theory of mind...In addition, failure of the amygdala to transmit social-emotional information to cognitive and motor output centers of the frontal lobe would result in abnormal responses to social stimuli, such as faces, and difficulties conveying social emotional information (e.g., prosody)” (p. 190).

The authors continued that the above snowballs and eventually causes profound disability.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Neuro-Imagery of Asperger's Disorder

- Those with Autism Spectrum Disorders have problems with the amygdala-medial Prefrontal Cortex circuit. This in turn causes a higher state of arousal and higher rates of anxiety. As a result they cannot mount a correct emotional response.

Schultz, R.T., Romanski, L.M., and Tsatanis, K.D. (2000). Neurofunctional Models of Autistic Disorder and Asperger Syndrome, Clues From Neuroimaging. In A. Klin, F. Volkmar, and S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 172-209.

Brain Areas Related to Social Interaction

Schultz and Klin (in press) indicated the following brain areas control the following social behaviors:

Frontal lobe: Theory of mind and social perception

Hypothalamus: Maternal behavior

Amygdala: Arousal, emotional learning, social orienting, recognition of emotional significance

Fusiform gyrus: Face perception

Temporal lobe: Interpretation of biological movement, recognition of facial expressions

Schultz, R.T., & Klin, A. (in press). Social Systems of the Brain: Evidence From Autism and Related Disorders. Philosophical Transitions of the Royal Society, Series B. (taken from: Ozonoff, S., Dawson, G., and McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High-Functioning Autism. New York, NY: Guilford, p. 58.

Brain Areas Related to Social Interaction



- Voeller believed all the above mentioned systems are located in their own specific brain areas.
- Impairment in one area does not necessarily mean impairment in other areas.

Voeller, K.K.S. (1995). Clinical Neurological Aspects of the Right-Hemisphere Deficit Syndrome. Journal of Child Neurology, 10 (Suppliment Number 1), pp. S16-S22.)

Alexithymia

- “Functional imaging studies implicate medial and prefrontal cortex and posterior superior sulcus (STS)...(sic. The) STS is concerned with representing the actions of others through the detection of biological motion; medial prefrontal regions are concerned with explicit representation of the states of the self. These observations suggest that the ability to mentalize has evolved from a system for representing actions”

Frith, C.D., and Frith, U. (1999). Intersecting Minds-A Biological Basis. Science, 286, 1692-1695.

Alexithymia

Lane wrote, “Several neuroimaging studies reveal that an area of the medial prefrontal cortex very close to that identified in our attention to emotional experience study has been implicated during the performance of theory of mind tasks...these findings suggest that the neural substrates of the mental representation of one’s own and other’s mental states are closely related” (p. 18). Lane continued that several studies of brain injured individuals when coupled with the above appeared to indicate, “*...that successful social adaptation requires the 'dual task' ability to stay in touch with the needs of others while paying due attention to one’s own needs*” (p. 20).

Lane, R. (2000). Neural Correlates of Conscious Emotional Experience. In L.R. Lane, et. al. (Eds.), Cognitive Neuroscience of Emotion. New York, NY: Oxford University Press, pp. 345-370.

Mirror Neurons



- Italian study of macaque monkeys in 1992
 - Known for years cells of premotor cortex fire just before movement.
 - Discovered the same cells fired in the same pattern when another primate was seen making the same movement!
 - Humans have these **MIRROR NEURONS** too.
 - They allow us to intuit others intentions and to feel their pain.

Begley, S. (Friday March 4, 2005). How Mirror Neurons Help Us to Empathize, Really Feel Others' Pain. The Wall Street Journal, p. B1.

Mirror Neurons



- Interparietal Sulcus- visual motor cortex integration
- Dorsal Premotor Cortex- complex motor planning and mirror neurons
- Daniel Glaser's dancers.

Glaser, D. (January 2005). Mirror Neurons: Research Update.
NOVAscienceNOW. Public Broadcasting System (PBS).

www.pbs.org/wgbh/nova/sciencenow/3204/01-resup.html, p. 1

Mirror Neurons



- “With knowledge of these neurons, you have the basis for understanding a host of enigmatic aspects of the human mind: ‘mind reading’ empathy, imitation learning, and even the evolution of language. Anytime you watch someone else doing something (or even starting to do something), the corresponding mirror neuron might fire in your brain, thereby allowing you to ‘read’ and understand another’s intentions, and thus develop a sophisticated ‘theory of other minds’” (p. 2)

Ramachandran, V.S. (3/8/05). Mirror Neurons and Imitation Learning as the Driving Force Behind “The Great Leap Forward” in Human Evolution.

www.edge.org/3rd_culture/ramachandran/ramachandran_p2.html, p. 2.

Mirror Neurons



- “I suggest, also, that a loss of these mirror neurons may explain autism...Without these neurons the child can no longer understand or empathize with other people emotionally and therefore completely withdraws from the world socially” (p. 2).

Ramachandran, V.S. (3/8/05). Mirror Neurons and Imitation Learning as the Driving Force Behind “The Great Leap Forward” in Human Evolution.
www.edge.org/3rd_culture/ramachandran/ramachandran_p2.html, p. 2.

Alexithymia **MAY** BE A NEUROBIOLOGICAL DISORDER!

People with Asperger's Disorder have difficulty with, "...conceptualizing and appreciating the thoughts and feelings of another person" (p. 112). This is "Theory of Mind".

Attwood, T. Asperger's Syndrome: A Guide for Parents and Professionals. Philadelphia, PA: Jessica Kingsley.



Genetics and Autism Spectrum Disorders

“There is now very strong evidence that in many (but perhaps not all) families, genetics plays some role in the development of the condition” (Sic. Autism Spectrum Disorders) (p. 65).

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Genetics and Autism Spectrum Disorders

- Human Genome Project Suspect Chromosomes: 7 & 15
- Genes on Chromosome 16 have been linked to Autism and AD/HD – 60 to 70% of Autism Genetic
- Replication study indicates Chromosome 17q21 linked to Autism
- Autism and possibly Asperger's Disorder susceptibility genes on Chromosomes 2, 7, 16, 17

Ozonoff, S., Dawson, G., McPartland, J. (2002). A Parent's Guide to Asperger Syndrome & High Functioning Autism. New York, NY: Guilford.

Page, D. (October 22, 2002). UCLA Geneticists Find Location of Major Gene in ADHD; Targeted Region Also Linked to Autism. UCLA News, www.newsroom.ucla.edu/page.asp?id=3612 .

Cantor, R.M., Kono, N., Duval, J.A., Alvarez-Retuerto, A., Stone, J.L., Alarcon, M., Nelson, S.F., and Geschwind, D.H. (2005). Replication of Autism Linkage: Fine-Mapping Peak at 17q21. American Journal of Human Genetics, 76 (6), pp. 1050-1056:
www.journals.uchicago.edu/AJHG/journal/issues/v76n6/42136.html .

Author (2001). Autism Susceptibility Genes on Chromosomes 2, 7, 16, 17. UniSci Daily University Science News: www.unisci.com/stories/200113/0807015.htm .

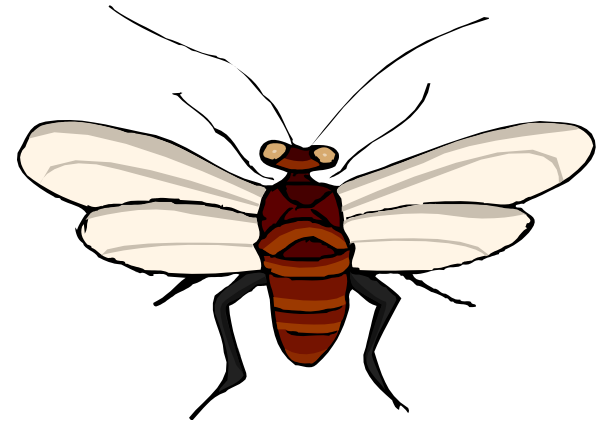
COMPLIMENTARY AND ALTERNATIVE MEDICINE AND DYSLEXIA



Alternative And Integrative Medicine Treatments Of AD/HD & LD

“We should all eat dung, because a thousand flies can’t be wrong!”

Russell Barkley, Ph.D.



Barkley, R.A. (1998). ADHD in Children, Adolescents, and Adults: Diagnosis Assessment and Treatment. New England Educational Institute, Cape Cod Symposia, August, Pittsfield, MA.

Controversial Treatments For Dyslexia

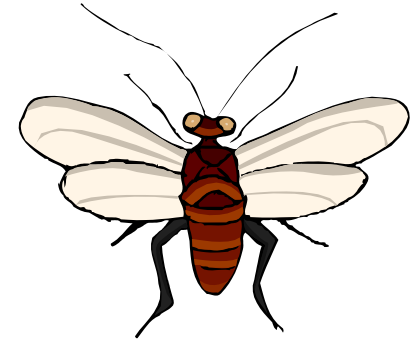
When to question if a treatment is legitimate:

- when no research in peer-reviewed journal is available;
- when they say, “traditional medicine, etc.” refuses to accept what they are saying;
- if most professionals would not use the method; and
- when the person pushing the treatment says, “...prove me wrong... (p.4).

Silver, L. (Summer, 2001). Controversial Therapies, Theme Editor's Summary. Perspectives, 27 (3), pp.1 and 4.

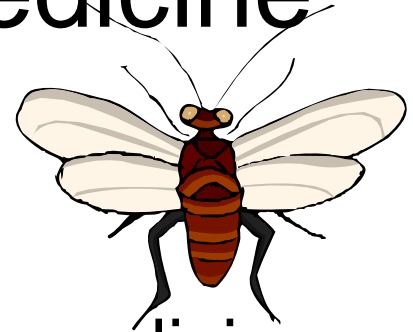
Alternative And Integrative Medicine Treatments Of AD/HD & LD

- 56% of those with Anxiety use alternative treatments.
- 53% with Depression
- 16% of hospitals offer CAM therapies
- Highest rates used by those with serious and debilitating conditions



Dittmann, M. (June, 2004). Alternative Health Care Gains Steam. Monitor On Psychology, 35 (6), pp. 42-44.

Alternative And Integrative Medicine Treatments Of AD/HD & LD

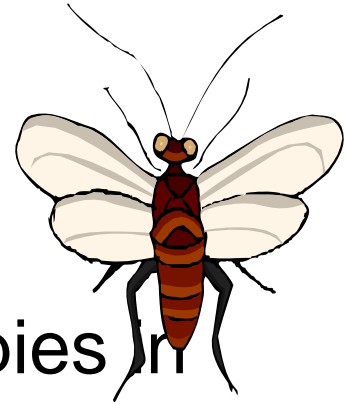


- “Today’s complementary and alternative medicine is tomorrow’s mainstream, but first it must meet with rigorous scientific evaluation.”
- –Alan Leshner, Ph.D., National Advisory Council for Complementary and Alternative Medicine and CEO of the American Association for the Advancement of Science (p. 44).

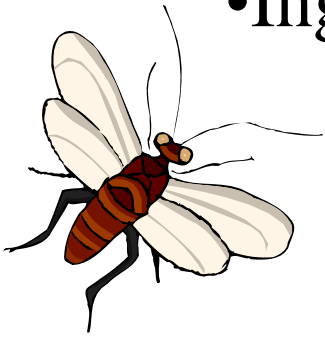
Dittmann, M. (June, 2004). Alternative Health Care Gains Steam. Monitor On Psychology, 35 (6), pp. 44.

Alternative, Integrative & Complementary Medicine: LD And AD/HD

- December 2003 edition of **Attention!** Available from CHADD.
- CHADD's National Resource Center
- www.MyADHD.com
- Rappaport, L.A., & Kemper, K.J. (2003). Complimentary and Alternative Therapies in Childhood Attention and Hyperactivity Problems. Developmental and Behavioral Pediatrics, 24, pp. 4-8.
- Silver, L. (Summer, 2001). Controversial Therapies, Theme Editor's Summary. Perspectives, 27 (3), pp.1 and 4.

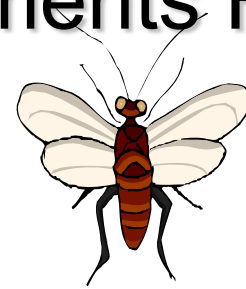


Places To Check Out “New” Treatments For AD/HD and LD



- Ingersoll, B., and Goldstein, S. (1993).
Attention-Deficit Disorder and Learning Disabilities: Realities Myths and Controversial Treatments. New York, NY: Doubleday.
- Cochrane Collaboration: www.cochrane.org
- www.quackwatch.com

Places To Check Out “New” Treatments For AD/HD and LD

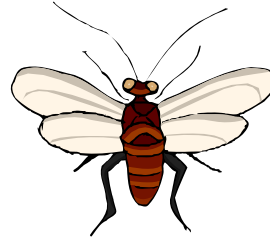


- National Center for Complimentary and Alternative Medicine: www.nccam.nih.gov
- NCCAM Clearinghouse: 888-644-6226
- Some findings:
 - St. John’s Wort (*Hypericum Perforatum*) no better than placebo with Major Depression. Now being studied with “Minor” Depression-There is some research that St. John’s Wort can help with mild to moderate depression- More research is needed.

Dittmann, M. (June, 2004). Alternative Health Care Gains Steam. Monitor On Psychology, 35 (6), pp. 42-44.

Autor (March 2004). Get the Facts: St. John’s Wort and The Treatment of Depression. National Center for Complementary and Alternative Medicine, National Institutes of Health, NCCAM Publication #: D005: www.nccam.nih.gov/health/stjohnswort/

Places to Check Out “New” Treatments for AD/HD and LD



- www.interdys.org
- www.chadd.org
- Cook, P. (1997). Knowledge is Power: Guidelines for Being an Informed Health Care Customer. Attention!, 4 (2), pp. 14-17.
- Arnold, L.E. (2002). Contemporary Diagnosis and Management of Attention-Deficit/Hyperactivity Disorder. Newtown, PA: Handbooks in Health Care.
- Author (May, 2004). Dangerous Supplements: Still at Large. Consumer Reports, 69 (5), pp. 12-17.
- Office of Dietary Supplements (ODS), National Institutes of Health: www.ods.nih.gov
- CAM on PubMed-National Library of Medicine: www.nlm.nih.gov/nccam/comon/pubmed.html

Reading Disorder - Hyperlexia



Reading Disorder-Hyperlexia



- Spontaneous reading before age 5
- Impaired reading and listening comprehension
- Word recognition far beyond expected for age and IQ
- Often intellectually challenged
- Speech, language, social, motor deficits
- Compulsive reading

(Sparks, R.L. (November 13-16, 2002). Orthographic Awareness Phonemic Awareness, and Working Memory Skill in Hyperlexic Children. 53rd Annual International Dyslexia Association International Conference, Atlanta, GE.)

Reading Disorder-Hyperlexia



- “A precocious ability to read words, far above what would be expected at their chronological age or an intense fascination with letters or numbers.
- Significant difficulty in understanding verbal language
- Abnormal social skills, difficulty in socializing and interacting appropriately with people” (p. 1).

From American Hyperlexia Association website; <http://www.hyperlexia.org/>, p. 1

Reading Disorder-Hyperlexia



- “Learn expressive language in a peculiar way, echo or memorize the sentence structure without understanding the meaning (echolalia), reverse pronouns
- Rarely initiates conversations
- An intense need to keep routines, difficulty with transitions, ritualistic behavior
- Auditory, olfactory and / or tactile sensitivity
- Self-stimulatory behavior
- specific, unusual fears...”

Reading Disorder-Hyperlexia



- Normal development until 18-24 months, then regression
- strong auditory and visual memory
- Difficulty answering "Wh--" questions, such as "what," "where," "who," and "why"
- Think in concrete and literal terms, difficulty with abstract concepts
- Listen selectively, appear to be deaf" (p. 1)

From American Hyperlexia Association website; <http://www.hyperlexia.org/>, p. 1

Reading Disorder-Hyperlexia



Often found in people with:

- Nonverbal Learning Disorders
- Asperger's Disorder
- Autism Spectrum Disorders
- Pervasive Developmental Disorders
- Tend to be weak in concept formation, analysis-synthesis of information, strategy generation, prosody and functional language

(Lorry, B.P. (1998). Language Based Learning Disabilities. In M. Gordon and S. Kieser (Eds.), Accommodations in Higher Education Under the Americans with Disabilities Act (ADA): A No Nonsense Guide for Educators, Administrators and Lawyers. New York, NY: Guilford, pp. 130-153.)

Reading Disorder-Hyperlexia



- Some with Hyperlexia may have fascination with numbers and math.
- Volkmar spoke of a man who solved all WAIS Block Design items using matrix algebra as verbal mediation.
- This man with Asperger's Disorder also tried to make algebraic equations to predict other's feelings.

(Volkmar, F. (April 23, 2003). Asperger Syndrome: Clinical Features, Assessment, and Intervention Guidelines. Seminar Presented by the New England Educational Institute, in Phoenix, AZ.)

Reading Disorder-Hyperlexia



“I used to believe that I was stupid. Attention span was inconsistent, comprehension was weak, I can recall such things as phone numbers without looking in the book, but if you took a book after I read a certain portion and asked me what I read, I could only tell you bits and pieces.” – 38 year old Hyperlexic man.

(Miller, S.M. (1996). The Voice of Experience: Reflections and Advice from older Hyperlexics. Newsletter of the American Hyperlexia Association. (From website: www.hyperlexia.org/aha_fall96.html)

Reading Disorder-Hyperlexia



Richman spoke of 2 possible types of Hyperlexia

1. “Hyperlexia Language Disorder”

- Autistic-like language problems-comprehension problems-may not be caught in elementary school
- Impulsive and distractible due to language deficit
- Processing speed problems
- Treatment-intensive language therapy is recommended

Reading Disorder-Hyperlexia



2. “Hyperlexia Visual-Spatial Disorder

- More Asperger’s-like, may have letter/word reversals, but may have good reading comprehension overall.
- May not have Social Reading Comprehension.
- Treatment: Social skills training, and behavior modification; avoid visual teaching.

(Richman, L. (1997). Peaceful Coexistence: Autism, Asperger’s, Hyperlexia. In S.M. Miller (Ed.), Hyperlexia Handbook: A Guide to Intervention Strategies and Resources. Elmhurst, IL: American Hyperlexia Association.)

Reading Disorder-Hyperlexia



Klin, et.al. (2000) suggested interdisciplinary assessment and transdisciplinary treatment of those with such disorders is the best approach. This would include neuropsychological, neurological, psychiatric, psychological, speech and language and occupational therapy assessment and treatment.

(Klin, A., et. al. (2000). Assessment Issues in Children and Adolescents with Asperger's Syndrome. In A. Klin, F.R. Volkmar and S.S. Sparrow (Eds.), Asperger Syndrome. New York, NY: Guilford, pp. 210-228.)

Reading Disorder-Hyperlexia

American Hyperlexia Association

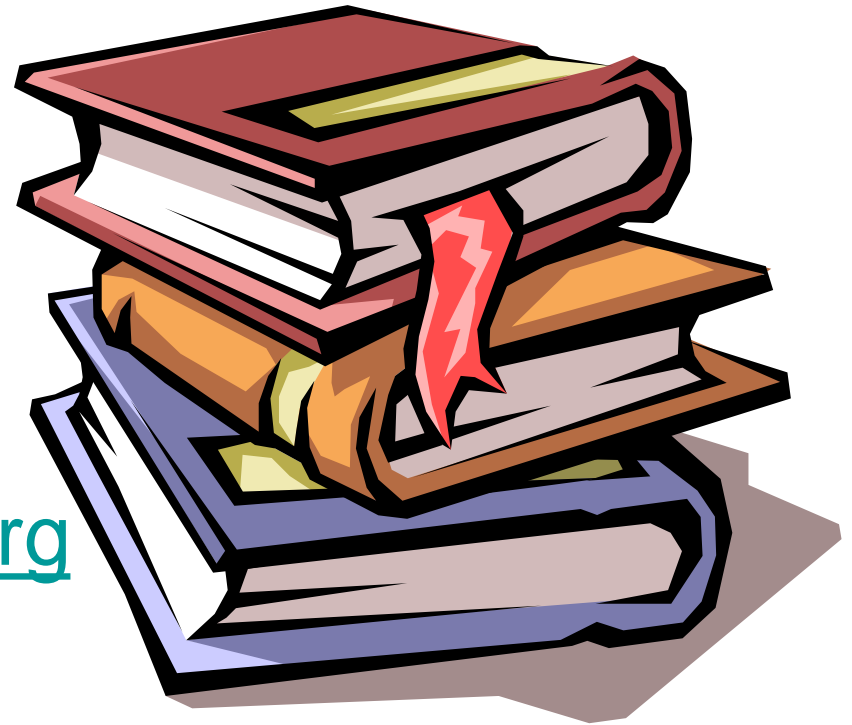
479 Spring Road

Elmhurst, IL 60126

Voice: 630-415-2212

Fax: 630-530-5909

Web: www.hyperlexia.org



Mathematics Disorder



Mathematics Disorder

“Unlike reading, which needs to be taught, children have a biologically based propensity to acquire arithmetic skills (eg, counting, adding, and comparing and understanding quantities) without formal schooling. Interestingly, the computational basis for numeric abilities is not exclusive to *Homo Sapiens* and has been demonstrated in monkeys as well” (p. 766).

Infants can tell small quantities from large ones.

Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

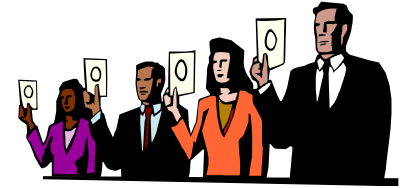
Mathematics Disorder



“Diagnostic criteria 315.1 Mathematics Disorder

- A. Mathematical ability, as measured by individually administered standardized tests, is substantially below that given the person's chronological age, measured intelligence, and age-appropriate education.
- B. The disturbance in Criterion A significantly interferes with academic achievement or activities of daily living that require mathematical ability.

Mathematics Disorder



C. If Sensory deficit is present, the difficulties in mathematical ability are in excess of those usually associated with it” (p. 54).

(American Psychiatric Association (2000). Diagnostics and Statistical Manual Fourth Edition-Text Revision. Washington, DC: American Psychiatric Association.)

Mathematics Disorder



“Diagnostic criteria for the diagnosis of a specific disorder of arithmetic skills

- A. The score on a standardized arithmetic test is at least 2 standard errors of prediction below the level expected on the basis of the child's chronological age and general intelligence.
- B. Scores on reading accuracy and comprehension and on spelling are within normal range ($-/+ 2$ standard deviations from the mean).

Mathematics Disorder



- C. There is no history of significant reading or spelling difficulties.
- D. School experience is within the average expectable range (i.e., there have been no extreme inadequacies in educational experiences).
- E. Arithmetical difficulties have been present from the early stages of learning arithmetic.

Mathematics Disorder



- F. The disturbance in Criterion A significantly interferes with academic achievement or with activities of daily living that require arithmetical skills.
- G. Most commonly used exclusion clause: IQ is below 70 on an individually administered standardized test.”

(World Health Organization (1992). International Statistical Classification of Diseases and Related Health Problems (ICD-10). Geneva, Switzerland:Author./ form: Lyon, G.R. (1996). The State of The Research. In S.C. Cramer and W. Ellis (Eds.), Learning Disabilities: Lifelong Issues. Baltimore, MD: Paul H. Brookes, p. 42.)

Mathematics Disorder:

Byron P. Rourke, Ph.D.

- Most people who do not have Reading Disorder-Dyslexia have Mathematics Disorder have symptoms similar to NVLD.
- NVLD is not the same as Mathematics Disorder.
- Those with Reading Disorder-Dyslexia represent the majority of those who have problems with arithmetic, but they do usually do not meet criterion for Mathematics Disorder.
- Approximately 65% of those 9 to 15 years old with NVLD will have Mathematics Disorder.

Rourke, B.P. (2006). Question # 8: "Is "specific arithmetic disability" (SAD) the same as NLD? Do all persons with NLD exhibit SAD? From Website: www.nld-bprourke.ca/BPR8.html .

Your Tax Dollars at Work

THE RESEARCH PROGRAM IN MATHEMATICS
AND SCIENCE COGNITION AND LEARNING-
DEVELOPMENT AND DISORDERS

Your Tax Dollars At Work

- Study the biology and genetics of math learning
- Longitudinal study of number estimation
- Study Subtypes of Math Disorders
- Study normative development of math abilities
- Study Classroom interventions for those with AD/HD, Reading Disorder, Turner Syndrome, fragile X, Williams Syndrome and Mathematics Disorder

Lyon, G.R. (March 25, 2004). United States Department of Health and Human Services. Testimony on Headstart before the Subcommittee on Labor, HHS, & Education and Related Agencies. Committee on Appropriations, U.S. House of Representatives: www.hhs.gov/asl/testify/t040325.html .

THE RESEARCH PROGRAM IN MATHEMATICS AND SCIENCE COGNITION AND LEARNING- DEVELOPMENT AND DISORDERS

- Research into etiology, classification, diagnosis, prevention, treatment, genetics, longitudinal aspects of, comorbidity, of Mathematics Disorders
- Daniel B. Berch, Ph.D.:
berchd2@mail.nih.gov

www.nichd.nih.gov/CRMC/cdb/math.htm#interest

Mathematics Disorder: Prevalence

- By age 19 5.9 to 13.8% of population will meet criterion for Mathematics Disorder
- More Frequent in Boys than in Girls
- 35 to 57% did not have a Comorbid Reading Disorder

Barbarese, W.J., Katusic, S.K., Colligan, R.C., Weaver, A.L., Jacobsen, S.J. (September-October, 2005). Math learning Disorder: Incidence in a Population-Based Birth Cohort 1976-82, Rochester, Minnesota. Ambulatory Pediatrics, 5 (5), p, 281-289; from Website:

www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids+16167851&adopt+Abstract .

Mathematics Disorder: Prevalence

- 3 to 5% have Mathematics Disorder
- There is an equal number of Males and females who have it.
- $\frac{1}{4}$ of those with Dyslexia and $\frac{1}{4}$ with AD/HD have Mathematics Disorder
- Those with Reading Disorder-Dyslexia and Mathematics Disorder are the most impaired.
- 50% will meet criteria into adolescence

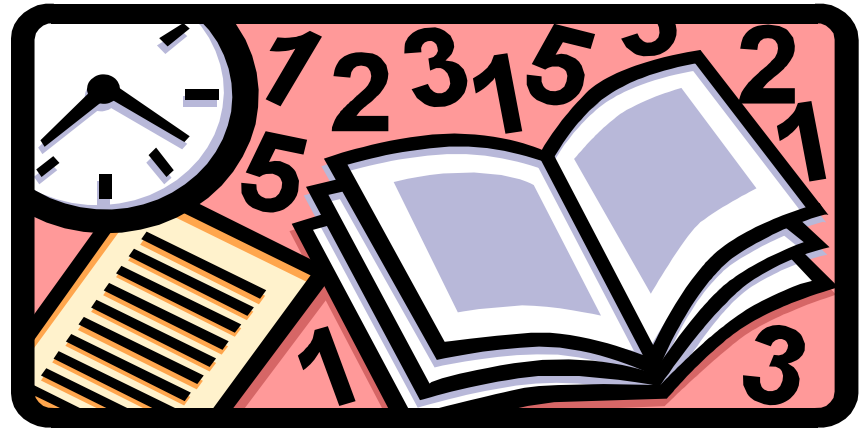
Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

Mathematics Disorder

“For children with dyscalculia, the solution of number problems such as $13-9$ or 7×6 is not self-evident. Another source of errors is their incomplete procedural knowledge of algorithms, as seen by misuse of the arithmetic sign, forgetting to carry over, misplacing digits, or undertaking the exercise in the wrong direction” (p. 766).

Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

Mathematics Disorder



Reading Disorder-Dyslexia may underlie Mathematics Disorders.

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

Mathematics Disorder and Comorbidities

- Low Birth Weight
- AD/HD
- Developmental Language Disorder
- Fragile X
- Epilepsy

Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

Mathematics Disorder

- “Developmental Dyscalculia...refers to the failure to develop arithmetic competence” (p. 43).
- “Dyscalculia is defined as a disturbance in learning mathematical concepts and computation and is associated with a central nervous system dysfunction” (p. 497).

Lyon, G.R. (1996). The State of The Research. In S.C. Cramer and W. Ellis (Eds.), Learning Disabilities: Lifelong Issues. Baltimore, MD: Paul H. Brookes, p. 42.)

Lerner, J. (1997). Learning Disabilities: Theories, Diagnosis, and Teaching Strategies (Seventh Edition). New York, NY: Houghton Mifflin.)

Mathematics Disorder



Kosc identified the following subtypes of Dyscalculia:

- * “Verbal Dyscalculia: An inability to name mathematical amounts, numbers, terms, symbols, and relationships.
- * Practognostic Dyscalculia: An inability to enumerate, compare and mathematically manipulate objects, either real or imagined.
- * Lexical Dyscalculia: A disability in reading mathematical symbols.

Mathematics Disorder

“...there are a number of characteristics of learning disabilities that affect quantitative learning, such as problems in spatial relationship, visual perception, symbol recognition, language and communication abilities, memory, graphomotor skills, and cognitive strategies” (p. 497).

Lerner, J. (1997). Learning Disabilities: Theories, Diagnosis, and Teaching Strategies (Seventh Edition). New York, NY: Houghton Mifflin.)

Mathematics Disorder

- 6 percent of children have a LD in math.
- 1/2 of those children have a Reading Disorder.
- 60 percent of those with learning disorders have significant problems with mathematics.

(Lyon, G.R. (1996). The State of The Research. In S.C. Cramer and W. Ellis (Eds.), Learning Disabilities: Lifelong Issues. Baltimore, MD: Paul H. Brookes, p. 3-61.)

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

(Gersten, R. (1999). Number Sense: Rethinking Arithmetic Instruction for Students with Mathematical Disabilities. Journal of Special Education, 44, pp. 18-28./From website: http://www.ldonline.org/ld_indepth/math_skills/gersten_dyscalculia.html (July 11, 2002).

Mathematics Disorder

“It is proposed that weak phonological processing abilities underlie the learning difficulties of MD/RD children, and that weak number sense is a causal factor in the math-fact learning of MD only in some MD/RD children” (p. 81)

(Robinson, C.S., Menchetti, B.M., and Torgesen, J.K. (2002). Toward a Two-Factor Theory of One Type of Mathematics Disabilities. Learning Disabilities Research & Practice, 17 (2). 81-89.)

Mathematics Disorder

Typical Symptoms

- Frequently malformed or reversed numbers and symbols
- Reading Disorder-Dyslexia
- Inability to sum integers
- Inability to recognize operation signs
- Because of their spacing and order, inability to read accurately the correct value of multi-digit numbers

Mathematics Disorder

- Poor memory for basic number facts
- Failure to carry numbers
- Inaccurate ordering and spacing of numbers in problems
- Also working memory and simultaneous processing problems

(Gaddes, W.H., and Edgell, D. (1994). Learning Disabilities and Brain Function: A Neuropsychological Approach (Third Edition). New York, NY: Springer-Verlag, pp. 422.)

(Levine, M. (1987). Developmental Variation and Learning Disorders. Cambridge, MA: Educator Publishing Service.)

Mathematics Disorder

Rourke stated that deficits in math calculation and reasoning are highly related to weaknesses in visual-perceptual and visual-spatial reasoning. He indicated this could be related to Nonverbal Learning Disorders (NVLD).

(Rourke, B.P. (1985). Neuropsychology of Learning Disabilities: Essentials of Subtype Analysis. New York, NY: Guilford.)

Mathematics Disorder: Subtypes

Geary indicated there are 3 subtypes of Mathematics Disorder

1. “Semantic Memory Problems: This includes inconsistent retrieval from memory of math facts, and processing time is inconsistent.
2. Procedural Problems: students use, “...immature procedures...frequent errors in the execution of procedures...potential delay in the understanding of concepts underlying procedural use...” (p. 6)

Mathematics Disorder

3. Visuospatial Problems: “ Difficulties in spatially representing numerical information such as the misalignment of numerals in multi-column arithmetic problems or rotating numbers ...misinterpretation of spatially based represented numerical information...may result in difficulties in areas that rely on spatial abilities, such as geometry” (p. 6).

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

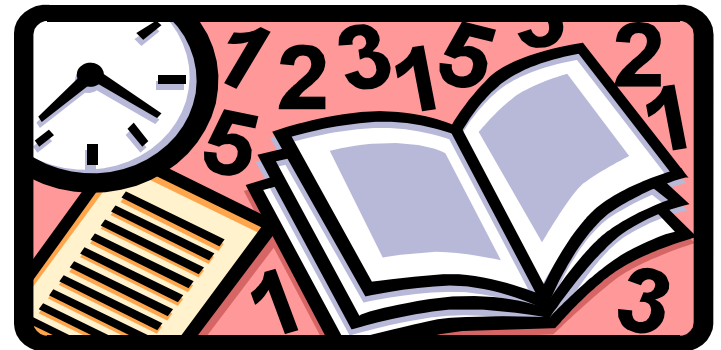
Mathematics Disorder

- Those with Semantic Memory Problems tend not to remember as many math facts as their non-disabled peers.
- They will not outgrow problems.
- At first they have trouble encoding math facts into long term memory; later they have problems retrieving such information.
- Trouble inhibiting unneeded math facts.

Mathematics Disorder

- Some of this may be related to the Rapid Automated Naming problems in those with Reading Disorder-Dyslexia

(Geary, D.C. (July 11, 2002). Mathematical Disabilities: What We Know and Don't Know. From website: http://www.ldonline.org/ld_indepth/math_skills/geary_math_dis.html , pp. 1-7.)



Mathematics Disorder



- Those with Mathematics Disorder tend to use immature problems solving strategies with math.
- This may be due to developmental delays.

(Geary, D.C. (July 11, 2002). Mathematical Disabilities: What We Know and Don't Know.

From website:

http://www.ldonline.org/ld_indepth/math_skills/geary_math_dis.html , pp. 1-7.)

Mathematics Disorder/ADHD

- Those with Combined Type AD/HD have significant difficulty with mathematical calculation and applied math.
- Those with Inattentive AD/HD have pervasive problems with mathematical calculations in particular.
- The Combined Type AD/HD tend to have problems with verbal sequences and mental calculations.

(Marshall, R.M., Schafer, V.A., O'Donnell, I., Elliot, j. and Handwerk, M.L. (1999). Arithmetic Disabilities and ADD Subtypes: Implications for *DSM-IV*. Journal of Learning Disabilities, 32 (3), pp. 239-247.)

(Barkley, R.A. (February 18-20, 2002). ADHD and Oppositional Defiant Children. Seminar presented in Phoenix, AZ The Institute for Continuing Education, P.O. Box 1269, Fairhope, AL33633.)

Caution About Mathematics Disorder Subtyping

- Silver, Pennette, Black, Fair and Balise (1999): half of the children they studied with Mathematics Disorder had comorbid reading and spelling problems that were found after a 19 month follow-up.
 - The majority of the other subtypes turned out to be in the above subtype or were not disabled at follow-up.
 - This may be due to the poor mathematics instruments currently available.

Silver, C.H., Pennet, B.D., Black, J.L., Fair, G.W., and Balise, R.R. (1999). Stability of Arithmetic Disability Subtypes. Journal of Learning Disabilities, 32, pp. 108-119.

Mathematics Disorder

“It is suggested that assessment move away from a system that seeks only correct responses and move toward a system that seeks information concerning student ability to communicate mathematics principles, reason, prove and explain mathematics, and demonstrate connections between mathematics and other subjects” (p. 47).

(Cawley, J.F., and Foley, T.E. (2001). Enhancing the Quality of Mathematics for Students with Learning Disabilities: Illustrations from Subtraction. Learning Disabilities, 11 (2), pp. 47-59).

Neurology of Mathematics Disorder

“...dyscalculia can result from dysfunction of either hemisphere, although the left parietotemporal area is of particular significance” (p. 765).

Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

Neurology of Mathematics Disorder

- Posterior right hemisphere- associated with deficits in math comprehension and written math
- Linguistic processing regions and areas that analyze relationships-math reasoning
- Frontal lobes-some problem solving
- Temporal lobes-auditory-verbal math

(Lyon, G.R. (1996). The State of Research. In S.C. Cramer and W. Ellis (Eds.), Learning Disabilities: Lifelong Issues. Baltimore, MD: Brookes, p. 3-61.)

Neurology of mathematics

- Arithmetic: bilateral activation of prefrontal and inferior parietal cortices
- Multiplication: Activation in the left parietal cortex
- Estimation: Both parietal lobes
- Exact calculation: Left inferior frontal lobe
- Subtraction: Left intraparietal sulcus

Shalev, R.S. (October, 2004). Developmental Dyscalculia. Journal of Child Neurology, 19 (10), pp. 765-771.

Neurology of Mathematics Disorder

- Very early left and right hemisphere problems can disrupt math learning in children.
- Left hemisphere insults have been linked to acalulia in adults.

(Fiedorowicza, C., Benezra, E., MacDonald, W., McElgunn, B, Wilson, A., and Kaplan, B. (2001). Neurobiological Basis of Learning Disabilities: An Update. Learning Disabilities, 11 (2), pp. 61-74.)

Neurology of Mathematics Disorder

- Mathematics Disorder of Semantic Memory: “Appear to be associated with hemispheric dysfunction, in particular posterior regions of the left hemisphere” (p. 6).
- Mathematics Disorder of Procedural Problems: “...Hemispheric dysfunction, and in some cases a prefrontal dysfunction” (p. 6).

Neurology of Mathematics Disorder



- Mathematics Disorder of Visuospatial Problems: "...appears to be associated with right hemispheric dysfunction, although the parietal cortex of the left hemisphere may be implicated as well" (p. 6).

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

Dyslexia and Mathematics Disorder

“Too frequently and too readily, individuals with dyslexia who have difficulty with mathematics are misdiagnosed as having *dyscalculia*-literally trouble with calculating, a neurologically based disability. True dyscalculia is rare...We know that for individuals with dyslexia, learning mathematical concepts and vocabulary and the ability to use mathematical symbols can be impeded by problems similar to those that interfered with their acquisition of written language” (p. 14)

(Tomey, H.A. (Fall, 1998). Mathematics and Dyslexia. Perspectives, 24 (4), pp. 14-15.)

Dyslexia and Mathematics Disorder

Dyslexics have different math problems than those with MD who are not dyslexic.

– Dyslexics have trouble with:

- Memorizing math facts
- Comprehending word problems
- Mis-sequencing numbers as they write

HOWEVER

Mathematics Disorder



Dyslexics without MD tend not to have trouble with:

- Basic computational problems
- Fundamental conceptual problems with math comprehension
- No secondary right hemisphere deficit of spatial cognition

(Pennington, B. (1991). Diagnosing Learning Disorders: A Neuropsychological Framework. New York, NY: Guilford.)

Mathematics Disorder

What is Mathematical Intuition?

- Even in elementary arithmetic multiple cognitive areas are used for different tasks.
- Exact arithmetic uses specific language areas in the left inferior frontal lobe which generates associations between words.
- Symbolic arithmetic was dependent on improvement of number notations, a cultural invention specific to humans.

Mathematics Disorder

- Approximate arithmetic relies on non-verbal quantity representation implemented in visual-spatial areas of the right and left parietal lobes.
- It is possible this non-verbal representational numeral quantifying ability has a long evolutionary history dating back to pre-humans.

(Dehaene, S., Spelke, E. , Pinel, P., Stanescu, R., and Tsivkin, S. (May 7, 1999). Sources of Mathematical Thinking: Behavioral and Brain-Imaging Evidence. Science, 284, pp. 970-974.)

Mathematics Disorder

Number Sense

“Gersten wrote, “Number sense is an emerging construct...that refers to a child’s fluidity and flexibility with numbers, the sense of what numbers mean and an ability to perform mental mathematics and to look at the world and make comparisons” (p. 3).

(Gersten, R. (1999). Number Sense: Rethinking Arithmetic Instruction for Students with Mathematical Disabilities. Journal of Special Education, 44, pp. 18-28./From website: http://www.idonline.org/ld_indepth/math_skills/gersten_dyscalculia.html (July 11, 2002).

Mathematics Disorder/Hyperlexia

- Some with Hyperlexia may have a fascination with numbers and math.
- Volkmar spoke of a man who solved all WAIS Block Design items using matrix algebra as verbal mediation.
- This man with Asperger's Disorder also tried to make an algebraic equation to predict other's feelings.

(Volkmar, F. (April 23, 2003). Asperger Syndrome: Clinical Features, Assessment, and Intervention Guidelines. Seminar Presented by the New England Educational Institute, in Phoenix, AZ.)

Mathematics Disorder



Habituation

- Remedial work to help master and/or process facts that were missed
- Work to overcome mathematics anxiety (counseling, etc.)
- Teach specific skills to work problems
- Remedial work with math facts
- Multi-sensory teaching
- Use flash cards with math facts
- When teaching math relate it to the “real world”

Mathematics Disorder



- Graph paper for calculations.
- Teach mnemonics.
- Use a pocket sized flip chart or Personal Data Assistant (i.e., PalmPilot, etc.) with basic math facts and/or procedures needed contained within it.
- Teach them to acknowledge their computational strengths and weaknesses and how to work with them.

Mathematics Disorder

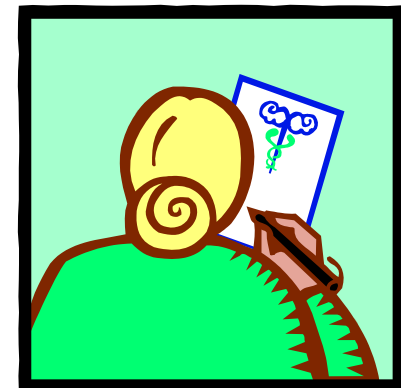


- Teach them to self-monitor their work.
- Have them work with others who may be skilled in math.
- Encourage the student to do math orally and have them monitor for errors and questions as they do.
- For AD/HD, consider medications.

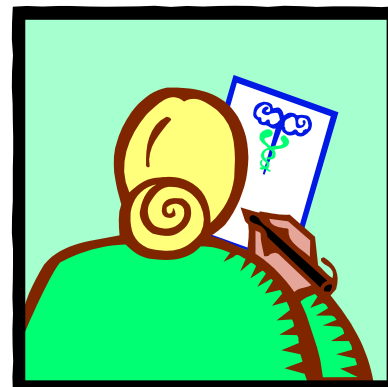
Mathematics Disorder

A Good Resource:

Marolda, M.R. (Summer, 2000). Challenger in Learning & Teaching Mathematics. Perspectives, 26 (3), entire issue. Available from: International Dyslexia Association, 8600 LaSalle Road, Chester Bldg., Suite 383, Baltimore, MD 21286-2044; 410-296-0232.



Mathematics Disorder



NVLD Resource

Applied Research Knowledge Foundation

ARK Foundation (ARK)

Allenmore Medical Center

1901 South Union Station, Suite A-311

Tacoma, WA 98405

Phone: 253-573-0211

Fax: 253-573-0211

E-mail: ARKfdn@aol.com

Web:

http://www.newhorizons.org/spneeds_arkspatial.html

Mathematics Disorder

NVLD Resource

Nonverbal Learning Disorder Association (NLDA)

2446 Albany Avenue

West Hartford, CT 06117

Phone: 860-570-0217

E-mail: NLDAResources@aol.com

Web: <http://www.nld.org>



Mathematics Disorder

Good Resource on Treating Visual-Spatial Problems of NVLD:

Neff, B., Neff-Lippman, J., and Stockdale, C.
(2002). The Source for Visual-Spatial Disorders.
East Moline, IL: LinguiSystems.



Mathematics Disorder

Asperger's Disorder

Asperger Syndrome Coalition of the United States, Inc. (ASC-US)

2020 Pennsylvania Avenue

Washington, DC 20006

Phone: 866-427-7747

E-mail: info@asc-us.org

Web: <http://www.asperger.org>



Mathematics Disorder



Lerner made the following suggestions for Secondary Students with Mathematics Disorder:

- “Provide many examples.
- Provide practice in discriminating various problem types.
- Provide explicit instruction.
- Separate confusing elements” (pp. 504-505).

(Lerner, J. (1997). Learning Disabilities: Theories, Diagnosis, and Teaching Strategies (Seventh Edition). New York, NY: Houghton Mifflin.)

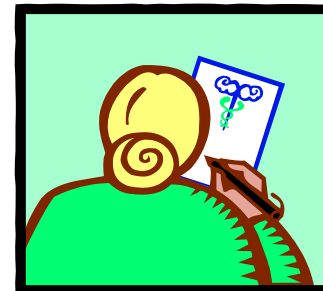
Mathematics Disorder and AD/HD



- Treatment:
 - Those with AD/HD have Working Memory Deficits
 - Stimulant medication can significantly improve Mathematical procedural and/or fact retrieval deficits.

Tannock, R., & Brown, T.E. (2000). Attention-Deficit Disorders With Learning Disorders in Children and Adolescents. In T.E. Brown (ed.), Attention –Deficit Disorders and Comorbidities in Children, Adolescents and Adults. Washington, DC: American Psychiatric Press, pp. 231-297.

Mathematics Disorder



General Accommodations for College:

- Allow calculator in class
- Provide tutoring
- Academic advisement with disability in mind
- Multi-sensory teaching of math
- Course substitution
- Kerper added that students with MD should be allowed to take tests alone with professors to ask questions.

(Kerper, C. (2002). Students with Dyscalculia May Need Additional Math Coaching. Disability Compliance for Higher Education. 7 (8), p. 7.)

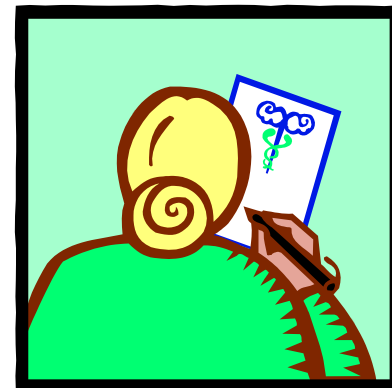
Mathematics Disorder

Technological Accommodation

Talking Calculator – and the use of a study carol to use it.



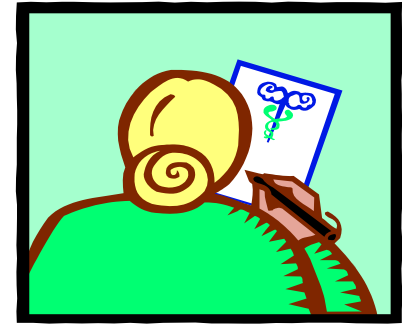
Mathematics Disorder



Broody and Ginsberg wrote of messages students with Mathematics Disorders perceive. They are as follows:

- “Only geniuses can understand mathematics. Just do as you are told. You are not really smart enough to understand it.
- Mathematics is a bunch of facts and procedures. Normal children memorize it quickly. You’re dumb if you can’t....

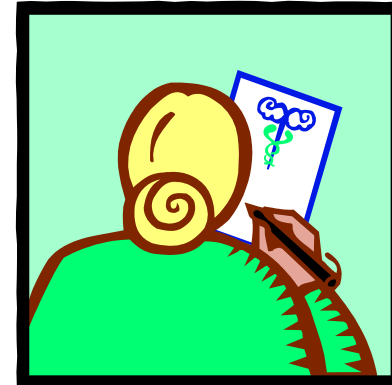
Mathematics Disorder



- In mathematics, there is one correct method for doing things. Good children can follow directions. You're bad if you use an unacceptable procedure like counting" (p. 193).

Broody, A.J., and Ginsburg, H.P. (1991). A Cognitive Approach to Assessing the Mathematical Difficulties in Children Labeled "Learning Disabled. In H.L. Seanson (Ed.), Handbook on the Assessment of Learning Disabilities: Theory, Research and Practice. Austin, TX: Pro Ed, pp. 177-227.)

Mathematics Disorder

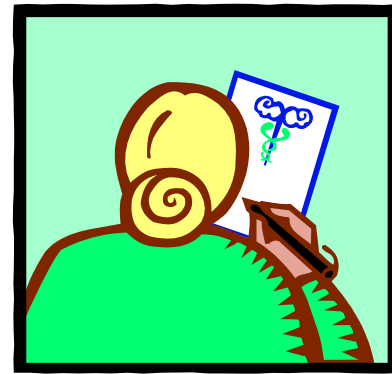


- Lyon (1997, Personal Communication) stated the IQ-Math Achievement Discrepancy is not appropriate for Mathematics Disorder due to the amount of linguistic processing needed in mathematics. A Listening Comprehension-Achievement Discrepancy is more appropriate.
- Geary indicated a two year discrepancy between grade level and achievement appears to be appropriate with Mathematics Disorder.

(Lyon, G.R. (1997). Personal Communication)

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

Mathematics Disorder



Comorbidities

- 50% Reading Disorder-Dyslexia (Geary, 2000)
- AD/HD 12-27%(Barkley, 2006, p. 127)
- NVLD 65% (Rourke, 2006)
- Asperger's Disorder (Smith Myles & Simpson, 1998)
- Synesthesias (Cytowic, 1999)

(Geary, D.C. (2000). Mathematical Disorders and Overview for Educators. Perspectives, 26 (3), pp. 6-9.)

(Barkley, R.A. (2006). Attention Deficit/Hyperactivity Disorder, Third Edition. New York, NY: Guilford, 127.

(Rourke, B.P. (2006). Question #1: You refer to NLD as a subtype of Learning Disabilities (LD). How do you define LD? From Website: www.nld-bprouke.ca/BPRA1.html)

(Smith Myles, B., and Simpson, R.L. (1998). Asperger Syndrome: A Guide for Educations and Parents. Austin, TX: ProEd.

(Cytowic, R.E. (August, 5 1999). Synesthesia: Phenomenology and Neuropsychology-A Review of Current Knowledge. Psyche: An Interdisciplinary Journal of Research on Consciousness, 2 (10), July 1995, pp. 1-18/Available on web at: [http://www. Psyche.cs.monash.au/v2/psyche-2-10-cytowic.html](http://www.Psyche.cs.monash.au/v2/psyche-2-10-cytowic.html))

Dyssemia

- AD/HD and AD/HD-like symptoms are highly comorbid in those with LD, NVLD, and Asperger's Disorder.

Brown, T.E. (2000). Attention-Deficit Disorders and Comorbidities in Children, Adolescents and Adults. Washington, D C: American Psychiatric Press.



NVLD and AD/HD

- Rourke believes:
 - NVLD people may have AD/HD that arises from different etiologies, but he feels most with NVLD **DO NOT** have AD/HD.
 - NVLD “inattention” he feels is a secondary result of problems with tactile and visual perception. As small children this shows up in school as “AD/HD” because curriculum for that age child is geared toward visual-tactile learning.
 - He believes stimulants **DOT NOT** help the truly NVLD child they just grow out of their hyperactivity and developmentally become hypoactive.

Rourke, B. (2006). Question 7: “What is the Comorbidity of NLD and Attention Deficit/Hyperactivity Disorder?” From Website: www.nld-bprouke.ca/Q_A.html

Asperger's Disorder and AD/HD

- “Asperger’s Syndrome and Attention Deficit Disorder are two distinct conditions, but it is possible for a child to have both” (Attwood, 1998, p. 146)
- Autism Spectrum may be comorbid with AD/HD (Barkley, 2006, p. 195):
 - PDD NOS or Autism = 26% AD/HD, CT
 - PDD NOS or Autism = 33% AD/HD, PIT
 - Total = 59%

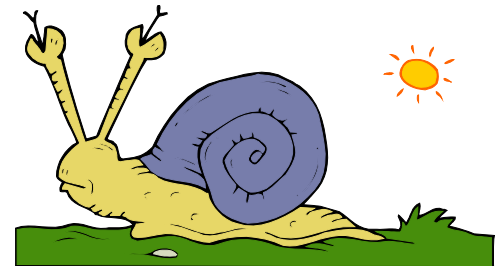
(Attwood, T. (1998). Asperger’s Syndrome: A Guide for Parents and Professionals. Philadelphia, PA: Jessica Kingsley, p. 146.)

(Barkley, R.A. (2006). Attention Deficit/Hyperactivity Disorder, Third Edition. New York, NY: Guilford, p. 195)

Attention-Deficit/Hyperactivity Disorder, Predominately Hyperactive-Impulsive Type (DSM-IV, TR #314.01)

- Tzelepis stated she has only seen Combined Type adults in her work and doubts the Predominately Hyperactive-Impulsive Type exists in adults.

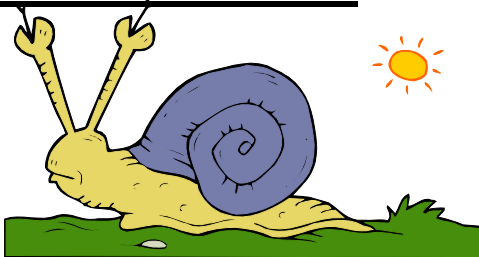
Tzelepis, A., and Mapou, R. (1997, May). Assessment. Paper presented at the Pre-Conference Professional ADD Institute of the 3rd Annual National ADDA Adult ADD Conference, St. Louis, MO.



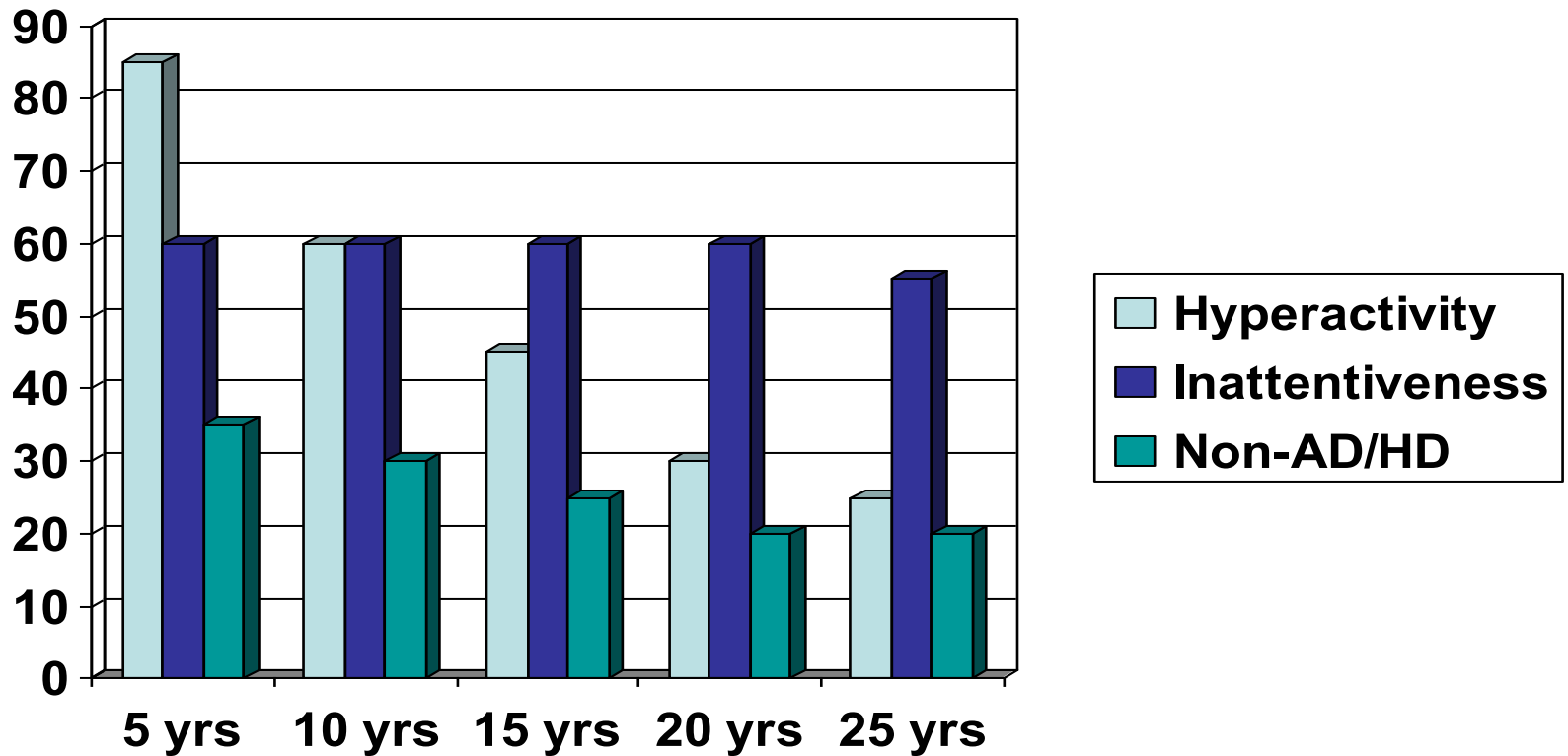
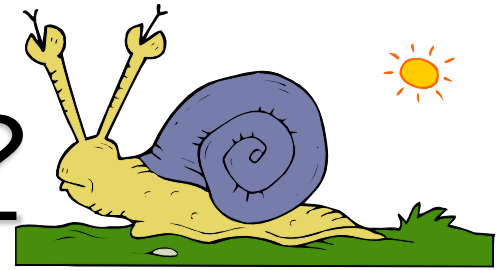
Brown

Brown called those who met DSM criteria for Hyperactive-Impulsive Type or Combined Type in Childhood, but only met criteria for Inattentive Type in Adulthood, “**CROSSOVERS**”.

Brown, T.E. (1995). Differential Diagnosis of ADD Versus ADHD in Adults. In K.G. Nadeau (Ed.), A Comprehensive Guide to Attention-Deficit Disorder in Adults. New York: Bruner/Mazel, pp. 93-108.



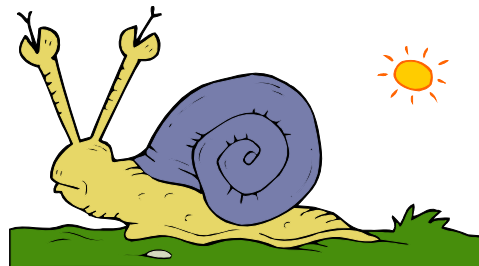
Crossovers?



Crossovers (Continued)

Barkley wrote when the Combined Type changes to the Inattentive Type by adolescence or adulthood then the person should be thought of as having the Combined Type.

Barkley, R.A. (2002B). ADHD and Oppositional Defiant Children. Seminar presented, February 19-20, Phoenix, AZ., The Institute for Continuing Education, Fairhope, AL.



Emotional Seeing Eye Dogs

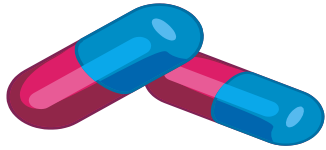


- 4Paws For Ability
253 Dayton Avenue
Xenia, OH 45385
- Training Center:
937-374-0385
- E-mail:
karen4paws@aol.com

Risperidone, Autism Spectrum Disorders and Social Interaction



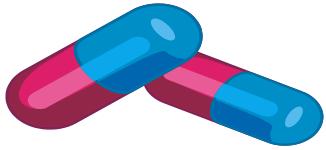
Risperidone, Autism Spectrum Disorders and Social Interaction



“...the results of multiple preliminary studies suggest that risperidone and other ‘atypical’ neuroleptics may be useful for reducing repetitive behaviors, aggression, and impulsivity and social relatedness in children, adolescents and adults with PDDs.”

Author (1997). Use of “Atypical” Neuroleptics in the Treatment of PDDs. MedScape Psychiatry & Mental Health e Journal, 2 (4): www.medscape.com/viewarticle/430897_5 .

Risperidone, Autism Spectrum Disorders and Social Interaction



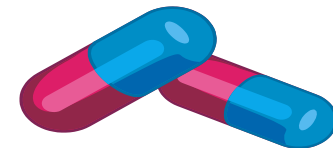
- Highly Effective and Risk of Side Effects are Rare.
- Side Effects: syncope, cardiac problems, weight gain, extrapyramidal problems, diabetes, increased prolactin and rarely galactorrhea and gynecomastia (Regularly screen for these prior to and while on this medication)

McCracken, J.T. (2005). Safety Issues With Drug Therapies For Autism Spectrum Disorders. Journal of Clinical Psychiatry (NIMH RUPP Autism Network), 66 (Sup 10), pp. 32-37.

Risperidone, Autism Spectrum Disorders and Social Interaction

“Risperidone led to significant improvements in restricted, repetitive, and stereotyped patterns of behavior interests, and activities in autistic children, but did not significantly change their deficit in social interaction and communication. Further research is necessary to develop effective treatments for the core social and communicative impairments of autism” (p. 1).

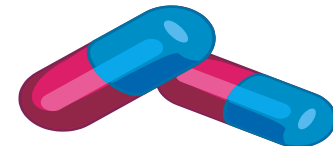
McDougle, C.J., Scahill, L., Amen, M.G., McCracken, J.T., Martin, A., Davies, M., Arnold, E., Posey, D.J., Swiezy, N.B., Gonzalez, N.M., Halloway, J., Koenig, K., McGough, J.J., Ritz, L., and Vitiello, B. (June, 2005). Risperidone For The Core Symptom Domains of Autism: Results From The Study By The Autism Network Of The Research Units On Pediatric Psychiatry. American Journal of Psychiatry, 162, 1142-1148; From Website:
www.ajp.psychiatryonline.org/cgi/content/abstract/162/1142?/ijkey=68ea62ff134a7fb35516415814ca0ef&keytype2=tf_ipsecsha .



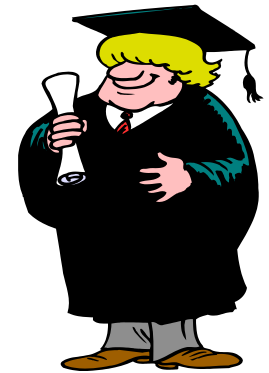
Risperidone, Autism Spectrum Disorders and Social Interaction

“In conclusion, we believe that, based on this study, it would be misleading to state the effectiveness of risperidone on **any** domain of autism and would like to emphasize to clinicians that research continues on pharmacological intervention, the behavioral approach still has the broadest empirical validation for effectiveness and has been shown to play a significant role in enhancing functioning” (p. 551).

Adetunji, B., Mathews, M., Osimowo, T., and Williams, A. (March, 2006). Letter to the Editor: Risperidone for the Core Symptom Domains of Autism. American Journal of Psychiatry, 163, p. 551; From Website: www.ajp.psychiatryonline.org/cgi/content/full/163/3/551 .



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