THE HITCHHIKERS GUIDE TO LEARNING DISORDERS IN ADULTS

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History and Learning Disorders

- 1861 Paul Broca, “Tan Tan” and Broca’s Aphasia—language loss (left frontal lobe)
- 1871 Carl Wernicke, Wernicke’s Aphasia—language understanding (temporal lobe)

History and Learning Disorders

- 1887 Joseph Djerine, Monsieur C., alexia and agraphia
- 1896 W. Pringle Morgan– “The Case of Percy F.”
- 1917 James Hinshelwood—”Wordblindness”, case study—angular gyrus?
- 1926 Henry Head developed method of testing for aphasia

History and Learning Disorders

- 1930's Samuel T. Orton– research, diagnoses and treats streptosymbolia"
- 1943 Grace Fernald establishes UCLA Reading Clinic
- 1947 Alfred Strauss, et. al. -- **Psychopathology of the Brain Injured Child**
- 1949 Orton Dyslexia Society founded

History and Learning Disorders

* 1960 Ann Gillingham and Bessie Stillman—**The Orton-Gillingham Approach to Remedial Training for Children with Specific Disability in Reading, Spelling and Penmanship**
- 1963 Samuel Kirk—"Learning Disabilities"
- 1963 Association for Children with Learning Disabilities (ACLD)

History and Learning Disorders

- 1963 National Institute of Child Health and Development (NICHD)—***RESEARCH PROGRAM IN READING DEVELOPMENT READING DISORDERS AND READING INSTRUCTION***
- 1973 **Public Law 93-112: Rehabilitation Act of 1973, Section 504**

History and Learning Disorders

- 1968 Margarett Rawson—Developmental Language Disability: Adult Accomplishments of Dyslexic Boys
- 1979 Eileen Simpson—Reverals: A Personal Account of Victory Over Dyslexia
- 1979 Galaburda and Kemper– First dyslexic autopsy
- 1980 Frank Duffy—Brain imagry on adult dyslexics

History and Learning Disorders

- 1983 Norman Geschwind—epidemiological research, sex, left-handedness, autoimmune disease and dyslexia
- 1985 Byron Rourke—Nonverbal Learning Disabilities: The Syndrome and the Model
- 1990 Human Genome Project and the Decade of the Brain
- 1990 **Public Law 101-336: The Americans with Disabilities Act**

History and Learning Disorders

- 1990 **Public Law 101-476: The Individuals with Disabilities Education Act**
- 1991 Maryanne Wolf—Double Deficit Hypothesis
- 1996 Sally Shaywitz—Dyslexia
- 1996 Nonverbal Learning Disabilities Association (NVLDA)
- 1997 Bartlett vs. New York State Board of Law Examiners

History and Learning Disorders

- 1997 Guckenberger vs. Boston University
- 1997 Association for Higher Education and Disability (AHEAD)– Guidelines for Documenting a Learning Disability in Adolescents and Adults
- 1998 Shaywitz and Shaywitz, et. al.– Functional Disruption in the Organization ot the Brain for Reading in Dyslexia

History and Learning Disorders

- 2000 Nancy Mather—"Triple Deficit Hypothesis"
- 2000 Report of The National Reading Panel
- 2001 Fawcett—Dyslexia: Theory & good Practice

What is “State of the Art”?

What is a Learning Disability?

- "'Specific learning disability' means a disorder in one or more of the basic psychological processes involved in understanding or in using language spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia…

What is a Learning Disability (Continued)?

…The term does not include children who have learning problems which are the primary result of visual, hearing, or motor handicaps, or mental retardation, of economic disturbance, or of environmental, cultural, economic disadvantage."

(Department of Health, Education, and Welfare, December 29, 1977, p. 65083.)

What is a Learning Disorder (Continued)?

"Learning disabilities is a generic term that refers to a hetrogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities, or of social skills. These disorders are intrinsic to the individual and presumed to be due to central nervous system dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions …

What is a Learning Disorder (Continued)?

"…(e.g., cultural differences, insufficient or inappropriate instruction, psychogenic factors), and especially attention deficit disorder, all of which may cause learning problems , a learning disability is not the direct result of those conditions or influences."

(Interagency Committee On Learning Disabilities, 1997, p. 222; Adopted by the LEAD 2000 Congress, January 28, 1991, Little Rock, AR.)

What is a Learning Disorder (Continued)?

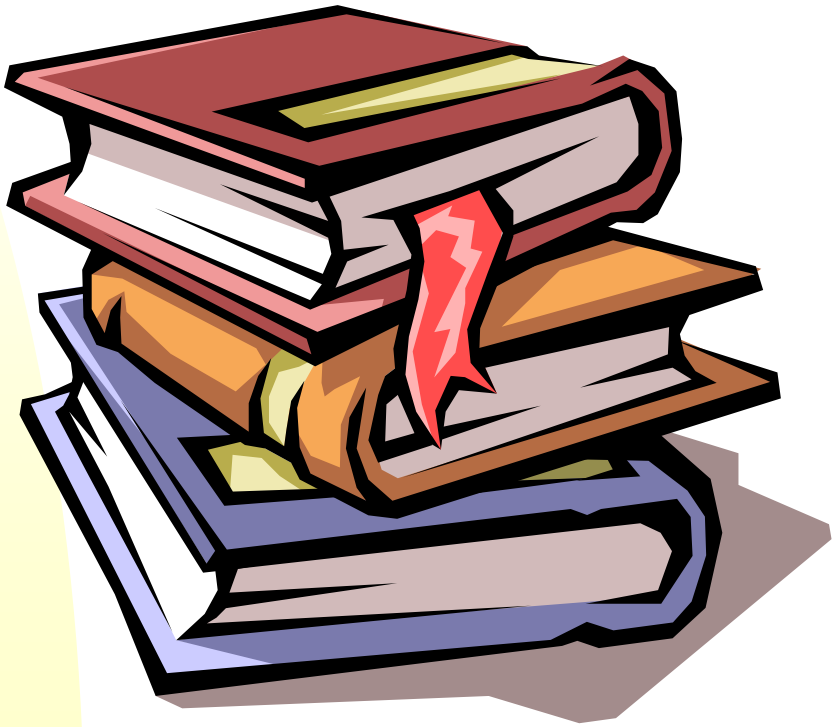
"However, it is possible that emotional disturbances and other adaptive defiencies may arise from the same patterns of central processing assets and deficits that generate the manifestations of academic and social learning disabilities. Learning Disabilities may arise from genetic variations, biological factors, events in the pre to perinatal period or any other subsequent events resulting in neurological impairment" (p. 215).

(Rourke, B.P. (1989). Nonverbal Learning Disabilities: The Syndrome and the Model. New York, NY: Guilford.)

What is the “Dismal Four”?

- Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition, Text Revision

(American Psychiatric Association, 2000 Washington, DC: American Psychiatric Association)



What is a Learning Disorder (Continued)?

"Learning Disorders are diagnosed when the individual's achievement on individually administered standardized tests in reading, mathematics, or written expression is substantially below that expected for age, schooling, and level of intelligence. The learning problems significantly interfere with academic achievement or activities of daily living that require reading, mathematical, or writing skills. A variety of statistical approaches…"

What is a Learning Disorder (Continued)?

"…can be used to establish that a discrepancy is significant. *Substantially below* is usually defined as a discrepancy of more than 2 standard deviations between achievement and IQ. A smaller discrepancy between achievement and IQ (i.e., Between 1 and 2 standard deviations) is sometimes used in cases where an individual's performance on an IQ test may have been compromised by an associated disorder in cognitive prossessing, a comorbid mental disorder or general medical condition, or individual's ethnic background… "

What is a Learning Disorder (Continued)?

"…If a sensory deficit is present the learning difficulties must be in excess of those usually associated with the deficit. Learning Disorders may persist into adulthood" (pp. 49-50).

(American Psychiatric Association (2000). Diagnostic and Statistical Manual of Mental Disorders—Text Revision (DSM-TR). Washington, DC: American Psychiatric Association.)

What is a Learning Disability (Continued)

Civil Rights Definition of Disability

- These are defined by:

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

What is a Learning Disability (Continued)?

Civil Rights Definition of Disabilities (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 is a Learning Disability (Continued)?

- ***Hence, you can have a disorder and not be considered "legally disabled" by it!***
- ***That's why I call them "Learning Disorders".***
- ***We still help those with disorders who do not meet the criteria for legal disability status.***
- ***The Concept of Legal Disability is highly controversial.***

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

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 (Continued)

For More on the Disability/Disorder Controversy Consult:

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

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 Does Neurobiological Mean?

- 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.)

* “Although learning disabilities may be exacerbated by other variables, such as ineffective teaching strategies or socioeconomic barriers, this paper supports the position that the essence of learning disabilities is neurobiological in nature” (p. 61).

  (Fiedorowicz, C., et.al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74.)

What Does Neurobiological Mean (Continued)?

"Of particular relevance to this review is the compelling evidence in support of the neurobiological basis of learning disabilities. Studies employing widely divergent methodologies, e.g. research using genetic analysis, neuroanatomical neuroimaging, electrophysiological recording, pathological analysis of brain tissue at at autopsy, and neuropsychological evaluation, have yielded highly convergent conclusions in support of a neurobiological etiology" (p. 70).

(Fiedorowicz, C., et.al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74.)

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 Reading Disorder?

DSM-IV, TR

"Diagnostic criteria for 315.00 Reading Disorder

a. Reading achievement , as measured by individually administered standardized tests of reading accuracy or comprehension, is substantially below that expected given the person's chronological age, measured intelligence,and age-appropriate education.

What is a Reading Disorder (Continued)?

b. The disturbance in Criterion A significantly interferes with academic achievement or activities of daily living that require reading skills.

c. I sensory deficit is present, the reading difficulties are in excess of those usually associated with it" (p. 53).

(American Psychiatric Association (2000). Diagnostic and Statistical Manual of Mental Disorders—Text Revision (DSM-TR). Washington, DC: American Psychiatric Association.)

What is a Reading Disorder (Continued)?

International Classification of Diseases, Tenth Edition (ICD-10)

A. Either of the following must be present:

   1. A score on reading accuracy and/or comprehension that is at least 2 standard deviations errors of prediction below the level expected on the basis of the child's chronological age and general intelligence, with both reading skills and IQ assessed on an…

What is a Reading Disorder (Continued)?

"…individually administered test standardized for the child's culture and educational system;

2. A history of serious reading difficulties, or test scores that net criterion A (1) at an earlier age plus a score on a spelling test that is at least 2 standard errors of prediction below the level expected on the basis of the child's chronological age and IQ…

What is a Reading Disorder (Continued)?

B. The disturbance in Criterion A significantly interferes with academic achievement or with activities of daily living that require reading skills.
C. The disorder is not the direct result of a deficit in visual or hearing acuity, or of a neurological disorder.
D. School experiences are within the average range (i.e., there has been no extreme inadequacies in educational experiences).

What is a Reading Disorder (Continued)?

E. 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.– From, Lyon, G.R. (1996). The State of Research. In S.C. Cramer and W. Ellis (Eds.), Learning Disabilities: Lifelong Issues. Baltimore, MD: Brookes, p. 37.)

What is a Reading Disorder (Continued)?

"Dyslexia is one of several distinct learning disabilities. It is a specific language-based disorder of constitutional origin characterized by difficulties in single word decoding, usually reflecting insufficient phonological processing abilities. These difficulties in single word decoding are often unexpected in relation to age and other cognitive and academic abilities; Dyslexia is manifested by variable difficulty with different…

What is a Reading Disorder (Continued)?

"…..forms of language, often including, in addition to problems in reading, a conspicuous problem with acquiring proficiency in writing and spelling".

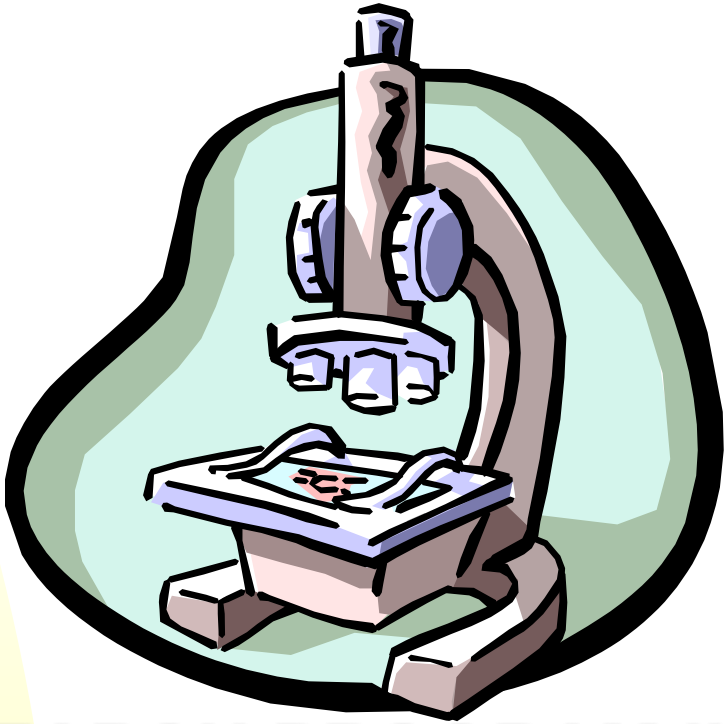
(Definition of Dyslexia as adopted by the Research Committee of the International Dyslexia Association, May 11, 1994 and by the National Institutes of Health, 1994-taken from IDA website:www.interdys.org on July 8, 2002.)

Reading Disorder-Dyslexia

"Important research efforts have focused mainly on developmental dyslexia, that is reading disability, because it represents the most common and frequently identified learning disability. Reading is the primary academic problem in approximately 80% of children diagnosed with learning disabilities" (p. 61).

(Fiedorowicz, C., et. al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74)

Your Tax Dollars at Work



RESEARCH PROGRAM IN READING DEVELOPMENT, READING DISORDERS, AND READING INSTRUCTION

Your Tax Dollars at Work

- Run by the National Institute of Child Health and Development (NICHD)
- Which is part of the National Institute of Health (NIH)
- Study began in 1965 and continues today!
- As of 1999 over ***$150,000,000.00*** has been spent!
- As of 1999 over 34,000 people in study!
- 12,600 dyslexia children; 9,000 dyslexic adults!

Your Tax Dollars at Work

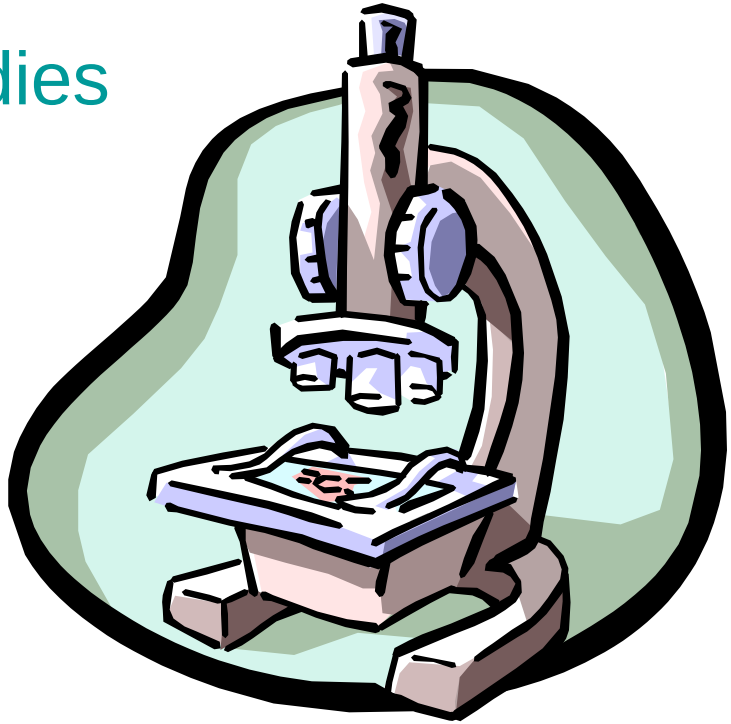
- Conducted at 42 sites in the U.S. and Europe
- Follow-up studies of over 14 years!
- Much of the neurological research in this presentation comes from this study.
- China, England, Israel, Russia, Sweden and Turkey have conducted similar studies…

(Lyon, G.R. (1999). In Celebration of Science in the Study of Reading Development, Reading Disorders and Reading Instruction. Paper presented at the International Dyslexia Association 50th Annual Anniversary Conference, November 4, 1999, Chicago, IL.)

Your Tax Dollars at Work

- 2,500 Scientific Articles
- 50 books
- 10 large scale longitudinal studies
- 1,500 smaller scale studies

(Lyon, G.R. (2000) Why Reading Is Not a Natural Process. LDA Newsbriefs, 35 (1), pp. 12-14, 17-18.)



Your Tax Dollars at Work

Why do the NICHD Research?

"A primary answer us that learning to read is critical to a child's overall well being. If a youngster does not learn to read in our literacy-driven society, hope for a fulfilling, productive life diminishes. In short, difficulties learning to read are not only an educational problem; they constitute a serious public health concern"(p. 12).

(Lyon, G.R. (2000) Why Reading Is Not a Natural Process. LDA Newsbriefs, 35 (1), pp. 12-14, 17-18.)

Reading Disorder-Dyslexia

"Programmatic research over the past 35 years has not supported the view that reading development reflects a *natural* process that children learn to read as they learn to speak, through natural exposure to a literate environment. Indeed, researchers have established that certain aspects of learning to read are highly unnatural…Unlike learning to speak, beginning readers must appreciate consciously what the symbols stand for in the writing system they learn" (p.14).

(Lyon, G.R. (2000) Why Reading Is Not a Natural Process.LDA Newsbriefs, 35 (1), pp. 12-14, 17-18.)

Reading Disorder-Dyslexia

"The idea that learning to read is just like learning to speak is accepted by no responsible linguist, psychologist, or cognitive scientist in the research community" (pp. 285-286).

(Stanovich, K.E. (1994). Romance and Reality. The Reading Teacher, 47, pp. 280-291.)

Reading Disorder-Dyslexia

"Spoken Language is seamless. Learning to read is sound to print and phoneme to print. Reading is not natural. Reading is more difficult than speaking."

(Lyon, G.R. (1999). In Celebration of Science in the Study of Reading Development, Reading Disorders and Reading Instruction. Paper presented at the International Dyslexia Association 50th Annual Anniversary Conference, November 4, 1999, Chicago, IL.)

The Neurology of Reading Disorder-Dyslexia

- An irregularity in the cellular architecture of the posterior planum temporal region of the Wernike's area of the left temporal lobe
- They have ectopias and dysplasias in far greater numbers
- Results of 9 autopsies of dyslexics

(Duane, D.D. (1993). Developmental Disorders of Learning, Attention, and Affect. Videotape prepared by the Institute for Behavioral Neurology, 10201 North 92nd Street, Suite #300, Scottsdale, AZ.)

(Riccio, C.A., and Hynd, G.W. (1996). Neurological Research Specific to the Adult Population with Learning Disabilities. In N. Gregg, C. Hoy, and A.F. Gay (Eds.), Adults with Learning Disabilities: Theoretical and Practical Perspectives. New York, NY: Guilford, pp. 127-143.)

The Planum Temporale

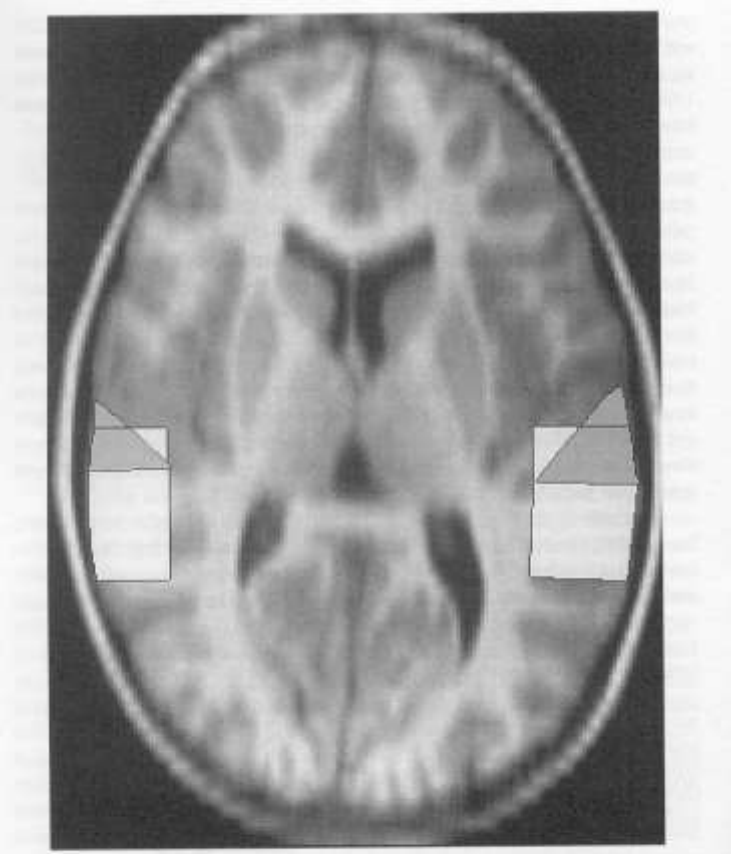
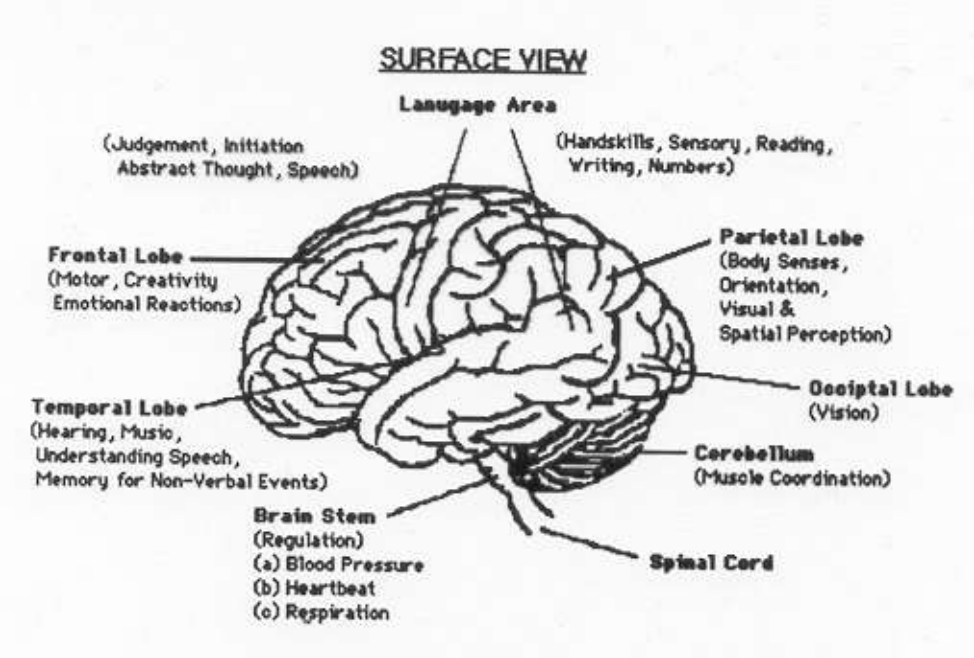


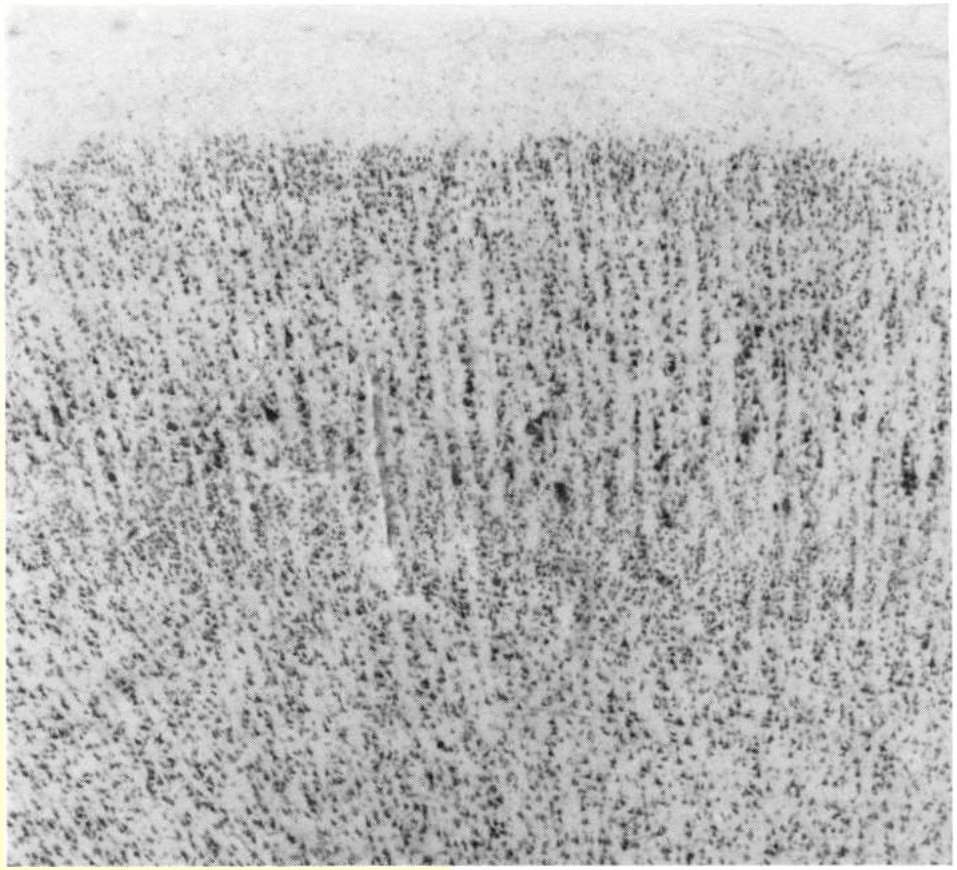
Figure 1. Two differing methods of measuring the "planum temporale" superimposed on a horizontal magnetic resonance imaging scan (taken from Galaburda 1993c; Larsen, Høien, and Ødegaard 1990). Note that, although the two "plana" overlap, there is considerable difference in the surface area as specified by the two definitions.

Filipek, P.A., et.al. (1999). Structural and Functional Neuroanatomy in Reading Disorder. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York, p. 48.)

From: http://sasquatch.com/tpn/BrainMap.html

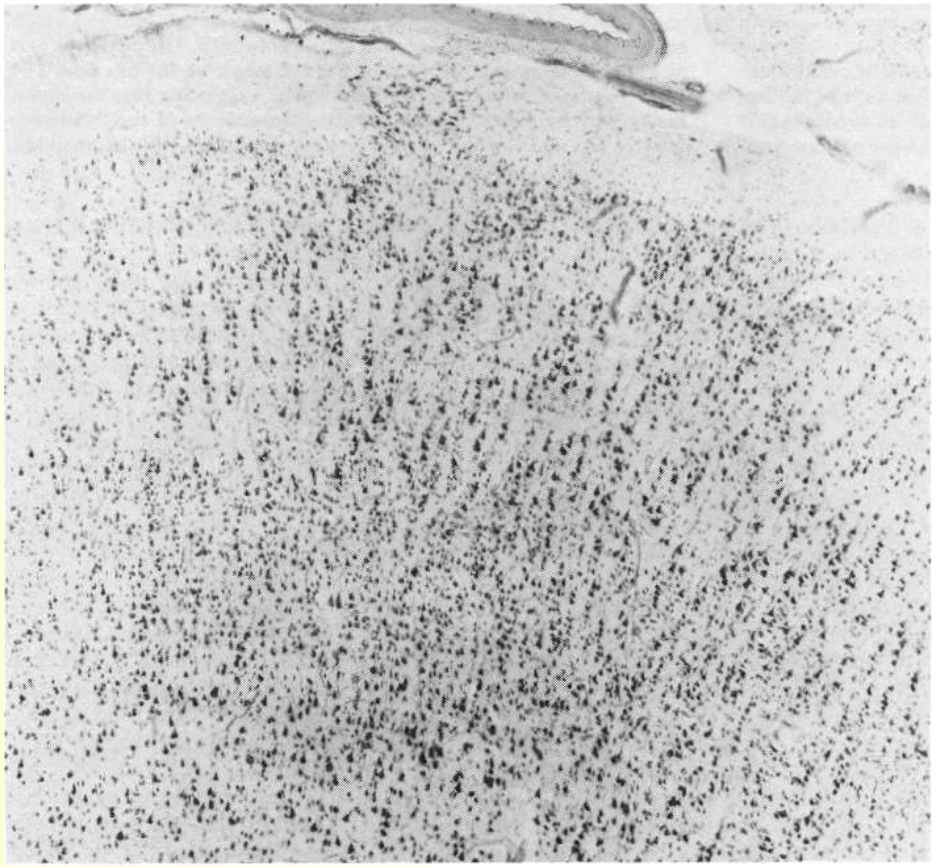


Non-Dyslexic Plenum Temporale



Geshwind, N. (1979). Specializations of the human brain. The Brain. New York, NY: W.H. Freeman, pp. 108-117– picture on page 116.)

Dyslexic Plenum Temporale



Geshwind, N. (1979). Specializations of the human brain. The Brain. New York, NY: W.H. Freeman, pp. 108-117– picture on page 116.)

Planum Temporale—Norman Geshwind

"**ABNORMAL CELLULAR ARCHETECTURE** has been found in a large area of a patient with a developmental reading disorder. The top photomicrograph is a section of the normal cortex from the posterior portion of the planum temporale, the region that makes up part of the Wernicke's area. Several layers can be perceived and the cells have a characteristic columnar organization…

Planum Temporale—Norman Geshwind

"…The bottom photograph is a section from the same region in a patient with dyslexia. One peculiarity is the presence of nerve-cell bodies in the most superficial layer (near the top of the photograph), where they are normally absent. Moreover, throughout the tissue the arrangement of cells is disrupted. The abnormality was found by Albert M. Galaburda of the Harvard Medical School and Thomas Kemper of the Boston University School of Medicine" (p. 116).

Geshwind, N. (1979). Specializations of the human brain. The Brain. New York, NY: W.H. Freeman, pp. 108-117– picture on page 116.)

Planum Temporale and Dyslexia

* 2/3rds of normals have asymetry of planum temporale (Lt> Rt)
* Dyslexics' planum Temporale are symmetrical
* These differences are important this area is related to one of the functional difficulties of dyslexia—language.

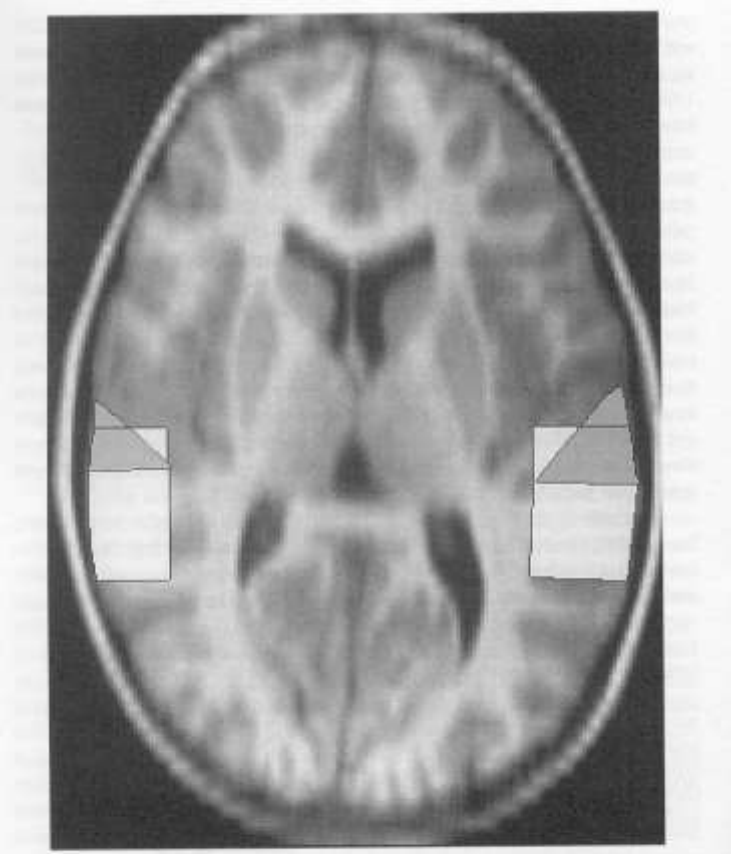
(Fiedorowicz, C., et. al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74)

Planum Temporale and Dyslexia

The differences in the Planum are thought to happen between the 16th and 24th month of gestation.

(Richardson, S.O. (1994). Doctors Ask Questions About Dyslexia: A Review of Medical Research (The Orton Emeritus Series). Baltimore, MD: Orton Dyslexia Society

The Planum Temporale



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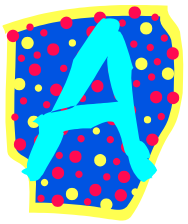
Filipek, P.A., et.al. (1999). Structural and Functional Neuroanatomy in Reading Disorder. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York, p. 48.)

Planum Temporale and Dyslexia

- 2 times more left-handedness among dyslexics
- 12 more LD in left-handers
- 11% of dyslexics have autoimmune diseases compared to 4% of non-dyslexics
- Dyslexics have more autoimmune diseases in blood relatives
- May be related to planum temporal development

(Richardson, S.O. (1994). Doctors Ask Questions About Dyslexia: A Review of Medical Research (The Orton Emeritus Series). Baltimore, MD: Orton Dyslexia Society

“Vana may I buy a PHONEME?”



- Smallest meaningful part of language
- 44 in English language
- All words spoken or read must be broken down by the brains phoneme module to be processed remembered, etc.

(Shaywitz, S.E. (November, 1996). Dyslexia. Scientific American, 275 (5), p. 98-104.)

The Core Phonological Deficit:

"When they are learning to read, most individuals with dyslexia have trouble identifying the separate speech sounds that make up words (phonemes) or the letters (graphemes) that represent those speech sounds" (p. 4).

(Moats, L.C. (1999). Basic Facts About Dyslexia, Part II: What Every Professional Ought to Know (The Orton Emeritus Series). Baltimore, MD: The International Dyslexia Association.)

The Core Phonological Deficit

- Phonological deficits continue into adulthood
- Phonological instruction promotes learning to read
- Spelling is poor and reading rate is slow into adulthood—Time pressure make them worse

(Pugh, K.R., et. al. (2001). Neurorimaging Studies of Reading Development and Reading Disability. Learning Disabilities Research & Practice, 16 (4), pp. 240-249.)

(Duane, D. (1991). Dyslexia: Neurobiological and Behavioral Correlates. Psychiatric Annals, 21 (12), pp. 703-716.)

The Core Phonological Deficit

"The ability to decode single words accurately and fluently is dependent upon the ability to segment words and syllables into abstract consistent sounds units (phonemes). Deficits in phonological awareness reflect the core deficit in dyslexia" (p. 11).

(Lyon, G.R. (1995). Research in Learning Disabilities at the National Institute of Child Health and Human Development (NICHD). NICHD, 6100 Building, Room 4B05, 9000 Rockville Pike, Bethesda, MD 20892.)

Phonemic Awareness and Genetics

- This may be related to anomalies on Chromozone 6
- Single word reading –anomalies on Chromozone 15 (long arm)

(Lyon, G.R. (1999). In Celebration of Science in the Study of Reading Development, Reading Disorders and Reading Instruction. Paper presented at the International Dyslexia Association 50th Annual Anniversary Conference, November 4, 1999, Chicago, IL.)

(Fiedorowicz, C., et. al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74)

Other Areas of Brain Symmetry in Dyslexia

- Increased posterior symmetry
- Dyslexics with severe language delay reversed parietal-occipital asymmetry – rt planum > lt
- Dyslexics tend to have a larger right hemisphere than left in adulthood

(Richardson, S.O. (1994). Doctors Ask Questions About Dyslexia: A Review of Medical Research (The Orton Emeritus Series). Baltimore, MD: Orton Dyslexia Society)

Filipek, P.A., et.al. (1999). Structural and Functional Neuroanatomy in Reading Disorder. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York, p. 48.)

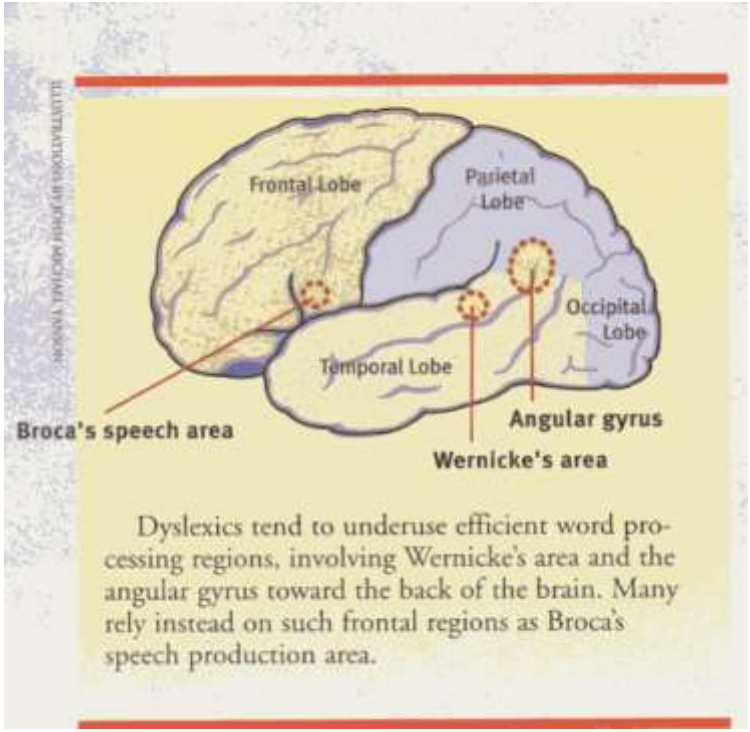
Corpus Callosum and Other Asymmetries

- Dyslexics may have asymmetries in the genu
- This may be associated with poor interhemispheric data transfer
- Shorter insula length bilaterally in dyslexia
- Asymmetries in the frontal lobes may be related to poor comprehension

(Fiedorowicz, C., et. al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74)

The Brain and Dyslexia

(Murray, B. (March, 2000). From the Brain to Lesson Plan. Monitor On Psychology, 31 (3), p. 24.)



Dyslexics tend to underuse efficient word processing regions, involving Wernicke's area and the angular gyrus toward the back of the brain. Many rely instead on such frontal regions as Broca's speech production area.

Hey, Kevin give these good people a break!

All Good Things Must Come to an End!

Please be back promptly in 15 minutes!

Hey, Let's Get Going!

Dyslexia and the Lateral Geniculate Nucelus

"…several studies on low-level visual processing have found that people with dyslexia show visual abnormalities that implicate a deficit in the transient (magnocellular) subdivision of the visual pathway" (p. 81).

(Livingstone, M.S. (1999). The Magnocellural/Parietal System and Visual Symptoms in Dyslexia. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York Press, pp. 81-92.)

Dyslexia and the Lateral Geniculate Nucelus

- Divided in two major parts: magnocellular and parvocellular
- Magnocellular: fast system, color blind, lower in acuity, carries information about spatial location, depth perception, figure ground, three D—allows to catch prey or avoid predetors
- Parvocellular: visual ID and association, color, much slower processing speed, trajectory, details, only in primates

(Livingstone, M.S. (1999). The Magnocellural/Parietal System and Visual Symptoms in Dyslexia. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York Press, pp. 81-92.)

Dyslexia and the Lateral Geniculate Nucelus

- The Magnocellular system appears to be slower in some dyslexics.
- The Magnocellular system transmits arrangement and shape of words and letters—sight reading.
- The Parvocellular system transmits details of letters and syllables.

(Richardson, S.O. (1994). Doctors Ask Questions About Dyslexia: A Review of Medical Research (The Orton Emeritus Series). Baltimore, MD: Orton Dyslexia Society)

Dyslexia and the Lateral Geniculate Nucelus

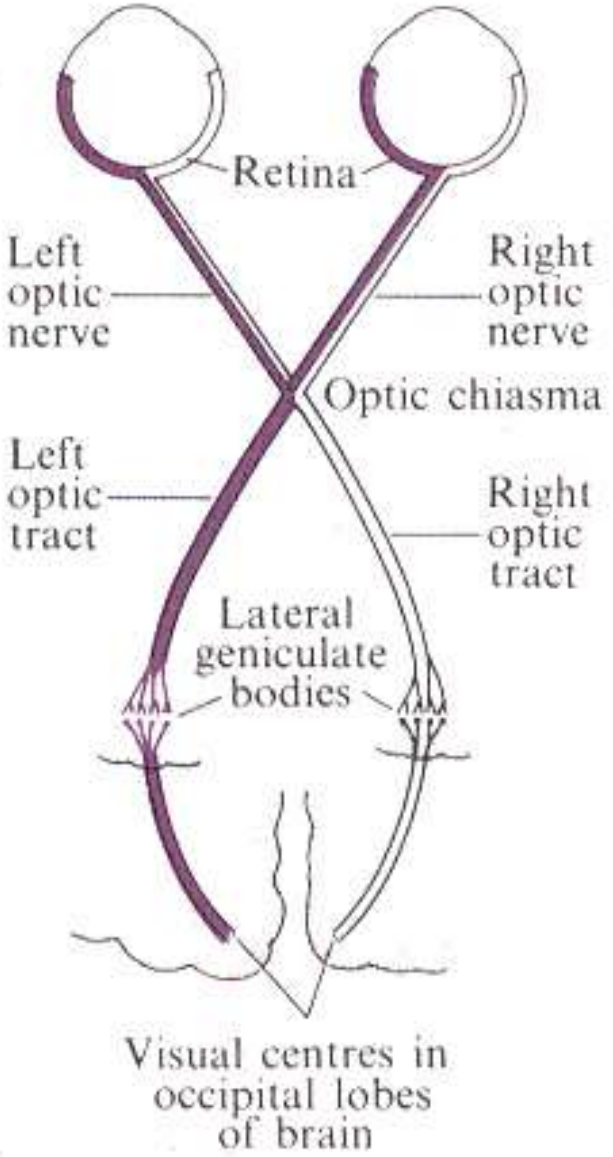
"I specifically propose that the word jumping around on the page during reading occurs because the identification of words is carried by the ventral pathway, but the spatial remapping that must occur with each saccade is done by the dorsal pathway, which is not fast enough to remap the image as fast as the eyes move during reading" (p. 89).

(Livingstone, M.S. (1999). The Magnocellural/Parietal System and Visual Symptoms in Dyslexia. In D.D. Duane (Ed.), Reading and Attention Disorders: Neurobiological Correlates. Baltimore, MD: York Press, pp. 81-92.)

Dyslexia and the Lateral Geniculate Nucelus

Research has demonstrated that dyslexics are slower at processing both visual and auditory information.

(Richardson, S.O. (1994). Doctors Ask Questions About Dyslexia: A Review of Medical Research (The Orton Emeritus Series). Baltimore, MD: Orton Dyslexia Society)



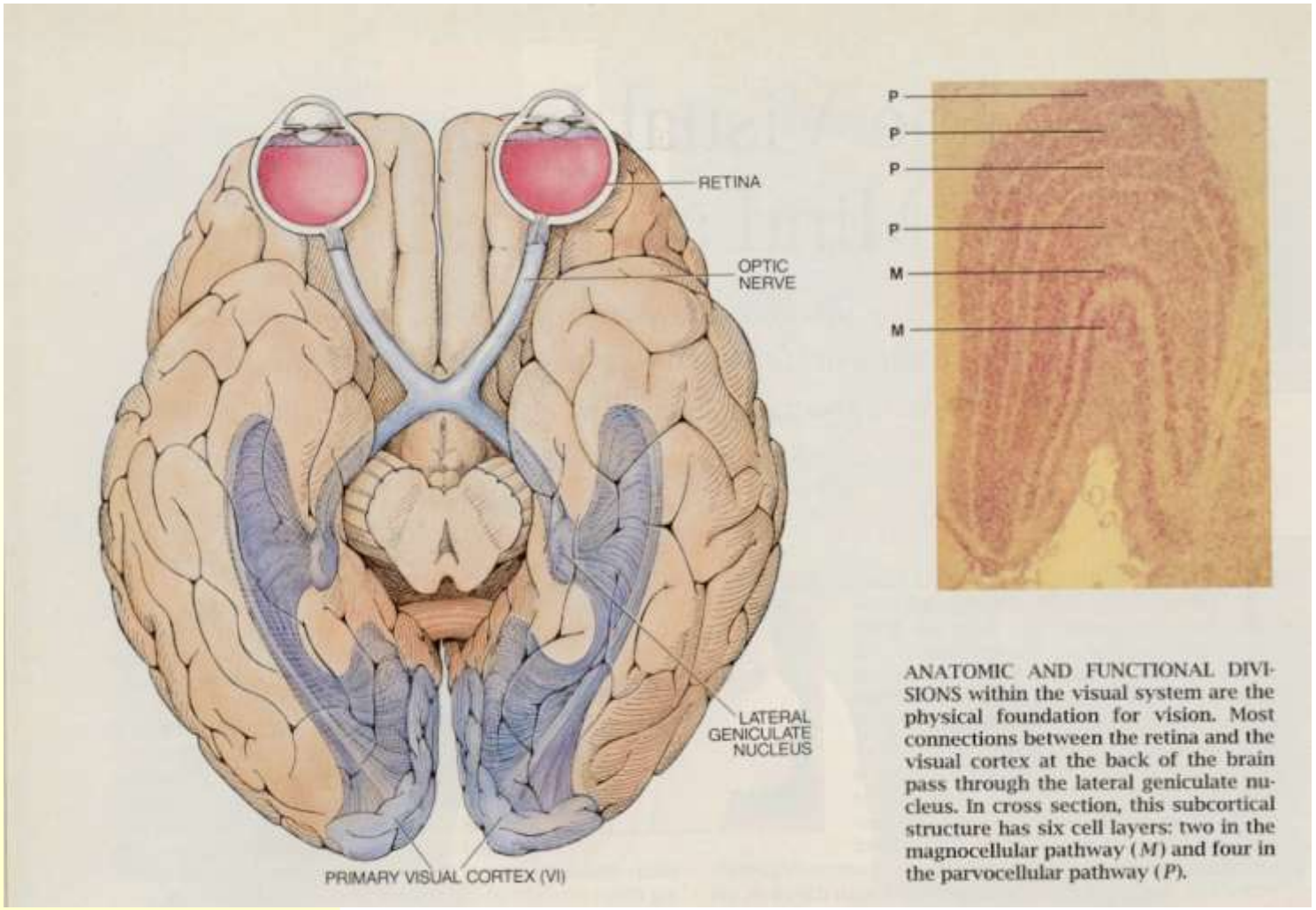
The visual path from the eyes to the visual centres.

The LGN

- The Lateral Geniculate Nucelus

Lateral Geniculate Nucelus

Zeki, S. (September, 1992). The Visual Image In the Mind and Brain. Scientific American: The Mind and Brain (Special Issue), 267 (3), p. 70)



ANATOMIC AND FUNCTIONAL DIVISIONS within the visual system are the physical foundation for vision. Most connections between the retina and the visual cortex at the back of the brain pass through the lateral geniculate nucleus. In cross section, this subcortical structure has six cell layers: two in the magnocellular pathway (*M*) and four in the parvocellular pathway (*P*).

Dyslexia and the Medial Geniculate Nucelus

- Dyslexics have abnormal auditory processing
- Non-dyslexics have no asymmetries in this area
- Dyslexics' left MGN is significantly smaller than their right MGN—Asymmetrical
- Dyslexics have fewer left large neurons and more small neurons.

(Fiedorowicz, C., et. al. (2001). Neurobiological Basis of Learning Disabilities. Learning Disabilities, 11 (2), pp. 61-74)

The Double Deficit Hypothesis

"…the processes underlying naming speed represent a second core deficit in dyslexia, largely independent from phonological processes…Further, we have now shown these problems in rate of processing stretch from kindergarten through adulthood in readers with dyslexia" (p. 130).

(Wolf, M., and O'Brien, B. (2001). On Issues of Time, Fluency, and Intervention. In A.J. Fawcett (Ed.), Dyslexia: Theory and Good Practice. Philadelphia, PA: Whurr, pp. 124-140.)

The Double Deficit Hypothesis

- Rapid Automatized Naming (RAN)
- Some dyslexics have phonological and word attack problems only.
- Some dyslexics have RAN and comprehension deficits only.
- Some have both phonological deficits and RAN an thus have the “Double Deficit”
  - These are the most seriously impaired and hardest to habilitate.

(Wolf, M., and O’Brien, B. (2001). On Issues of Time, Fluency, and Intervention. In A.J. Fawcett (Ed.), Dyslexia: Theory and Good Practice. Philadelphia, PA: Whurr, pp. 124-140.)

The Triple Deficit Hypothesis

"*Orthographic dyslexia* refers to a problem with the acquisition of decoding or encoding skills that is caused by difficulty with rapid and accurate formation of word images in memory" (p. 239).

(Roberts, R., and Mather, N. (1997). Orthographic Dyslexia: The Neglected Subtype. Learning Disabilities Research & Practice, 12 (4), pp. 236-250.)

The Triple Deficit Hypothesis

Those with Orthographic Processing deficits:

- Have difficulty recalling sight words (i.e., was, etc.)
- Are slow to develop fluency and automaticity
- Have difficulty storing mental representations of words
- Rely on phonics for reading and produce misspellings that are phonemically regular for sight words

(Roberts, R., and Mather, N. (1997). Orthographic Dyslexia: The Neglected Subtype. Learning Disabilities Research & Practice, 12 (4), pp. 236-250.)

The Triple Deficit Hypothesis

"In a synthesis of Samuel T. Orton's work, June Orton…explained that for some students, visual memory is sufficient enough to recognize the printed word in reading, but not strong enough to recall the image of the word to reconstruct it for spelling" (p. 244).

(Roberts, R., and Mather, N. (1997). Orthographic Dyslexia: The Neglected Subtype. Learning Disabilities Research & Practice, 12 (4), pp. 236-250.)

The Triple Deficit Hypothesis

Mather went on to call this;

The Triple Deficit Hypothesis

1. ***Phonemic Processing Deficits***
2. ***Rapid Automatized Naming Deficits***
3. ***Orthographic Processing Deficits***

(Mather, N. (1999). Dyslexia: From Assessment to Effective Interventions. Paper presented at the Arizona Branch of the International Dyslexia Association 3rd Annual Conference, April 17, 1999, Phoenix, AZ.)

Dyslexia and the Cerebellum

Damage to the Cerebellum can cause:

- Disturbances in balance and posture
- Limb rigidity
- Loss of muscle tone
- Lack of coordination
- Impaired pre-planned automatic movements
- Impaired automatization

(Fawcett, A.J., Nicolson, R.I. (2001). Dyslexia and The Role of The Cerebellum. In A.J. Fawcett (Ed.), Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr, pp. 89-105.)

Dyslexia and The Cerebellum

Allen indicated neuroimaging studies indicate the Cerebellum is involved in the following functions:

- Attention
- Forms of Learning
- Memory tasks
- Conditional anxiety
- Complex reasoning and problem solving
- Sensory and Motor Tasks

Dyslexia and The Cerebellum

Allen continued deficits in the cerebellum impairs:

- Planning
- Reasoning
- Shifting of cognitive set
- Fluency naming
- Working memory
- Learning recall

Dyslexia and The Cerebellum

Allen (Continued):

- Changes in emotionality and emotional functioning
  - Flattened affect
  - Inappropriate behavior
  - Impulsivity
  - Behavioral aggression

(Allen, G. (1998). Functional Diversity of the Cerebellum. Paper presented at the New Angles on Motor and Sensory Coordination in Learning Disabilities, Topical Medical Workshop: Learning Disabilities Association, International Conference, March 11, 1998, Washington, DC.)

Dyslexia and The Cerebellum

Fawcett and Nicolson reported research that dyslexic children have significant problems with phonology, working memory, speed of information processing, balance and motor skills. With the exception of phonology the remaining symptoms can be attributed to cerebellar problems.

(Fawcett, A.J., Nicolson, R.I. (2001). Dyslexia and The Role of The Cerebellum. In A.J. Fawcett (Ed.), Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr, pp. 89-105.)

Dyslexia and The Cerebellum

"Our neuroanatomical analysis of the Orton Society brain bank showed differences in cell size and cell-size distribution in posterior and anterior cerebellar cortex, and inferior olive with no differences in the output areas (the dentate nucleus). The PET study of motor sequence learning showed that there were abnormalities in cerebellar activation in automatic processing and in new learning, for subjects in our panel who had cerebellar signs…"

Dyslexia and The Cerebellum

"…Rather than the expected cerebellar activation in these tasks, the dyslexic subjects showed greater frontal lobe activation in new learning, suggesting they were by-passing the cerebellum to some extent, and relying on conscious strategies. These important findings confirm the behavioural evidence of cerebellar dysfunction, and suggest that the dyslexic subjects use different methods in sequential learning and automatic performance" (p. 98-99).

(Fawcett, A.J., Nicolson, R.I. (2001). Dyslexia and The Role of The Cerebellum. In A.J. Fawcett (Ed.), Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr, pp. 89-105.)

Dyslexia and The Cerebellum

80% of dyslexics show signs of cerebellar problems!

(Fawcett, A.J., Nicolson, R.I. (2001). Dyslexia and The Role of The Cerebellum. In A.J. Fawcett (Ed.), Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr, pp. 89-105.)

Dyslexia and The Cerebellum

- Automaticity is the problem!
- When multitasking and rapid processing are needed
- Thinking is a frontal lobe function
- It a problem of fluency
- "…fluency is in essence the ability to repeat previous actions or thoughts more and more quickly without conscious thought" (p. 101).

(Fawcett, A.J., Nicolson, R.I. (2001). Dyslexia and The Role of The Cerebellum. In A.J. Fawcett (Ed.), Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr, pp. 89-105.)

Dyslexia and The Cerebellum

Nicolson Said Bottom Line:

"…That means if you have a task that takes 4 hours for the non-dyslexic kid to learn, it will take twice as long for the dyslexic kid; 8 hours. But, its not linear. You have a task which takes 100 hours it will take 10 times as long. If you have a task that takes 10,000 hours it will take 100 times as long, and so on…Therefore if you have something like reading, writing and spelling which takes 100s…"

Dyslexia and The Cerebellum

"…of hours that's the sort of thing in which dyslexic children are particularly adversely affected."

(Nicolson, R., and Fawcett, A. (November, 2000). Dyslexia The Cerebellum and Phonological Skill . Paper presented at the International Dyslexia Association Annual Conference, Washington, DC.)

Exhaustion and Learning Disorders

Roffman wrote, “One final ongoing issue that is worthy of mention for many with LD/ADHD is the problem of fatigue. The extra effort required to cope with the continued social and academic demands of schooling can be chronically exhausting” (p. 217).

(Roffman, A.J. (2000). Meeting The Challenge of Learning Disabilities In Adulthood. Baltimore, MD: Brookes.)

Anxiety and Learning Disorders

Roffman wrote, “Adults with LD/ADHD often experience pressure as they work to cope with their symptoms. Anxiety develops out of such day-to-day occurrences as the loss of yet another sat of keys…” (p. 49).

(Roffman, A.J. (2000). Meeting The Challenge of Learning Disabilities In Adulthood. Baltimore, MD: Brookes.)

Reading Disorder-Dyslexia

The Symptoms of Dyslexia are:

1. Weak Phonemic Awareness
2. Slow Rapid Automatized Naming
3. Poor Orthographic Processing
4. Exceptionally Poor Automatization
5. Poor Coordination

(Fawcett, A.J. (2001). Dyslexia: Theory & Good Practice. Philadelphia, PA: Whurr.)
(Blake, K.. (2003) Personal Observation)

Male and Female Reading Disorder-Dyslexia

Shaywitz (1996) reported on FMRI research done on adult male and female dyslexics and non-dyslexics. It was found that men and women use different parts of the brain to read. “The fact that woman’s brains tend to have bilateral representations for phonological processing explains several formerly puzzling observations: Why for example after a stroke on the left side of the brain, women are less likely than men…”

Male and Female Reading Disorder-Dyslexia

"…to have significant decrements in their language skills, and why women tend more often than men to compensate for dyslexia" (p. 103).

(Shaywitz, S.E. (November, 1996). Dyslexia. Scientific American, 275 (5), p. 98-104.)

Phonological Processing in Men and Women.

(Shaywitz, S.E. (November, 1996). Dyslexia. Scientific American, 275 (5), p. 104.)

WHAT IS READING DISORDER-DYSLEXIA?

"Children with dyslexia have difficulty with reading, spelling, writing, and related language skills that is unexpected in relation to intelligence and educational opportunity. The individual's ability to understand, analyze, and use systems of language is deficient. Such problems with language processing are intrinsic to the individual; they are not synonymous with poor teaching, limited intellectual ability, impaired hearing or vision, or lack of motivation to learn" (p. 3).

(Moats, L.C. (1999). Basic Facts About Dyslexia, Part II: What Every Professional Ought to Know (The Orton Emeritus Series). Baltimore, MD: The International Dyslexia Association.)

WHAT IS READING DYSORDER-DYSLEXIA?

- 15 to 20% of the population is moderately dyslexic
- 2 to 5% are severely dyslexic and will need continuing help throughout matriculation
- Almost equal number of females and male have dyslexia—males more often noticed
- Dyslexia may cause problems in those who speak other languages
- People of all levels of intellect may be dyslexic

(Moats, L.C. (1999). Basic Facts About Dyslexia, Part II: What Every Professional Ought to Know (The Orton Emeritus Series). Baltimore, MD: The International Dyslexia Association.)

WHAT IS LEARNING DISORDER-DYSLEXIA

"Dyslexia is a lifelong, intrinsic condition **that is modified by instruction**. The manifestations of dyslexia change as the individual grows and learns, although the underlying causal factors tend to be stable. What begins as a problem with speech sound awareness, letter recognition, or verbal expression becomes a problem with sounding out new written words, acquiring a sight vocabulary, recalling basic spellings, and producing written compositions…"

WHAT IS READING DISORDER-DYSLEXIA?

"…the disorder in older students often causes slow and inaccurate reading, poor spelling, disorganized writing, and difficulty learning foreign languages" (p. 3).

(Moats, L.C. (1999). Basic Facts About Dyslexia, Part II: What Every Professional Ought to Know (The Orton Emeritus Series). Baltimore, MD: The International Dyslexia Association.)

"LEXDEXIA?"

"Most individuals with dyslexia have no problem with visual perception, visual memory, or awareness of direction and space. They do not see letters or anything else in reverse or mirror image, although they may transpose or reverse letters in reading and writing. They confuse similar letters, misread similar words, and have trouble forming letters, but these problems usually are associated with language processing weaknesses" (P. 5).

(Moats, L.C. (1999). Basic Facts About Dyslexia, Part II: What Every Professional Ought to Know (The Orton Emeritus Series). Baltimore, MD: The International Dyslexia Association.)

PLEASE ENJOY LUNCH!

PLEASE ENJOY LUNCH!

We will be starting over in an hour and a half.

Please return on time. We have a lot of material to cover…Thank you!

Thank You for Attending!

- Have a safe trip home!
- Kevin T. Blake, Ph.D., P.L.C.

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