Dyslexia and the Reading Brain

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Key Concepts

- Learning to read is a key milestone for life in a literate society
- Learning to read is not natural for many children
- Literacy development starts long before children start formal reading instruction
Reading Disability: DYSLEXIA

- Comprises about 80% of all learning disabilities
- Fundamentally a language-based disorder
- Not caused by a visual problem
Reading Disability: DYSLEXIA

- Not based on brain damage
- Not based on low IQ
- Not based on poor motivation or laziness
National Reading Crisis

- 10-20% of children have dyslexia
- Another 20% struggle with reading
- 75% of children with reading disabilities who are not identified until 3rd grade will have significant reading problems through high school
- Most students receiving special education for reading do not make significant gains
Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition, and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction.
Who Is At Risk For Dyslexia?

- Occurs across all races, ethnicities, gender, and socioeconomic levels
- Occurs in all known written languages
- Preschool history of oral language delay is a significant risk factor
- Family history is the single greatest risk factor
- Poor quality home/school language environment adds further risk
Features of Dyslexia

- Faulty word recognition
- Poor phonics
- Slow reading speed
- Poor phonological awareness
- Poor spelling
- Poor written expression
- Grammar and word calling errors in oral reading
Phonemic Awareness

- The core deficit for classic dyslexia
- Refers to ability to identify and manipulate individual phonemes (sounds) within words
- Without this skill, learning to read will be difficult to nearly impossible
National Reading Panel Study

![Diagram showing the components of reading proficiency: Fluency, Comprehension, Phonemic Awareness, Phonics, Vocabulary.]
Learning to Read

Word Recognition
- Print Awareness
- Phonological Awareness
- Decoding
- Sight Recognition

Language Comprehension
- Vocabulary
- Verbal Reasoning
- Language Structures
Reading Is An Unnatural Act!

- Humans are genetically and neurologically hardwired for speech.
- This is not true for reading, which must be learned through conscious effort.
- Brain regions designed for other functions must adapt to new demands that result from the highly complex skill of reading.
The Reading Brain

- Three major regions in the left hemisphere of the brain carry the workload for reading in most good readers.

- As children become good readers, more brain activity takes place in the back part of the left hemisphere, which allows word recognition to become more automatic.

- For people with dyslexia, this growing efficiency in brain processing does not occur as it should.
The Reading Brain

- Underactivation in critical dorsal and ventral regions in the left hemisphere of the brain constitutes a “neural signature” for dyslexia, detectable as early as the end of kindergarten.

- Compensatory activation occurs in frontal and right hemisphere brain regions, but this does not result in accurate, efficient reading.
The Reading Brain

- Functional connectivity among critical brain regions is equally important for reading proficiency.
- Intensive, appropriate remedial reading therapy results in more normal brain activation patterns, and better reading skills.
Assessment for Dyslexia

- For possible dyslexia, assessment MUST INCLUDE:
  - Phonemic awareness, phonics, fluency, vocabulary, and comprehension
  - Screening for other learning disorders, ADHD, other behavioral and emotional disorders or symptoms
  - Linkage to appropriate intervention
Examples Of Effective Programs

- Lindamood-Bell Learning Processes
- Barton Reading & Spelling System
- Wilson Language Training
- Language!
- Orton-Gillingham
Accommodations for Older Students

- Obtain extra time on tests, especially high-stakes tests
- Limit the number of concurrent courses with a heavy reading load
- Use books on tape (Recordings for the Blind and Dyslexic, www.rfbd.org) or software to convert print into a computer text file (Kurzweil 3000, www.kurzweiledu.com, or WYNN 3.1, www.freedomscientific.com).
- Obtain a waiver from foreign language requirements
- Use a laptop computer for all writing assignments
- Photocopy a good student’s class notes or record lectures
What About Preschoolers?

“The likelihood that a child will succeed in the first grade depends most of all on how much he or she as already learned about reading before getting there.”

Dr. Marilyn J. Adams,
National reading expert
Symptoms of Possible Dyslexia in Young Children

- Difficulty recognizing and writing letters in kindergarten
- Difficulty connecting letters to their sounds
- Difficulty breaking words into syllables (e.g., baseball into base and ball)
- Difficulty recognizing rhyming words
Symptoms of Possible Dyslexia in Young Children

- Difficulty identifying words with the same beginning or ending sounds
- Difficulty reading simple words that can be sounded out (e.g., big, cat)
- Difficulty remembering common, irregularly spelled words (e.g., said, who)
Books on Reading and Dyslexia

- Overcoming Dyslexia, by Sally Shaywitz, MD
- Straight Talk About Reading, by Susan Hall and Louisa Moats, Ed.D.
- Starting Out Right: A Guide to Promoting Children’s Reading Success. Published by the National Academies Press.
Websites on Reading and Dyslexia

- ldonline.org
- nimh.nih.gov (National Institute of Health)
- schwablearning.org
- interdys.org (International Dyslexia Association)