Dyslexia: Myths and Realities

Portland, Oregon
January, 2014
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Topics We’ll Address

- Definition
- Etiology (What causes it?)
- Neurobiology (Reading in the brain)
- Treatment (instruction)
- The role of compassion
- Resources

History in Medical Literature

- 1877: Adolf Kussmaul
  - Word blindness in adults with acquired brain injuries
    - Normal sight, intelligence and ability to understand language but can't recognize print
- 1896: W. Pringle Morgan
  - Recognition as a developmental disorder

What is Dyslexia?

- From the Greek
  - dys – difficulty, lexia – words
- Hereditary
- Neurobiological
- Developmental and chronic
- Affects 5-15%, depending on the study
  - Mayo Clinic
  - Yale Center for LD
  - World Health Organization

Dyslexia: Definition

- One of several distinct reading difficulties
- Characterized by...
  - Poor decoding and encoding (spelling)
  - Problems with accurate and/or fluent printed word recognition
  - Inconsistent with age and/or cognitive ability
  - Often associated with difficulty identifying, manipulating, and/or producing the speech sounds in spoken words (phonology)
Dyslexia is present when the automatization of word identification (reading) and/or word spelling does not develop or does so very incompletely or with great difficulty. The term automatization refers to the establishment of an automatic process. A process of this kind is characterized by a high level of speed and accuracy. It is carried out unconsciously, makes minimal demands on attention and is difficult to suppress, ignore or influence…

A “Spectrum” Disorder

- Analogous to obesity
- Cut-off scores for diagnosis, on distributions of physical characteristics, are arbitrarily drawn
- Multiple causes; complex cause-effect relationships
- Treatments vary in effectiveness with individuals

Dyslexia and ADHD

- 12-24% of children with dyslexia also have ADHD
- 25-35% of children with ADHD have dyslexia

How We Read and Spell Words

Language-Processing Areas of the Brain

The Many Strands that are Woven into Skilled Reading (Scarborough, 2001)
Reading builds on language…” (Perfetti, 2011)

**Poor Detection of Phonemes**

- What is the first sound in “cat“?
- Say “sigh” backwards.
- Say “most”. Now say “moats”. What two sounds have changed order?
- What is the third phoneme in “sling”?  
- How many phonemes (sounds) are in this word: box

**Confusion of similar sounding words…**

- prude/prune
- pacific/specific
- anecdote/antidote
- hostile/hostage
- perseverate /persevere
- further than the truth/ further from the truth

**How We Recognize Printed Words**

**Units of Analysis**

unreachable  
un-reach-able  
un-reach-a-ble  
un-r-e-a-ch-a-b-l-e  

word  
morpheme  
syllable  
grapHEME  
letter

**Common Characterization: The Roadblock in Dyslexia**
A Newer Conceptualization of Reading Disabilities (Fletcher et al., 2007; Aaron, Joshi et al., 2008; Moll, Loff, & Snowling, 2013)

Is Dyslexia Associated with Giftedness?
- Claims of visual, artistic, and entrepreneurial superiority are common
- Reality: reading, in the early stages, has a low correlation with intelligence, especially non-verbal intelligence
- Reading and many aspects of intelligence are independent

The “Einstein” Syndrome?
- He was slow in learning how to talk... Whenever he had something to say, he would try it out on himself, whispering it softly until it sounded good enough to pronounce aloud... He had such difficulty with language that those around him feared he would never learn... Throughout his life, Einstein had a mild form of echolalia, causing him to repeat phrases to himself, especially if they amused him.
- ...a cheeky rebelliousness toward authority
- ...he generally preferred to think in pictures, most notably in famous thought experiments
- ...in primary school, he was at the top of his class...

People with LD Can Have Disparate Talents
- Pablo Picasso (visual-spatial imagination)
- Winston Churchill (oration)
- Agatha Christie (literary/narrative imagination)
- Philip Schultz (poetry)
- Greg Louganis (sense of body position in space)
- Jim Dutcher (wildlife photographer)
- Simon Pierce (glass blower/designer)
- Whoopi Goldberg (actress, comedienne)

Discrepant and Non-Discrepant Have Similar Outcomes Over Time (Francis et al., 1996)

Poor Nonsense Word Decoding – Common but Not Universal
- sloat
- broige
- bemuddlement
- tyresterine
- chlorebasticism
Case Study #1, Sam

- Repeated kindergarten – “progressing normally”
- First grade teacher “expressed concerns that he was falling behind”
- Second grade teacher referred him to Title 1 remedial reading program; observed difficulty with phonics, speech sound discrimination, and verbal comprehension
- Parents sought private evaluation in summer before 3rd grade

Sam’s Behavior During Academic Tests

- Very slow processing speed on verbal or symbolic tasks; yawned and tuned out.
- No spontaneous conversation; didn’t initiate.
- Needed high rate of reinforcement to persist and much encouragement to respond to tasks.
- Gave truncated responses to verbal questions; often was unable to elaborate. Like “pulling molasses.”
- Deliberate, methodical; attentive when a motor (hands-on) component was present.

SD’s Reading Evaluation - WRMT

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Standard Score</th>
<th>Percentile Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Identification</td>
<td>73</td>
<td>4</td>
</tr>
<tr>
<td>Word Attack</td>
<td>71</td>
<td>3</td>
</tr>
<tr>
<td>Word Comp</td>
<td>78</td>
<td>7</td>
</tr>
<tr>
<td>Passage Comp</td>
<td>72</td>
<td>3</td>
</tr>
<tr>
<td>Composite</td>
<td>72</td>
<td>3</td>
</tr>
</tbody>
</table>

Speech/Language Evaluation

Not low enough to qualify as “language disordered” but scored at about the 10th %ile on the CELF.

Strengths: Labeling pictures; repeating sentences verbatim.

Pronounced weakness in ability to:
- Explain word meanings; recognize multiple meanings of words; comprehend spatial and temporal word classes and categories; and formulate complete sentences with conjunctions.
- Doesn’t know months of the year, calendar concepts.

Spelling Errors (TWS, 8th %ile)

- Confusion of short vowels a, e (lat/let; nast/nest; spand/spend; myself/myself; avreonn/everyone)
  - Omission of nasals before consonants (whet/went; ucul/uncle; ninn/nineteen)
- Omission of /l/ in “storm”
- Confusion of /s/ and /ch/ (mues/much)
- C-1e syllable (ucul/uncle; pepule/people)
Questions: Case Study #1, SD

- What is the nature and severity of this student’s problem?
  “Mixed” or “triple deficit” reading disability.
- Why wasn’t it identified sooner?
  No universal screening; no behavioral problems.
- Who should be responsible for teaching a student like this?
  Everyone, all day every day.

What Components of Instruction Should Be Emphasized for Sam?

- phonological awareness
- phoneme-grapheme mapping (encoding)
- accurate blending and word reading (decoding)
- vocabulary: multiple meanings, elaborated definitions, spatial and temporal words; categorization; inflectional morphemes
- sentence elaboration and formulation
- verbal reasoning and expressive skills

Phoneme Identification

Link the phoneme to a gesture, object, or picture of the word.
- Call attention to articulation.
- Identify the sound in spoken words.
- Cue the production of the sound with the gesture, object, or picture.

Phoneme Identification

Why Does Phoneme Awareness Predict Reading and Spelling?

“Children faced with the task of learning to read in an alphabetic script cannot be assumed to understand that letters represent phonemes because awareness of the phoneme as a linguistic object is not part of their easily accessible mental calculus, and because its existence is obscured by the physical properties of the speech stream.”

(A. Liberman, 1989)
Phoneme-Grapheme Mapping

<table>
<thead>
<tr>
<th>Phoneme</th>
<th>Grapheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>ch</td>
<td>ock</td>
</tr>
<tr>
<td>sh</td>
<td>rii</td>
</tr>
<tr>
<td>kn</td>
<td>igh</td>
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<tr>
<td>j</td>
<td>udge</td>
</tr>
<tr>
<td>c</td>
<td>r ow d</td>
</tr>
</tbody>
</table>

Dimensions of English Orthography

<table>
<thead>
<tr>
<th>Sound-Symbol</th>
<th>Syllable Patterns</th>
<th>Morpheme Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglo-Saxon</td>
<td>Consonants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>single, digraphs,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>trigraphs, blends</td>
<td>closed patterns</td>
</tr>
<tr>
<td></td>
<td>Vowels</td>
<td>open</td>
</tr>
<tr>
<td></td>
<td>short, long</td>
<td>vowel-r</td>
</tr>
<tr>
<td></td>
<td>-v-c-e, vowel team</td>
<td>vowel team</td>
</tr>
<tr>
<td></td>
<td>patterns</td>
<td>consonant -le</td>
</tr>
<tr>
<td>Latin</td>
<td></td>
<td>high frequency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>words</td>
</tr>
<tr>
<td>Greek</td>
<td>ph for /f/ (graph)</td>
<td>compounding forms</td>
</tr>
<tr>
<td></td>
<td>ch for /k/ (chorus)</td>
<td>Latin roots</td>
</tr>
<tr>
<td></td>
<td>y for /i/ (gym)</td>
<td></td>
</tr>
</tbody>
</table>

“Deep Knowledge” of Words

Antonyms  Synonyms

(word)

Examples in context

Categories

Connotations/ Denotations

Multiple meanings Linguistic Structure

Sentence Sense, Grammar & Syntax

- exposure to "literary" syntax
- sentence coding and diagramming
- multisensory grammar
- sentence combining
- sentence anagrams
- sentence elaboration

Comprehension

Surface Code

WM

Text Base

LTM

Goal: Mental Model

Reading Comprehension Depends on Active Processing of...

- figurative language
- multiple meanings
- academic language formalities
- discourse structure
- phrase structure in sentences
- topic-specific terminology
Summary: Implications

- Traditional “O-G” is necessary but not sufficient
- Teachers need preparation in all aspects of oral and written language
- Curriculum should include direct teaching of all strands of language PLUS accommodations, technology supports, and compensatory strategies
- Student’s strengths should be developed

Beyond O-G: Many Validated Therapies and Approaches

- Lindamood-Bell – LIPS and VV
- REWARDS
- Direct, Explicit Teaching (e.g., Reading Mastery; ReadWell; SFA)
- Wolf’s RAVE-O; Lovett’s PHAST
- Hochman’s Teaching Basic Writing Skills
- LANGUAGE! Live

Case Study #2, 2nd Grader

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
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<tbody>
<tr>
<td>WISC Vocabulary</td>
<td>98th</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>90th</td>
</tr>
<tr>
<td>Listening Comp</td>
<td>98th</td>
</tr>
<tr>
<td>WIAT III Word Reading</td>
<td>16th</td>
</tr>
<tr>
<td>Gray Oral Rate &amp; Accuracy</td>
<td>16th</td>
</tr>
<tr>
<td>OWLs-II (Reading Comp)</td>
<td>20th</td>
</tr>
<tr>
<td>Woodcock RMT Word ID</td>
<td>16th</td>
</tr>
<tr>
<td>Spelling (TWS-4)</td>
<td>12th</td>
</tr>
</tbody>
</table>

Phonological Awareness (PAT, C-TOPP) all above avg

Instruction Aimed at the Problem of Poor Memory for Orthography

- Establish “sight word” habits for highest frequency words
- Teach a few at a time
- Constantly review and reteach as needed
- Teach the logic of English spelling, emphasizing patterns, word origin, and morphology
- Use word sorting to aid visual attention to print
- Use computer to reinforce sight word reading
- Do not spend time on phoneme segmentation unless to explain a pattern

Do All Dyslexic People Have Phonological Deficits?

Franck Ramus (cited in Dehaene, 2009)

- “A core deficit in phonological processing lies at the origin of most dyslexia...” but “about one in four presents a pronounced visual [orthographic] deficit and no phonological impairment.” (p. 242)
- “The problem that faces us is complex and does not have a single well-defined cause.” “A joint deficit of vision and language.”
Fluency

- The ability to read text
  - With adequate speed
  - With 97% to 98% accuracy
  - With good understanding
  - With comparatively little effort

- Is acquired word by word

Language-Processing Areas of the Brain

Dyslexia: Neurobiology
(Composite of 8 studies, G. Eden)

Typical Readers

Dyslexic Readers

7th-Grader, Before and After Remediation

Dyslexia: Assessment Essentials

- Single word reading (timed, in lists)
- Nonsense word reading (timed, in lists)
- Survey of phonics, syllabification
- Dictated spelling
- Written expression (writing to prompt)
- Vocabulary
- Listening comprehension/oral language
Tests of Related Processes?

- Phonological awareness
- Rapid automatic naming
- Phonological working memory
- Orthographic pattern recognition
- Receptive and expressive vocabulary
- Nonverbal problem-solving
- Overall language proficiency

Early Identification

How do you know one when you see one?

Growth Rate Toward Reading Achievement Is Established Early

Can We Identify It in Preschool?

- Delay in speaking
- Difficulty in pronunciation
- Insensitivity to rhyme
- Poor word retrieval or word finding
- Forgets the letter names and/or their sounds
- Is averse to print

Student Writing Sample, K

Student Spelling Test, 1st
Treatment (Intervention)

What to do about it.

Educational Intervention for Dyslexia and Reading Difficulties

- Linguistic concepts
- Systematic
- Explicit
- Cumulative
- Multisensory
- Intensive
- Applied to purposeful reading and writing

Research Based Reading Instruction

- Essential Components
  - Phonemic awareness
    - Recognize, remember and manipulate individual sounds
  - Phonics and word recognition
    - Sound – symbol relationship, word meaning
  - Reading Fluency
    - Read with sufficient speed an accuracy to support comprehension
  - Vocabulary development
  - Individual word meanings
  - Reading comprehension
    - Verbal reasoning, background knowledge, comprehension strategies

Reading Instruction

- Other components
  - Basic writing skills
    - Compose English with accuracy, fluency and clarity of expression
  - Comprehending and using language
    - The ability to listen and understand the meaning of what someone is saying
A Multi-component Lesson Framework

• “Sound warm-up” – phoneme awareness
• Direct, explicit teaching of word or language concept (phonics, etc.)
  – Modeling
  – Guided practice
  – Supported independent practice
  – Application in context

Multi-component Lesson, continued.

• Fluency development
  – speed drills
  – repeated reading
  – Partner work
• Vocabulary building
• Oral and silent text reading for comprehension, including sentence level work
• Spelling and writing

Phoneme-Grapheme Mapping

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<tr>
<th>c</th>
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<th>t</th>
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<tbody>
<tr>
<td>c</td>
<td>augh</td>
<td>t</td>
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<tr>
<td>sh</td>
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<td>t</td>
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<td>s</td>
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</table>

Reading Should Be Meaningful

• Is the vocabulary rich and evocative?
• Is there thematic depth?
• Are major genres well sampled?
• Are the ideas engaging and worth knowing about?
• Is the text worth rereading?

Adapt for the Learner!

• “Through books we experience other times, other places, other lives. We manage to become much more than our own selves.”

  …Anna Quindlen,
  How Reading Changed My Life
Dyslexia: Management

- Start early
- Label the problem accurately
- Build the student's strengths
- Use compensatory technology for content learning

The Consequences of Not Reading

<table>
<thead>
<tr>
<th>Percentile Rank</th>
<th>Words Read Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>683,000</td>
</tr>
<tr>
<td>50</td>
<td>1,400,000</td>
</tr>
<tr>
<td>90</td>
<td>3,020,000</td>
</tr>
<tr>
<td>Average students receive approximately 10 TIMES as much practice in a year</td>
<td></td>
</tr>
</tbody>
</table>

The Experience of the Person with Dyslexia

Reading from "My Dyslexia"

Phillip Schultz

Winner of the Pulitzer Prize for poetry in 2009.

In Summary – Some Guidelines

- Learning to read is complex; there is no single cause for dyslexia and related reading disabilities
- Most students need a multi-component approach
- Assess and treat the problem directly; use "processing" tests to help explain the student, but not as a gateway to services
- Rely on structured language approaches for intervention
- Look for and develop compensatory student strengths

Where to Find Good Information

- The International Dyslexia Association – www.interdys.org
- Yale Center for Dyslexia and Creativity – Dyslexia.yale.edu
- Florida Center for Reading Research – www.fcrr.org

The dnE nEd

We're DONE!
Thank You!
Louisa.Moats@gmail.com