Arkansas Reading Association Literacy Conference
November 19-20, 2015

An Overview of Developmental Dyslexia and Specific Reading Disability

The presentation reviews the cognitive and neurocognitive basis of dyslexia. It also summarizes specific reading disability (SRD) and the identification process. Case studies of student profiles are provided, along with recommendations for addressing the instructional needs of students with a SRD.

Dr. Timothy N. Odegard, PhD.
An overview of developmental dyslexia and specific reading disability

Timothy N. Odegard, PhD

Murfree Chair of Excellence in Dyslexia Studies
Tennessee Center for the Research and Treatment of Dyslexia,
Middle Tennessee State University
(formerly the Director of Research and Evaluation,
Wilson Language Training)

Presentation Outline

I. Neurological Basis of Reading
II. Cognitive Basis of Reading
III. Specific Reading Disability
IV. Identification

Sources of Variability that Influence Academic Outcomes

Fletcher, JM.; Lyon, GR.; Fuchs, LS.; Barnes, MA. Learning disabilities: From identification to intervention. Guilford: New York. 2007.

Neurocognitive Model of Reading

(CUP) Temporo-parietal
Mapping orthography to phonological and semantic representations
Neurocognitive Model of Reading

Dyslexia is a brain-based type of learning disability that specifically impairs a person's ability to read. Excerpt from the definition adopted by the National Institute of Child Health and Human Development (2014)

How do we know?

Areas of Decreased Brain Function

Functional brain differences are commonly observed in individuals with dyslexia when they perform reading tasks.

Functional Brain Differences:

Individuals with dyslexia present with decreased activation in several brain regions associated with skilled reading.

Areas of Decreased Brain Function
Suspected Compensatory Brain Function

Individuals with dyslexia also present with increased activation in several brain regions.

Structural Brain Differences:
Structural brain differences are commonly observed in individuals with dyslexia.

Preliterate children with a family history of dyslexia have decreased brain volume.

Response to Instruction

Takeaway Points from Brain Research

• There is evidence documenting functional and structural brain differences in children and adults with dyslexia.
• Some differences are likely due to the lack of exposure to reading resulting in developmental delays.
• Some differences are likely not the result of developmental delays and are rather the result of something else.
• Future research is still needed to determine what that something else is and identify the neurobiological factors causing dyslexia.
Sources of Variability that Influence Academic Outcomes

Framework representing different sources of variability that influence academic outcomes in children with LDs.

- Neurobiological
- Core Cognitive Processes (e.g., phonological awareness)
- Behavioral / Psychosocial Factors (e.g., anxiety, motivation)
- Environmental (Socioeconomic, schooling, instruction)

Academic Skills Deficits (e.g., word identification)

Fletcher, JM.; Lyon, GR.; Fuchs, LS.; Barnes, MA. Learning disabilities: From identification to intervention. Guilford; New York: 2007.

Reading Abilities

- Reading Comprehension
- Word Identification – Accuracy
  (Phonological Decoding, Sight Words, High Frequency Words)
- Word Identification – Automaticity

Reading Abilities: Reading Comprehension

- The ability to read text, process it and understand its meaning.

Reading Abilities: Word Identification

- Children must learn to identify words quickly and effortlessly.

Reading Abilities: Word Identification

- Accurate translation of the letters or spelling patterns of written words into speech sounds to identify words and access their meanings.

Reading Abilities: Fluency

- Getting the text off the page (either silently or orally) should be effortless.
Reading Abilities and Cognitive Processes

Cognitive Processes / Knowledge: Reading Abilities

- Fluency
- Word Identification - Automaticity
  (Phonological Decoding, Sight Words, High Frequency Words)
- Word Identification - Accuracy
  (Phonological Decoding, Sight Words, High Frequency Words)

Cognitive Skills: Phonological Awareness

- The ability to hear and manipulate the sound structure of language.
- Encompasses the ability to work with the sounds of language at the word, syllable, and phoneme level.

Cognitive Skills: Phonological Memory

- The capacity to hold a small amount of auditory information in mind in an active, readily available state for a short period of time.

Cognitive Skills: Alphabetic Knowledge

- Knowledge of letter formations, their names and sounds.

Cognitive Skills: Sound-Symbol Correspondence

- The relationship between letter sounds and letter formations.

Cognitive Skills: Rapid Visual-Verbal Responding

- A task that measures how quickly individuals can name aloud objects, pictures, colors or symbols.
**Takeaways from Cognitive Basis of Reading**

- Cognitive processes and knowledge undergird reading achievement.
- Research has established links between cognitive processes and different areas of reading.
- Individual differences in cognitive processes and knowledge provide one of the causal explanations as to why people have varying levels of reading ability.

**Specific Reading Disorders**

- **Word Decoding (Dyslexia):** People who have difficulty sounding out written words; matching the letters to sounds to be able to read a word.
- **Lack of Fluency:** People who lack fluency have difficulty reading quickly, accurately, and with proper expression (if reading aloud).
- **Poor Reading Comprehension:** People with poor reading comprehension have trouble understanding what they read.

*Taken from the National Institute of Child Health and Human Development (2014)*
Takeaway Points from Specific Reading Disability

- There are numerous reasons why individuals vary in reading ability.
- There is a growing awareness that individuals can have reading disabilities specific to word-level skills, fluency, and/or reading comprehension.
- The cognitive skills model has helped inform our understanding of specific reading disabilities.
- There is not a single profile that individuals with a specific reading disability fit.

Identification of a Reading Disability

- Across all three identification methods, it is common practice to test a student with a comprehensive battery of assessments to confirm and characterize reading deficits.

Comprehensive Assessment

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<tr>
<th>Norm-referenced Assessments</th>
<th>Reading Abilities</th>
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<td>Reading Comprehension</td>
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<tr>
<td>WRMT – Reading Comprehension</td>
<td>Fluency</td>
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<tr>
<td>GORT – Oral Reading Fluency</td>
<td>Word Identification – Automaticity</td>
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<tr>
<td>WAT – Oral Reading Fluency</td>
<td>Word Identification – Accuracy</td>
</tr>
<tr>
<td>WMRT – Oral Reading Fluency</td>
<td>Word Identification – Accuracy</td>
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<td>TOWRE – Sight Word Efficiency</td>
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<td>TOWRE – Phonological Decoding</td>
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<tr>
<td>WAT – Word Reading</td>
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<td>WMRT – Word Attack</td>
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<tr>
<td>WAT – Pseudo word Decoding</td>
<td>Word Identification – Accuracy</td>
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<tr>
<th>Cognitive Skills / Knowledge</th>
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<th>Reading Abilities</th>
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<td>Oral Comprehension (Phonemic Awareness, Auditory Memory)</td>
<td>WAT – Receptive Vocabulary</td>
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<td>WMRT – Listening Comp</td>
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<td>Orthographic Memory / Knowledge</td>
<td>WAT – Spelling</td>
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<td>Rapid Visual-Verbal Responding (Read Automated Naming)</td>
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<td>Alphabetic Knowledge</td>
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<td>Phonological Memory</td>
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The information collected from these assessments can be useful to getting a better handle on a student’s areas of instructional need.

An assessment battery is most powerful when leveraged to inform and differentiate instruction.