

*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)*

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

Presentation Outline

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

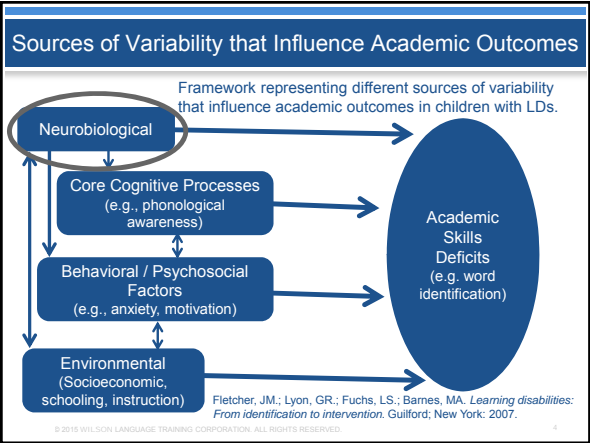
© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

Reading Continuum

WHY?

Poor Reader Exceptional Reader

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

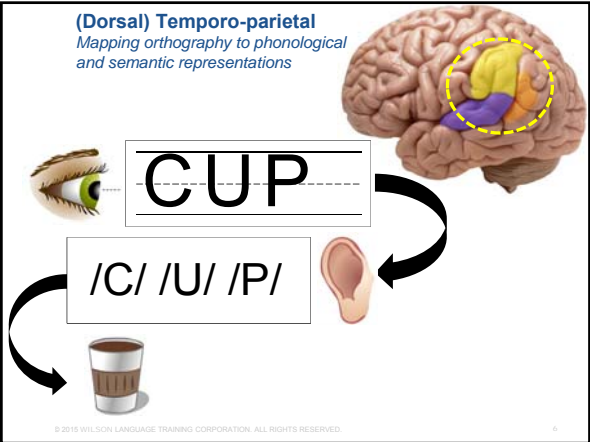


Neurocognitive Model of Reading

Pugh, K. R., et al. (2000). "Functional neuroimaging studies of reading and reading disability (developmental dyslexia)." *Mental Retardation and Developmental Disabilities: Research Reviews* 6(3), 207-213.

Pugh, K. R., et al. (2010). Mapping the word reading circuitry in skilled and disabled readers. In P. L. Cornelissen, P. C. Hansen, M. L. Kringelbach and K. R. Pugh, (Eds.), *The Neural Basis of Reading*. Oxford Press, 281-305.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.



(Anterior) Inferior frontal gyrus
Articulatory recoding

CUP

/C/ /U/ /P/

“CUP”

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 7

(Ventral) Occipito-temporal
Linguistically structured memory-based word identification system

CUP

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 8

Neurocognitive Model of Reading

(Dorsal) Temporo-parietal
Mapping orthography to phonological and semantic representations

(Ventral) Occipito-temporal
Linguistically structured memory-based word identification system

(Anterior) Inferior frontal gyrus
Articulatory recoding

Pugh, K. R., et al. (2000). "Functional neuroimaging studies of reading and reading disability (developmental dyslexia)." *Mental Retardation and Developmental Disabilities Research Reviews* 6(3), 207-213.

Pugh, K. R., et al. (2010). Mapping the word reading circuitry in skilled and disabled readers. In P. L. Cornelissen, P. C. Hansen, M. L. Kingetbach and K. R. Pugh, (Eds.), *The Neural Basis of Reading*. Oxford Press, 281-305.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 9

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?

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 10

Functional Brain Differences:

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

Pugh, K. R., et al. (2010). Mapping the word reading circuitry in skilled and disabled readers. In P. L. Cornelissen, P. C. Hansen, M. L. Kingetbach and K. R. Pugh, (Eds.), *The Neural Basis of Reading*. Oxford Press, 281-305.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 11

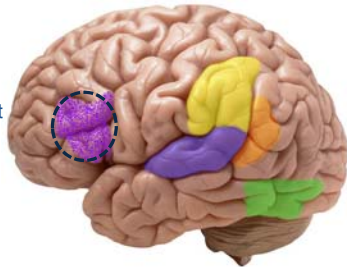
Areas of Decreased Brain Function

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

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 12

Suspected Compensatory Brain Function

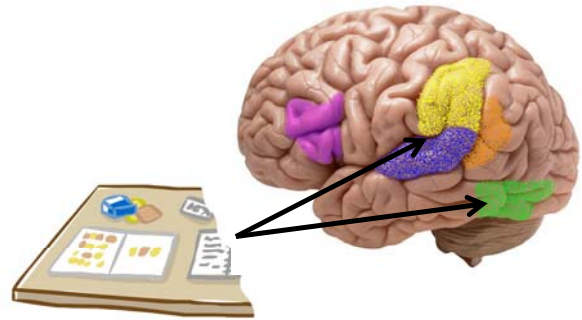
Individuals with dyslexia also present with increased activation in several brain regions.



© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

13

Response to Instruction



© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

14

Structural Brain Differences:

Structural brain differences are commonly observed in individuals with dyslexia.

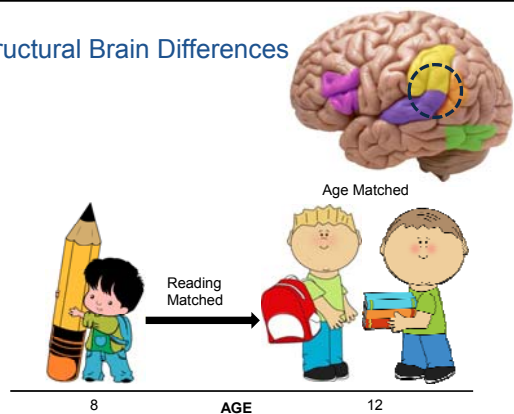


Richlan, F., et al. (2013). "Structural abnormalities in the dyslexic brain: A meta-analysis of voxel-based morphometry studies." *Hum Brain Mapp* 34(11), 3055-3065.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

15

Structural Brain Differences

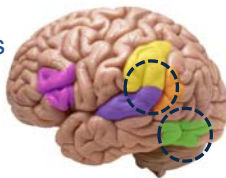


© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

16

Structural Brain Differences

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



© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

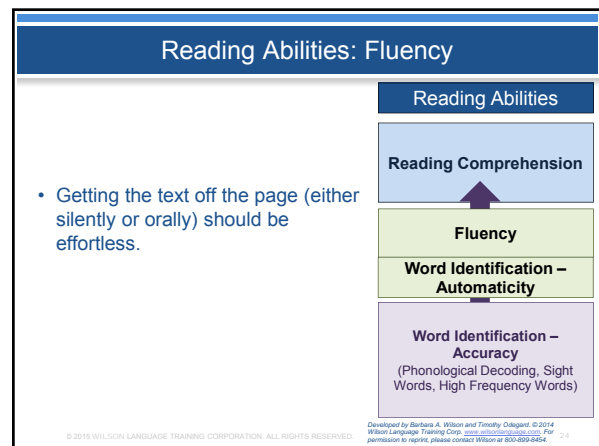
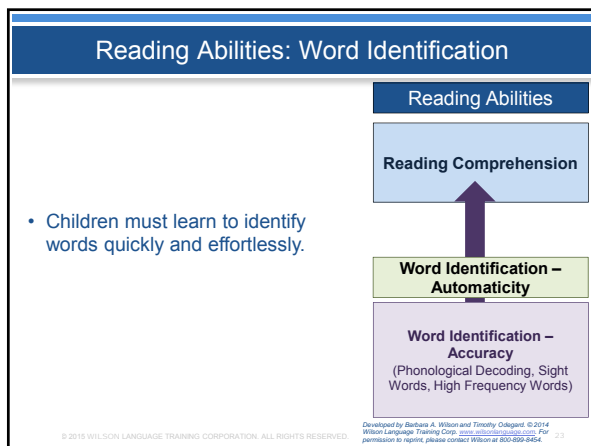
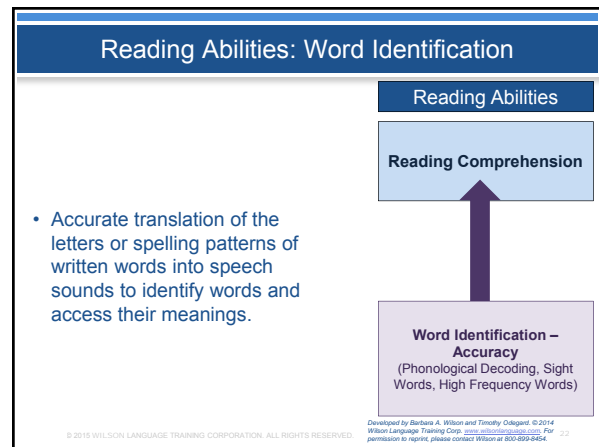
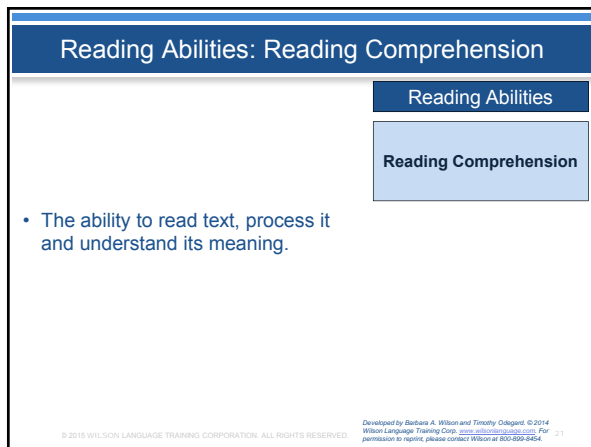
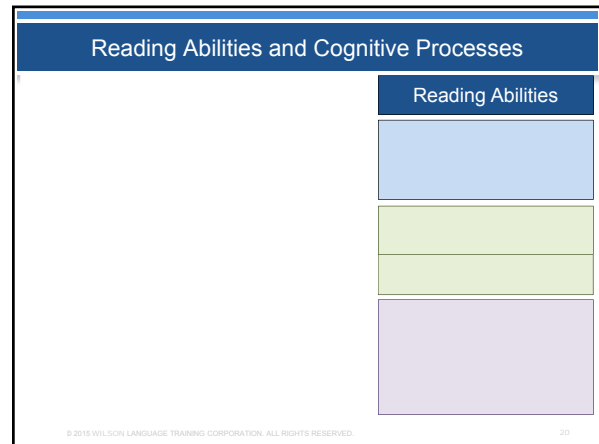
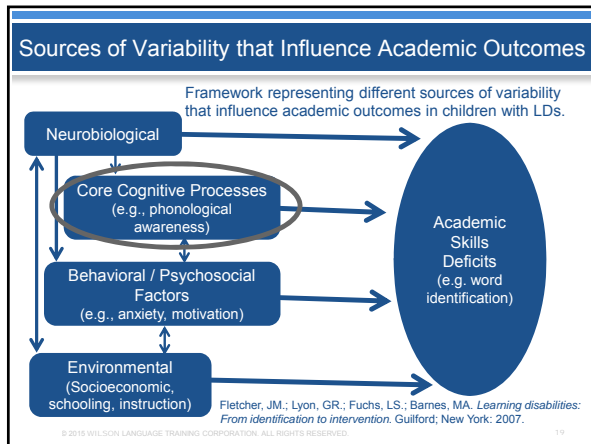
17

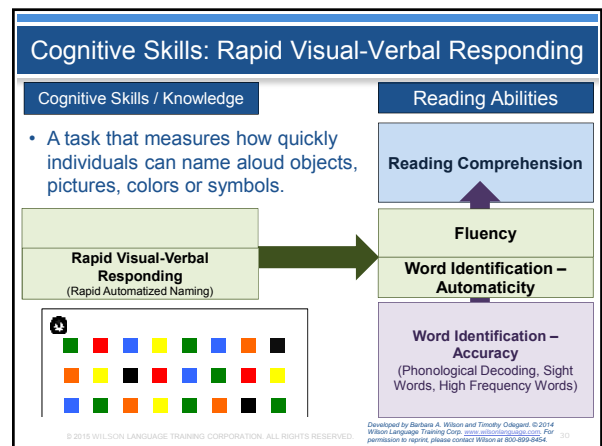
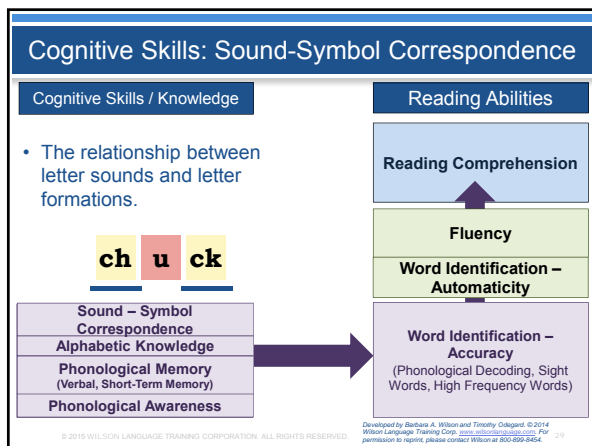
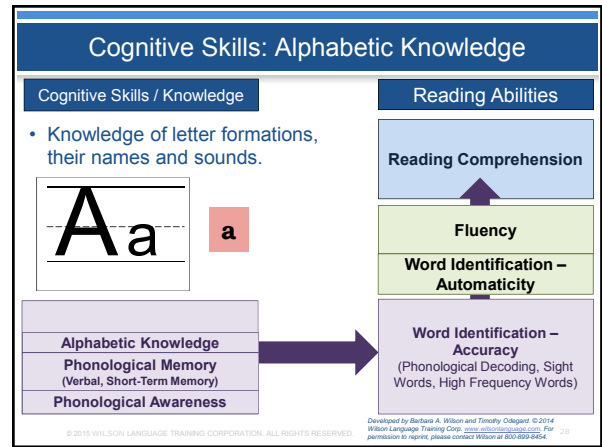
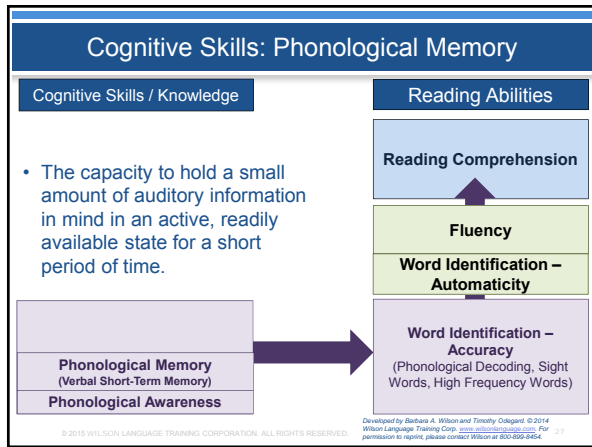
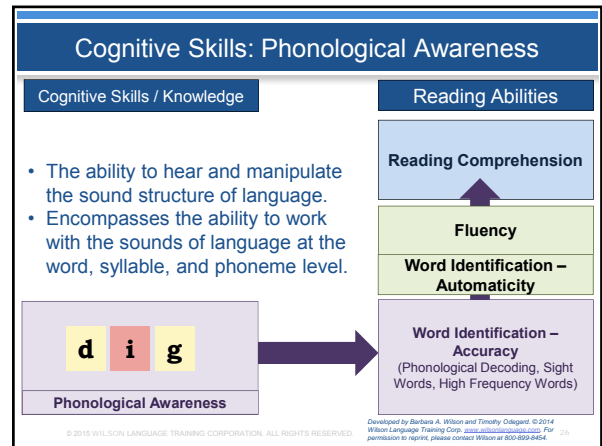
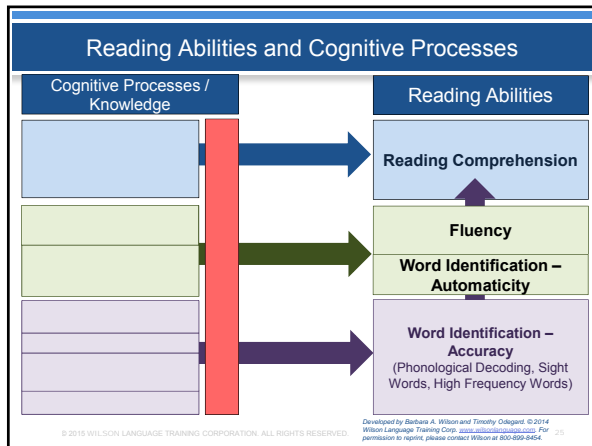
Takeaway Points from Brain Research

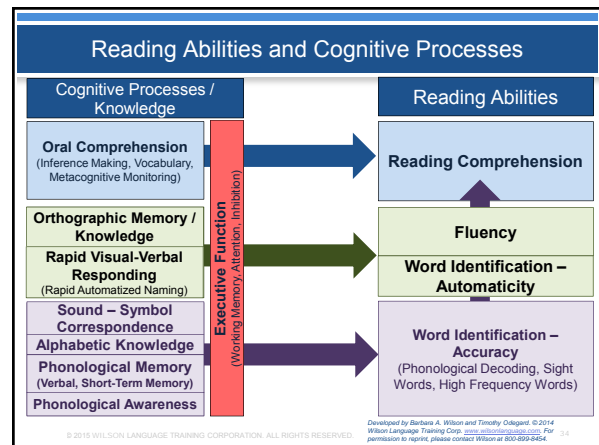
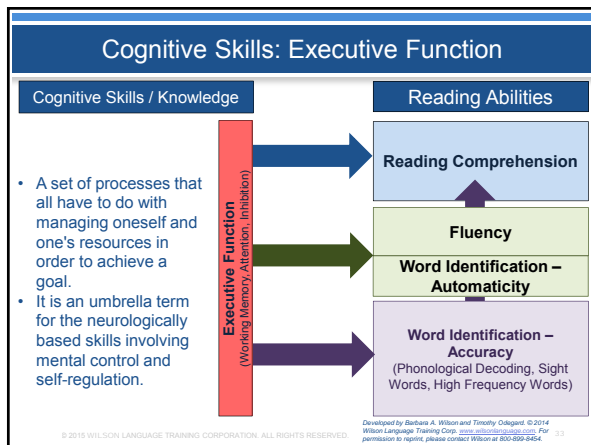
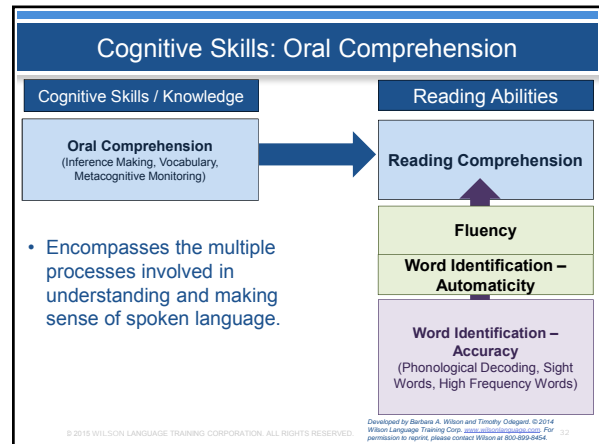
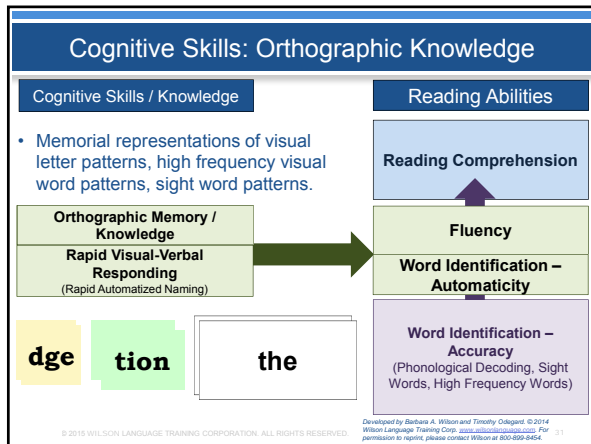
- There is evidence documenting functional and structural brain differences in children and adults with dyslexia.
- Some differences are likely due to the lack of exposure to reading resulting in developmental delays.
- Some differences are likely not the result of developmental delays and are rather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

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

18







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.

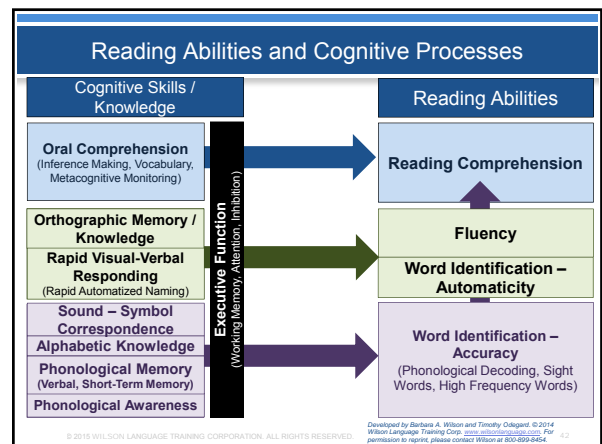
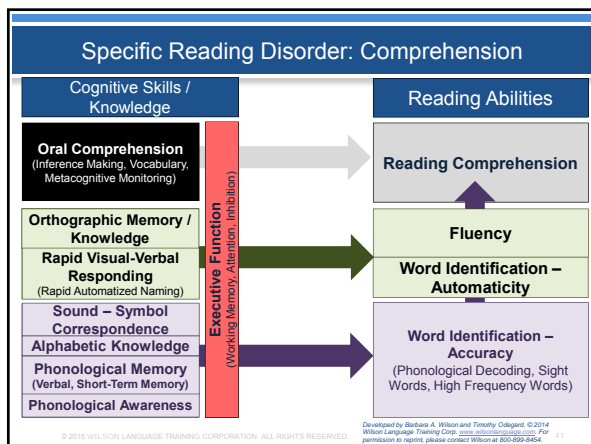
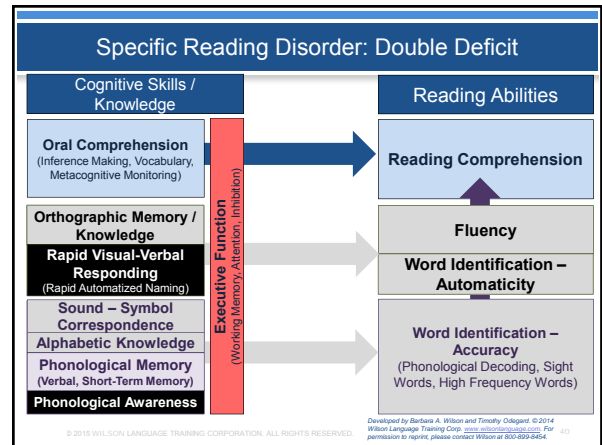
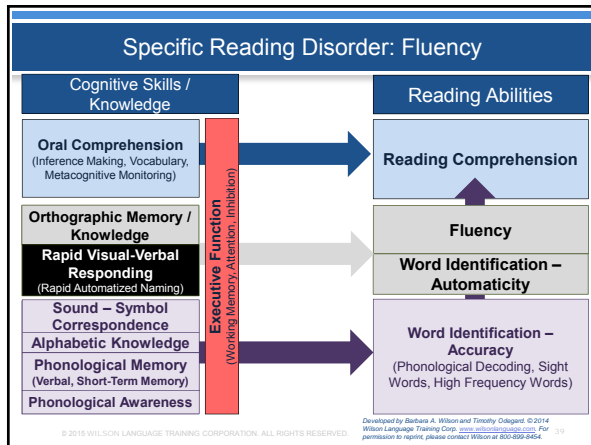
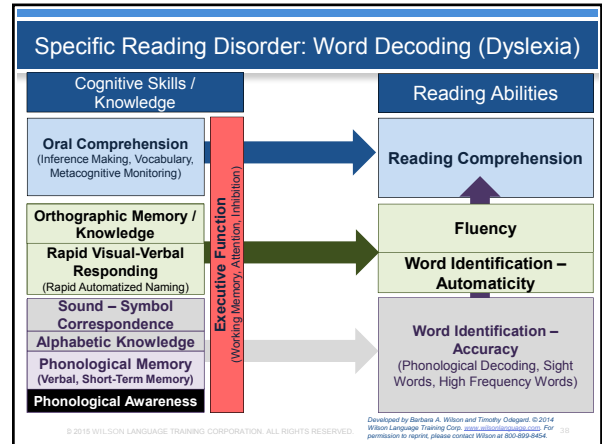
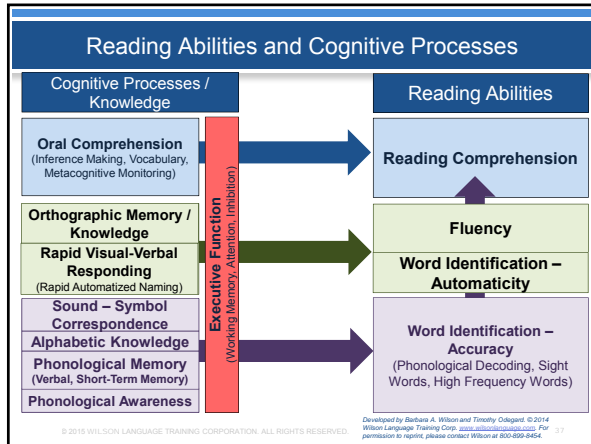
© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.

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)

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED.



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.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 43

Identification of a Reading Disability

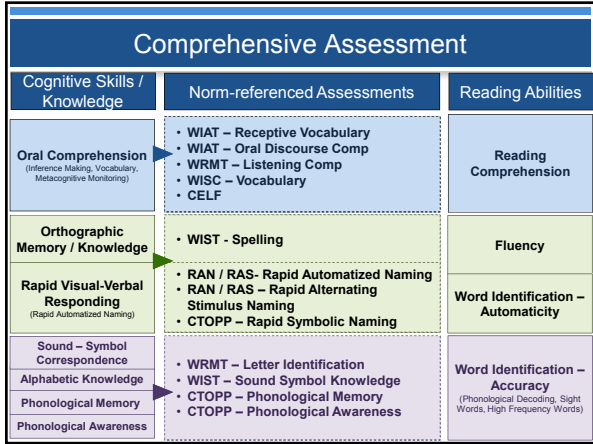
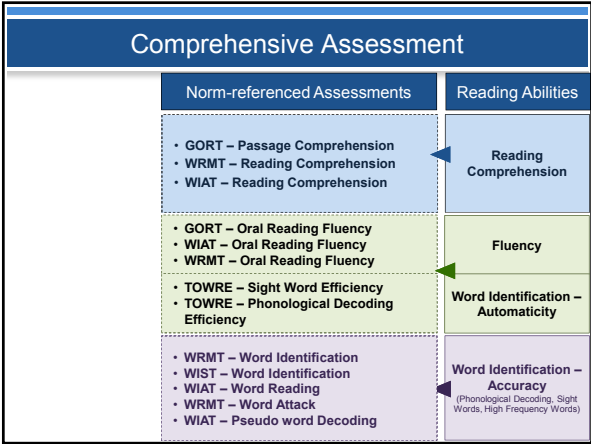
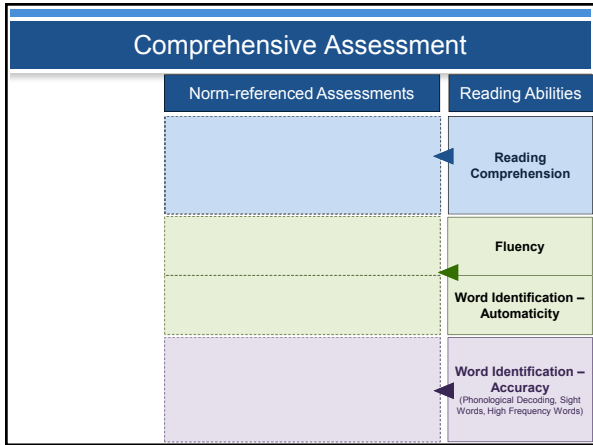
	Ability – Achievement Discrepancy	Intra Individual Differences	Response to Instruction
Basic Idea	Learning disability as unexpected underachievement	Learning disabilities as a disorder in basic psychological processes	Prevention and early intervention
Decision Making	Comparison of two test scores	Profile analysis of multiple test scores	Underachievement and insufficient progress
Timeframe	Fixed point in time	Fixed point in time	Multiple assessments over time
Key student data	IQ scores; achievement scores	Cognitive ability / processes; achievement scores	Achievement measures; curriculum based measurement

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 44

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.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 45



Comprehensive Assessment		
Cognitive Skills / Knowledge	Norm-referenced Assessments	Reading Abilities
Oral Comprehension <small>(Inference Making, Vocabulary, Metacognitive Monitoring)</small>	<ul style="list-style-type: none"> WIAT – Receptive Vocabulary WIAT – Oral Discourse Comp WRMT – Listening Comp WISC – Vocabulary CELF 	Reading Comprehension
Orthographic Memory / Knowledge	<ul style="list-style-type: none"> WIST – Spelling 	Fluency
Rapid Visual-Verbal Responding <small>(Rapid Automatized Naming)</small>	<ul style="list-style-type: none"> RAN / RAS: Rapid Automatized Naming RAN / RAS – Rapid Alternating Stimulus Naming CTOPP – Rapid Symbolic Naming 	Word Identification – Automaticity
Sound – Symbol Correspondence	<ul style="list-style-type: none"> WRMT – Letter Identification 	Word Identification – Accuracy <small>(Phonological Decoding, Sight Words, High Frequency Words)</small>
Alphabetic Knowledge	<ul style="list-style-type: none"> WIST – Sound Symbol Knowledge CTOPP – Phonological Memory 	
Phonological Memory	<ul style="list-style-type: none"> CTOPP – Phonological Awareness 	
Phonological Awareness	<ul style="list-style-type: none"> WRMT – Word Identification WIST – Word Identification WIAT – Word Reading WRMT – Word Attack WIAT – Pseudo word Decoding 	

Student Profiles		
Cognitive Skills / Knowledge	Norm-referenced Assessments	Reading Abilities
Oral Comprehension <small>(Inference Making, Vocabulary, Metacognitive Monitoring)</small>		Reading Comprehension
Orthographic Memory / Knowledge		Fluency
Rapid Visual-Verbal Responding <small>(Rapid Automatized Naming)</small>		Word Identification – Automaticity
Sound – Symbol Correspondence		Word Identification – Accuracy
Alphabetic Knowledge		
Phonological Memory		
Phonological Awareness		

■ Average – Above Average
■ Low Average
■ Below Average

4 th Grade Student labeled Struggling Reader		
Cognitive Skills / Knowledge	Norm-referenced Assessments	Reading Abilities
Oral Comprehension <small>(Inference Making, Vocabulary, Metacognitive Monitoring)</small>	<ul style="list-style-type: none"> Vocabulary WASI Listening Comp WRMT 	Reading Comprehension
Orthographic Memory / Knowledge	<ul style="list-style-type: none"> Spelling WIST 	Fluency
Rapid Visual-Verbal Responding <small>(Rapid Automatized Naming)</small>	<ul style="list-style-type: none"> Rapid Automatized Naming CTOPP 	Word Identification – Automaticity
Sound – Symbol Correspondence	<ul style="list-style-type: none"> Sound Symbol Knowledge WIST 	Word Identification – Accuracy
Alphabetic Knowledge		
Phonological Memory		
Phonological Awareness	<ul style="list-style-type: none"> CTOPP 	

7 th Grade Student labeled Struggling Reader		
Cognitive Skills / Knowledge	Norm-referenced Assessments	Reading Abilities
Oral Comprehension <small>(Inference Making, Vocabulary, Metacognitive Monitoring)</small>	<ul style="list-style-type: none"> Vocabulary WASI Listening Comp WRMT 	Reading Comprehension
Orthographic Memory / Knowledge	<ul style="list-style-type: none"> Spelling WIST 	Fluency
Rapid Visual-Verbal Responding <small>(Rapid Automatized Naming)</small>	<ul style="list-style-type: none"> Rapid Automatized Naming CTOPP 	Word Identification – Automaticity
Sound – Symbol Correspondence	<ul style="list-style-type: none"> Sound Symbol Knowledge WIST 	Word Identification – Accuracy
Alphabetic Knowledge		
Phonological Memory		
Phonological Awareness	<ul style="list-style-type: none"> CTOPP 	

Takeaway Points
<ul style="list-style-type: none"> The term struggling reader misrepresents the complexity of the student's profile. 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.

© 2015 WILSON LANGUAGE TRAINING CORPORATION. ALL RIGHTS RESERVED. 53