Early Identification of Dyslexia

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Disclosure

- Milton J. Dehn is CEO and co-owner of Schoolhouse Educational Services, Inc. the publisher of some assessment products mentioned in this presentation.
- Milton J. Dehn is also the author of some publications referred to in this presentation.
- Schoolhouse Educational Services distributes many of the products included in this presentation

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Main Sources of Information

- *Essentials of Dyslexia Assessment and Intervention,* Mather & Wendling
- *Essentials of Assessing, Preventing, and Overcoming Reading Difficulties,* Kilpatrick
- *The Neuropsychology of Reading Disorders,* Feifer
- *The Dyslexia Checklist,* Rief & Stern
- *Psychological Processing Analyzer,* (PSW) Dehn
- *Reynolds Dyslexia Risk Questionnaire,* Reynolds

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Workshop Content

1. What is dyslexia
2. Different types of dyslexia
3. Orthographic processing
4. Brain basis of reading
5. General assessment recommendations
6. Assessing related cognitive processes
7. Using PSW analysis to identify dyslexia
8. Brief review of recommended scales
9. Early identification factors
10. Case study
11. Typed in questions

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IDA Dyslexia Definition

"Dyslexia is a specific learning disability that is neurobiological 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. Secondary consequences may include problems in reading comprehension…"

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IDEA and Other Definitions

- SLD is "a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may have manifested itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as …… dyslexia."
- DSM-V also has dyslexia under SLD types.
- LDA definition includes impaired orthographic processing.

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Dyslexia vs Reading Disability

1. Both are reading disorders
2. Is dyslexia the same as SLD in reading?
3. Fundamentally, but types, criteria, and how we assess it differ
4. Most parents think it's something different
5. All 50 states now have separate dyslexia legislation, many indicating that it is something different than an SLD in basic reading skills and SLD in reading fluency

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How Dyslexia is Different

1. It's not just an IQ – Achievement discrepancy
2. Not just low/delayed reading skills
3. There are clear neurological (cognitive processing weaknesses)
4. Phonological &/or orthographic weakness(es)
5. Spelling weakness is present
6. The reading problem is more severe and resistant to intervention
7. Not a reading comprehension disorder

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Dyslexia Symptoms (Mather)

1. Difficulty learning to rhyme words
2. Difficulty learning letter names and sounds
3. Confuses letters and words that look alike
4. Confuses letters with similar sounds (f and v)
5. Reversals and transpositions past age 7
6. Difficulty with multisyllabic words
7. Slow reading rate and fluency
8. Relies more on memorization of words

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Preschool Dyslexia Symptoms

- Difficulty with rhyming
- Difficulty pronouncing words
- Poor auditory memory for nursery rhymes
- Difficulty learning new vocabulary words
- Word retrieval problems
- Difficulty learning and naming letters & numbers
- Not interested in books

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Kindergarten-First Grade Dyslexia Symptoms

- Difficulty segmenting words into smaller parts
- Difficulty identifying and manipulating sounds in words
- Difficulty remembering the names of letters and recalling their corresponding sounds
- Difficulty decoding isolated words
- Difficulty spelling words phonetically or remembering letter sequences in very common words

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2nd – 3rd Grade Dyslexia Symptoms

- Difficulty recognizing common sight words
- Difficulty decoding single words
- Difficulty decoding unfamiliar words in sentences
- Difficulty recalling the correct sounds for letters and letter patterns
- Difficulty spelling
- Difficulty reading fluently
- Reliance on picture clues, story theme, or guessing at words

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4th -6th Grade Dyslexia Symptoms

- Difficulty reading aloud
- Avoidance of reading
- Poor reading fluency
- Difficulty decoding new words
- Poor vocabulary growth
- Poor reading comprehension

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Dyslexia Spelling Symptoms

1. Letters not in the correct sequence
2. Spells same word in different ways
3. Attempts to spell irregular words phonetically
4. More difficulty with irregular words

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Dyslexia Misconceptions

1. It's a visual problem only.
2. It's mainly seeing and reading letters/words backwards, etc.
3. It's different than a "reading" disability.
4. Belief in interventions that are not supported by research.
5. It can be caused by poor instruction.

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Dyslexia Misconceptions

1. They can't read at all
2. They will outgrow it
3. All reading problems are dyslexia
4. High IQ children can't have dyslexia
5. Up to 20 percent of children have it

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Dyslexia Subtypes: Dysphonetic

1. Deep (Dysphonetic Dyslexia/Phonological Dyslexia)
2. Problems applying phonological rules when decoding printed words (letter-sound correspondence/mapping)
3. An underlying weakness in phonemic awareness of oral language
4. Difficulty decoding unfamiliar words such as nonwords; frequently guess
5. The over rely on visual cues
6. They lack accuracy

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Dyslexia Subtypes: Orthographic

1. Surface (Orthographic Dyslexia/Dyseidetic Dyslexia)
2. Poor immediate recognition of the printed word and parts of words
3. Low sight word vocabulary, weak reading of irregular words, slow rate, spelling errors, especially with irregular words
4. Poor reading fluency

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Dyslexia Subtypes: Mixed

1. Both dysphonetic and orthographic
2. Is the most common type.
3. Often have other cognitive deficits as well
4. If mixed, the dyslexia will be more severe.

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Phonological Processing

1. Ability to perceive and manipulate the speech sounds that make up oral and written words
2. Words, syllables, and phonemes
3. Phonemic Awareness, primarily oral
   1. Aware of and manipulation of phonemes
   2. 42-44 in English

   How many ways can you spell 44 sounds in American English? The answer is why English is an opaque language that challenges both phonological and orthographic.

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Phonological Processing

1. Deficits in phonological processing are the main cause of basic reading skills disabilities and dyslexia
2. In CHC theory, is under Auditory Processing, but should be separated
3. Auditory is more receptive and more than phonemes
4. Phonological requires manipulation of sounds; more expressive

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Levels of Phonological Processing in Order of Difficulty (Kilpatrick)

1. Rhyming
2. Segmenting
3. Blending
4. Deleting (Elision)
5. Replacing
6. May do fine with rhyming, segmenting, and blending, but poorly on deleting and replacing (analysis skills)
7. Note which type required by the test/subtest

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Orthographic Processing

"the ability to visually recognize and remember printed words and parts of words. It includes the ability to recognize letter sequences and patterns and to spell phonetically irregular words"

1. Considered a specific ability that is often deficient in dyslexia.
2. Different from broad visual-spatial processing.
3. Orthographic is specific to symbols/letters.
4. Stands alone in Dehn's PSW cognitive processes/PSW analysis

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Orthographic Processing and Reading

1. Orthographic is recognizing words and parts of words by sight, such as prefixes, suffixes, and roots.
2. Necessary for
   1. Reading decoding/basic reading skills
   2. Reading fluency
   3. Written expression (spelling)
3. Not a direct influence on reading comp.

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Orthographic vs Visual Processing

1. Visual-Spatial involves shapes, designs, pictures, objects, location.
2. Orthographic is specific to letters and words and symbols that represent words.
3. Usually, visual-spatial will be average while there is a weakness in orthographic.

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Signs of Orthographic Weakness

- Severe decoding problems, even though phonemic awareness is adequate
- Severe spelling problems, but can spell phonetically
- Can't remember new sight words
- Has to sound out common sight words

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Orthographic Knowledge

1. Learning the common letter patterns such as *ing, ed, tion, ough*
2. Knowing what is permissible and not permissible in English language spelling, such as "ight" versus "tbl" or triple letters
3. Recalling common spelling patterns such as "tion" and "ight"
4. All the letters in a word are perceived in a single glance.

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Orthographic Mapping (Memory)

1. Process of turning unfamiliar written words into instantly accessible sight words.
2. This mapping determines whether readers will easily recognize the words they see.
3. It results in fluency
4. Normal readers map a new word in as few as 1-4 exposures.
5. Dyslexic readers: it takes many exposures >10

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Orthographic Mapping Requires

1. Advanced phonemic awareness
2. Letter-sound knowledge
3. Phonological long-term memory
4. The oral pronunciations of words and parts of words that are already stored in long-term memory are the anchoring points for the orthographic sequences.
5. The symbols are associated with their acoustical properties (phonological)

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Phonological and Orthographic Relations

1. Some basic orthographic mapping begins early, before phonetic decoding.
2. Younger children rely more on phonological.
3. Older children more on orthographic.
4. Strong vocabulary may mask weaknesses in either one (context cues are being used).

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Phonological vs Orthographic

- Orthographic is the quicker decoding route
- Phonological skills are more explicitly consciously learned
- Orthographic skills/mapping are more implicit
- Phonological Processing weakness causes accuracy problems
- Orthographic Processing weakness causes fluency problems

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Spanish Readers: Dyslexia Signs

Relative to English Readers

- Spanish is more phonetically consistent (transparent)
- Fewer difficulties with spelling and phonetic decoding
- Orthographic is still weak
- Rapid Naming is still weak
- Fluency is still weak
- Reading comprehension is still weak

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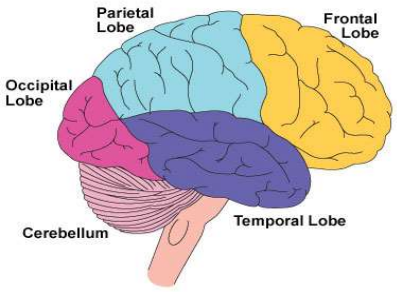
The Brain and Dyslexia



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The Brain and Reading Decoding

1. All four brain lobes and many brain regions are involved, but reading processes are mainly at the back of the brain
2. Dyslexics rely more on frontal lobe
3. Phonological processing is mainly in the parietal lobe, especially the parieto-temporal lobe, referred to as “Word Analysis” area

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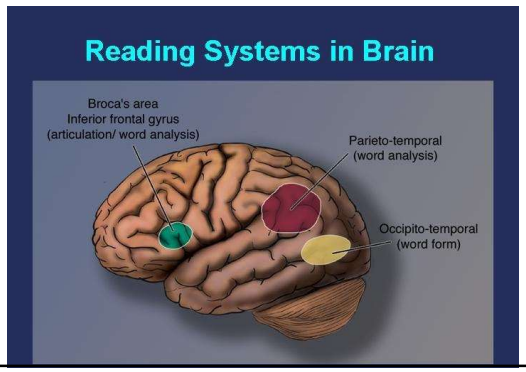
Shaywitz Research



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The Brain and Dyslexia

1. Inefficient functioning of left posterior reading systems
2. Less use of the parietotemporal word analysis/phonics area
3. Less use of the left occipitotemporal area referred to the "visual word-form area"
   1. Functions as a memory area
   2. This integrates phonology and orthography, but how is unknown
4. Dyslexic brains process information slower

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The Brain and Dyslexia

- Supramarginal gyrus at the intersection of the temporal and parietal lobes is responsible for the phonological assembly of words
- This gyrus is not very active in dyslexic readers
- The left superior temporal gyrus is responsible for blending
- The angular gyrus processes meaning
- Broca's area – word analysis and articulation

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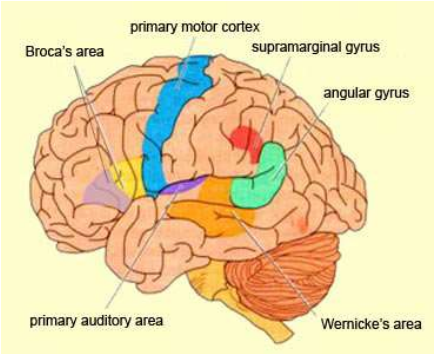
The Brain and Dyslexia



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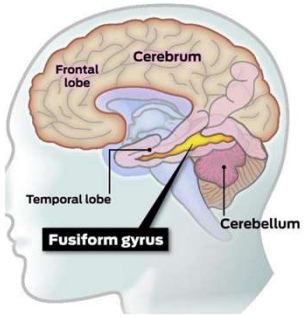
Fusiform Gyrus



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Orthographic in Fusiform Gyrus

1. An area that overlaps the temporal and parietal lobes in the lower part of the cortex in both hemispheres
2. This is where visual representations of letter sequences are stored and retrieved from.
3. In dyslexics the left fusiform gyrus is not very active.

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Fusiform Gyrus

- Also known as the occipitotemporal gyrus, is part of the temporal occipital lobes.
- Brain's automatic word recognition center
- Adults can recognize 250 words per minute
- The visual word form area
- Also, face recognition area

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Genetics

1. If parent has dyslexia, 30-50% of the children will
2. If one child has, 50% of siblings will
3. Both phonological and orthographic deficits have a strong genetic component
4. However, orthographic processing/memory development are at least partially dependent on exposure to symbols and print

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General Dyslexia Assessment Strategies and Recommendations

1. Listen to the child read informally in addition to oral reading tests
2. Consider risk factors; e.g., family disabilities
3. Consider other disorders, ADHD, Autism, etc.
4. Rule out ELL and exclusionary factors
5. If it does not meet new dyslexia criteria, may still meet reading disability criteria.

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Dyslexia Assessment: General Testing Recommendations

1. Assess related cognitive processes
2. Letter and word recognition (isolated words)
3. Phonetic decoding
4. Spelling
5. Oral reading fluency
6. Reading comprehension
7. Use PSW analysis to determine cognitive processing weaknesses

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Assess Neuropsychological Processes Highly Related to Dyslexia

1. **Phonological**
2. **Orthographic**
3. Auditory
4. **Oral Language (Morphological Awareness)**
5. Processing Speed
6. Verbal Long-Term Recall
7. Visual-Spatial Long-Term Recall
8. **Rapid Automatic Naming**
9. **Verbal Working Memory**
10. **Visual-Spatial Working Memory**

(Basically the same processes as those needed for Basic Reading Skills)
How it compares to other SLD categories Link

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PSW and Dyslexia

1. A pattern of cognitive strengths and weaknesses
2. Look for processing weakness that are related to the reading weakness
3. Cognitive weaknesses cause, are associated with/account for the learning problem
4. PSW analysis works for dyslexia just like it does for SLD

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Using PSW to Identify Dyslexia

1. One or more highly related cognitive processes should be an intra-individual (within person) weakness
2. One of the weaknesses should be either phonological or orthographic
3. Consider other related processing weaknesses
4. There is consistency, i.e., low basic reading skills with a low related cognitive score

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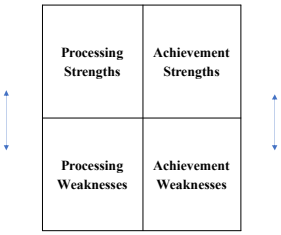
Dehn's PSW Model



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Dehn's Psychological Processing Analyzer (PPA) Version 8.5.2

1. Is PSW software that does a statistical analysis of processing and achievement scores for strengths and weaknesses
2. Compares related processes and achievement for consistency
3. Is a download to your computer
4. Individual purchases/use or site license
5. User friendly for data input & interpretation
6. It has an Orthographic category and 13 other processes

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Dyslexia and Working Memory

1. Well-established connection but may have average WM
2. An average WM can be overloaded during a cumbersome decoding and retrieval process (too much cognitive load)
   1. E.g., they may forget sounded out phonemes before they can be blended
3. Weak phonological and/or orthographic add to cognitive load

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Rapid Automatic Naming

1. Ability to name familiar objects, **symbols,** or **letters** quickly
2. A specific type of long-term recall
3. Deficits associated with reading problems
4. Is especially related with orthographic reading and reading phonetically irregular words

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Oral Language

1. Not so much the content (vocabulary)
2. But the oral language & linguistic processes
3. Syntax: forming phrases and grammatically correct sentences
4. Morphology: manipulation of the meaningful units of speech

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Morphology

"In linguistics, morphology is the study of words, how they are formed, and their relationship to other words in the same language. It analyzes the structure of words and parts of words, such as stems, root words, prefixes, and suffixes. Morphology also looks at parts of speech, intonation and stress, and the ways context can change a word's pronunciation and meaning."

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Assessing Orthographic Processing

1. Spelling, especially phonetically irregular words
2. Letter-pattern matching (WJ IV battery)
3. Word reading fluency, especially phonetically irregular words (should be timed)
4. Memory for words and word patterns
5. Special "orthographic" subtests
6. See PPA list of tests/subtests

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Classic Orthographic Test

WATER

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Classic Orthographic Test

I M T H

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Irregular Words

1. Even phonetically irregular words typically have only one irregular letter-sound relationship, such as island
2. More than one irregular relationship in a word is unusual, e.g., words such as "one" which is pronounced as wun
3. When teaching irregular words, they should be analyzed and the parts that are phonetically regular and irregular should be pointed out

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TOWRE-2

1. Test of Word Reading Efficiency
2. Has timed nonsense word reading subtest and timed reading of real words
3. If untimed, examinee can decode phonetically
4. May be too easy for older students
5. KTEA-3 Decoding Fluency subtest is similar

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TIWRE

1. Test of Irregular Word Reading Efficiency
2. Uses only irregular words
3. But is not timed

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KTEA-3 Orthographic Processing

1. Spelling
2. Letter-Naming Facility
3. Word Recognition Fluency

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WIAT 4

1. Orthographic Processing Composite
   1. Orthographic Fluency (timed)
   2. Spelling
   3. Orthographic Choice (extended composite)
2. Dyslexia Index (subtests depend on age)
   1. Word Reading
   2. Phonemic Proficiency
   3. Pseudoword Decoding
   4. Orthographic Fluency
   5. Data supports this index as a good quality dyslexia screener

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TOC

1. *Test of Orthographic Competence (TOC)*
2. Several subtests
3. Based on tasks in research studies
4. Includes a homophone choice task, such as, "Which is a flower, *rose* or *rows?*
5. Has Signs and Symbols subtest
6. Assesses orthography of both reading and writing

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TOC Subtests

1. Signs and symbols
2. Grapheme Matching
3. Homophone Choice
4. Punctuation
5. Abbreviations
6. Letter Choice
7. Word Scramble
8. Sight Spelling
9. Word Choice

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Spelling Tests

1. Pay attention to irregular words
2. Is the spelling mainly phonetic
3. If irregular words are worse, points to an orthographic processing weakness
4. Spelling nonsense words (WJ IV) requires precise spelling (only one option is correct)

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Word Identification Tests

1. These are sight word tests, regular, irregular, and nonsense words
2. Ideally should be timed to reduce reliance on phonetic decoding
3. If the student has the sight word in orthographic memory, the word will be consistently pronounced correctly, instantly, and effortlessly without needing context

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Orthographic Processing on WJ IV

- WJ IV ACH
  - Letter-Word Identification
  - Spelling
  - Spelling of Sounds
  - Word Attack
  - Word Reading Fluency
- WJ IV COG
  - Letter-Pattern Matching
  - Number-Pattern Matching
- Use the PPA to get the average of these

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Phonological Awareness Test Example: CTOPP-2

- Elision Subtest
- Blending Words
- Sound Matching; for example:
  - "Which word starts with the same sound as pan? Pig, hat, or cone."
  - Also asks which word ends with the same sound.

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Feifer Assessment of Reading (FAR)

Phonological Index

- Phonemic Awareness
- Nonsense Word Decoding
- Isolated Word Reading Fluency
- Oral Reading Fluency
- Positioning Sounds

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FAR

Fluency Index (this is mostly an orthographic factor)

- Rapid Automatic Naming
- Verbal Fluency
- Visual Perception
- Irregular Word Reading Fluency
- Orthographical Processing

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FAR

Comprehension Index

- Semantic Concepts
- Word Recall
- Print Knowledge
- Morphological Processing
- Silent Reading Fluency: Comprehension

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Screening Young Children for Dyslexia (Ages 4-8)

1. Early identification leads to early intervention.
2. Reading aptitudes are developing by age 4.
3. Screeners also assess reading skills.
4. A screener can identify those at risk. These can then be administered a comprehensive performance-based assessment.
5. Screeners can be done efficiently without direct contact with the child.
6. Screeners can be very reliable and valid.

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Reynolds Early Assessment of Reading (READ; in development)

1. An early dyslexia screener
2. Ages 4-8
3. Computer-assisted administration
4. This scale is being standardized
5. Will be available in early 2021
6. Published by Schoolhouse Educational Services

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READ Subtests

1. Print Conventions
2. RAN: Letter Naming
3. Semantic Sequential Recall
4. Orthographical Processing
5. Basic Language Concepts
6. Letter Recognition
7. Word Recognition
8. Phonemic Awareness: Elision
9. Phonemic Awareness: Blending

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Reynolds Dyslexia Risk Assessment (RDRA)

1. National, norm-referenced test
2. An online teacher and parent rating scale
3. Can be administered without rater being present
4. Ideal for universal screening
5. Forms for ages 4-5 and 6-7
6. Forms have 45-60 items
7. Can typically complete in less than 8 minutes
8. Helpful with young children who are not very testable

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What is the RDRA?

1. A screening measure for risk of having or developing Dyslexia or a related reading disorder.
2. Not a stand-alone diagnostic instrument; the RDRA is designed to locate children who require more extensive assessment in reading acquisition
3. In addition to scores, a risk classification level and recommendation is included in report
4. The RDRA makes identification programs in reading disability more efficacious and cost-effective.

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Main Skills Sampled in RDRA

1. Word and letter recognition
2. Phonemic awareness
3. Understanding principles of phonics
4. Knowledge of print conventions
5. Language development
6. Short-term memory

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Dyslexia Symptoms Sampled by RDRA

1. Mixing up letters, e.g. reversals
2. Can’t name rhyming words
3. Difficulty learning and remembering new words
4. Confuses words that sound alike
5. Difficulty writing and spelling
6. And other dyslexia-type behaviors

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Other Factors Sample by RDRA

These are not skills but are behaviors highly related to reading skill development:

- Feelings about reading
- Interest in reading
- Paying attention during reading activities
- Difficulty following directions

- See sample form/items

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How Does the RDRA Perform? Correlations with the WJ-IV and CTOPP-2

Concurrent Measure Correlations	Parent	Teacher
WJ-IV Tests of Achievement		
Letter-Word Identification	0.70	0.68
Word Attack	0.66	0.63
Basic Reading Skills	0.71	0.68
CTOPP-2		
Elision	0.22	0.45
Blending Words	0.12	0.21
Rapid Letter Naming	0.43	0.69
Rapid Object Naming	0.18	0.80

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RDRA Interpretive Guidance and Recommendations (Sample Report)

DRI T-Score Range	Risk Level Designation	Recommendation for Follow Up Activities
≥70	Extremely elevated risk	Performance-based comprehensive assessment
60-69	Moderately elevated risk	Performance-based comprehensive assessment
55-59	Mildly elevated risk	Frequent progress monitoring of reading milestone achievements
46-54	Normal risk	Normal or routine classroom evaluation of reading milestone achievements
≤45	Below normal risk	Normal or routine classroom evaluation of reading milestone achievements

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RDRA Case Study

- 5 year, 3-month old, preschooler
- Out of school 6 weeks because of COVID 19
- Mother-college degree; father-high school
- No family history of disabilities
- Child has no diagnosed disability

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RDRA Case Study Results

- Mother's T-score = 68 (SS = 73) moderately elevated risk
- Teacher's T-score = 55 (SS = 93)mildly elevated risk
- Should be referred for testing if either parent or teacher results are in the risk range
- Mother's results matched WJ IV Reading Tests
  - Basic Reading Skills Cluster = 72
- Teacher's results matched CTOPP-2 results
- See report

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General Case Study I

1. Grade 5; beginning 1st grade reading level
2. Average intelligence with mid-average vocabulary and above average visual-spatial
3. Also has Autism
4. Spelling is extremely low – 0.1 percentile
5. Painfully sounds out each word even those that should be simple sight words (phonics training has been emphasized with him)

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Case Study I Processing Scores

- GIA – 86
- Fluid Reasoning – 89
- Processing Speed – 93
- Auditory Processing – 90
- Visual Processing – 111
- Rapid Naming – 91
- Oral Language - 99
- Working Memory – 90
- Phonological Processing - 102
- FAR Orthographic Processing - 55
- Orthographic processing deficit supports dyslexia diagnosis when matched with Basic Reading Skills score of 56

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General Case Study II

1. Middle of 2nd Grade
2. New words do not stick
3. Difficulty recognizing some letters and their sounds
4. Father had dyslexia
5. Average GIA of 96 on WJ IV
6. Average Oral Language on WJ IV
7. Spelling on WJ IV at 79
8. WJ IV Basic Reading Skills score of 80
   1. Letter-Word Identification – 75
   2. Word Attack – 87
9. Poor response to reading interventions

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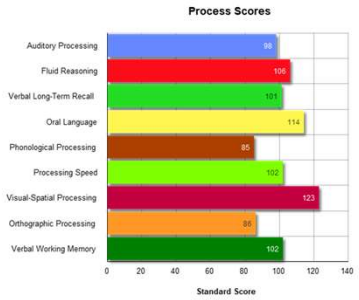
Case Study II PPA Results



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Questions

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