 Speaking of Reading
A Speech-Language Pathologist’s Guide to Dyslexia

Meet Mike.

- Achieved early milestones on time, though articulation was delayed.
- Pre-K and K- hesitant in the classroom, but happy & social kid
- 1st grade- sent to I&RS for reading and writing difficulties
- CST Eval at end of 1st grade showed 106 IQ, while oral reading scores were in the 70s

Meet Mike.

- 1st grade- phonological awareness SS= 82
- Increasing frustration, struggle, and anger through 2nd & 3rd grades.
- By spring of 4th grade: letter sound knowledge- 75th %ile, phonological awareness 15th %ile, oral lang 50th %ile
- 4th grade: sight word identification- 1st %ile, decoding 1st %ile, oral reading fluency 1st %ile, reading comprehension 5th %ile
The Simple View of Reading

What skills contribute to Word Recognition?
- Phonological & Phonemic Awareness
- Phonological memory
- Rapid automatic naming
- Letter identification
- Letter-sound knowledge
- Phonics knowledge
- Morphological understanding
- Self-sustaining acquisition of automatic word recognition

What skills contribute to Language Comprehension?
- Vocabulary knowledge
- Syntactic skills
- General world knowledge
- Understanding of narrative and other discourse structures
- Sustained attention
- Memory (working memory, phonological memory, and other variants)
- Self-monitoring (executive) skills
- Inferential thinking skills

Result = Skilled Reader

The Simple View of Reading

Originally developed by Gough and Tunmer, 1986
Graphic design by Beyond Communication, 2017
Dyslexia Definition per N.J.A.C. 6A:14, the NJ Special Education Code

“Dyslexia” means a specific learning disability that is neurological in origin. It can be characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. 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 and reduced reading experience that can impede growth of vocabulary and background knowledge.

Dyslexia Definition Deconstructed

- The problem is visible in brain scans as differences in physical development in certain brain regions.
- The primary symptom is poor word recognition and spelling.
- The primary cause is a core deficit in phonological processing.
- Poor reading leads to other problems with language and academics over time.

Dyslexic Reader

- Primary problems with WR
- Stem from problems with phonological processing
- Student has strong oral language comp in early grades
- Significant discrepancy between oral language comp and reading comp, due to weak word id

Word Recognition

Our Subject
The State Board of Education shall promulgate regulations that incorporate the International Dyslexia Association’s definition of dyslexia into chapter 14 of Title 6A of the New Jersey Administrative Code.

The State Board of Education shall, as part of the professional development requirement established by the State board for public school teaching staff members, require certain teaching staff members to annually complete at least two hours of professional development instruction on the screening, intervention, accommodation, and use of technology for students with reading disabilities, including dyslexia. The professional development requirement established pursuant to this section shall apply to general education teachers employed in grades kindergarten through 3, special education, basic skills, and English as a second language teachers, reading specialists, learning disabilities teacher consultants, and speech-language specialists. A board of education may make the professional development opportunities available to other instructional or support staff as the board deems appropriate.

“A board of education shall select and implement age appropriate screening instruments for the early diagnosis of dyslexia and other reading disabilities.”

We screen to “identify students who possess one or more potential indicators of dyslexia or other reading disabilities.”

“Potential indicators of dyslexia or other reading disabilities” means indicators that include, but shall not be limited to, difficulty in acquiring language skills; inability to comprehend oral or written language; difficulty in rhyming words; difficulty in naming letters, recognizing letters, matching letters to sounds, and blending sounds when speaking and reading words; difficulty recognizing and remembering sight words; consistent transposition of number sequences, letter reversals, inversions, and substitutions; and trouble in replication of content.
A board of education shall ensure that each student enrolled in the school district who has exhibited one or more potential indicators of dyslexia or other reading disabilities is screened for dyslexia and other reading disabilities using a screening instrument selected pursuant to section 2 of this act no later than the student’s completion of the first semester of the second grade.

...the board of education shall ensure that the newly-enrolled student is screened for dyslexia and other reading disabilities using a screening instrument...within 90 calendar days of the date the student is enrolled in the district.

In the event that a student is determined through the screening conducted pursuant to section 3 of this act to possess one or more potential indicators of dyslexia or other reading disabilities, the board of education shall ensure that the student receives a comprehensive assessment for the learning disorder. In the event that a diagnosis of dyslexia or other reading disability is confirmed by the comprehensive assessment, the board of education shall provide appropriate evidence-based intervention strategies to the student, including intense instruction on phonemic awareness, phonics and fluency, vocabulary, and reading comprehension.

http://www.njleg.state.nj.us/2012/Bills/PL13/210_.PDF

NJ DOE Dyslexia Handbook
Fall 2017
Clinical Markers of Dyslexia

#1 - Phonological core deficit

- Can manifest as difficulties with word discrimination, phonological and phonemic awareness, short-term auditory memory (aka phonological memory), letter-sound awareness, articulation errors, auditory processing problems
- Considered by many researchers to be the "universal cause" of word-level reading difficulties
- Phonological skills must be accurate, sophisticated, and automatic in order to support skilled reading

"Every point in a child's development of word-level reading difficulties is affected by phonological awareness skills."
- Kilpatrick, 2015

Clinical Markers of Dyslexia

#2 - Rapid automatized naming weakness

- Defined: the skill of quickly accessing presumably rote information (numbers, letters, colors, objects)
- Directly impacts reading fluency, independently of PA and WM
- Cannot be directly remediated (though sometimes RAN improves when PA and reading overall are intensively treated)
Clinical Markers of Dyslexia

#3 - Phonic decoding weakness

- Difficulties with decoding typically originate from underlying deficits in PA, RAN, or both.
- Weaknesses may be observed in all or some of the following foundational skills:
  - letter identification
  - letter-sound awareness
  - orthographic rules and patterns
  - phonological blending

#4 - Slow / inaccurate sight word identification

- Contrary to widespread belief, sight word identification is not rooted in visual memory and in fact is dependent on advanced phonemic awareness.
- Orthographic mapping: the mechanism for sight word learning; the cognitive process used to store words for immediate, effortless retrieval through application of phonemic awareness, letter-sound knowledge and the alphabetic principle

- Weak phonemic skills leads to difficulty using sounds as anchoring points for the spellings of exception words.
- Skilled reading requires new words to be stored as instantly recognizable wholes after just a few exposures; this does not occur with sufficient efficiency for dyslexic students.
### Clinical Markers of Dyslexia

**#5 - Deficit in reading fluency**

- Weaknesses in decoding and sight word identification result in reduced accuracy and speed in oral and silent reading fluency.
- Reading comprehension is negatively impacted by reduced fluency in early and middle years.
- Over the long term, reading comprehension may also be negatively affected by reduced language growth resulting from limited reading experience.

**#6 - Difficulty with spelling**

- Phonological and orthographic weaknesses result in difficulty spelling phonetically regular words.
- Difficulty with orthographic mapping results in difficulty spelling irregular words.
- Difficulty with spelling often leads to restricted written output, even when the student typically has creative, elaborated ideas in spoken discourse.

**#7 - Average intellectual and language comprehension foundations**

- The dyslexic profile signifies that all of these traits exist in the presence of broadly average IQ and oral language skill.
- When the same traits are observed in the presence of reduced cognitive/linguistic ability, we can diagnose Reading Disability together with Developmental Language Disorder and/or Intellectual Disability.
“Research has shown quite clearly that the factors that prevent poor readers with high IQ scores from developing skilled word recognition are the very same factors that are responsible for poor word-level reading among those with low IQ scores.”

Kilpatrick, 2015

Low IQ… need not affect word-level reading skills because the skills required for word-level reading are not substantially correlated with IQ test scores.

Kilpatrick, 2015

Clinical Markers of Dyslexia
Severity Considerations

- The presence of even “mild” weakness (SS of 80-89) in multiple clinical markers can have a cumulative effect and result in significant reading disability.

- Double deficit dyslexia- characterized by deficits in both PA and RAN; most common subtype of dyslexia; most challenging to remediate.

In double deficit dyslexia both PA and RAN are weak, so both accuracy and speed of word identification will be impacted.
Characteristics NOT considered clinical markers

- Letter reversals and transpositions
- Letters moving on the page
- Unintentionally writing wrong letters
- Visual-perceptual challenges
- Right hemisphere strengths

There are a variety of symptoms reported by some, or even many, dyslexic people that have not been validated by research as statistically significant or representative of unique variance.

Developmental dyslexia vs. Acquired dyslexia

Acquired dyslexia (or alexia) can occur following brain injury or disease when primary language or visual centers are damaged.

- Damage to the visual cortex can result in alexia, a visual processing problem in which letter strings are no longer recognized quickly and easily.
- Difficult to remediate. Intervention likely to focus on compensation.

Developmental dyslexia vs. Acquired dyslexia

- Damage to the language centers (left perisylvan or temporal regions, Broca's area) can result in phonological dyslexia. Often associated with non-fluent aphasia.
- Typically responsive to phonological re-training.
- Damage to the frontal temporal lobe (particularly in progressive dementia) can result in surface dyslexia.
- Therapies focus on linking printed words to meaning, though little evidence available.
Dyslexia and Auditory Processing

Dyslexia

10-20% of the population

Auditory processing disorders

<1-7% of the population

50% of individuals diagnosed with dyslexia are also diagnosed with APD

50% 50%

- APD proponents agree that there are subtypes of the disorder, some of which impact skills that underlie reading & spelling. Others do not necessarily.

- APD problems in decoding, binaural integration, and auditory memory are relevant to phonological processing and thus literacy.

Widely varying views on the nature, role, & measurement of auditory processing skills pose obstacles to drawing strong clinical ties to dyslexia.
Dyslexia and Auditory Processing

A Functional Perspective on the Impact of APD

Phonological challenges  Language challenges  Environmental listening challenges

We have an evidence base for addressing these three facts of APD.

Dyslexia and ADHD / Executive Dysfunction

• IDA estimates that 30% of individuals with dyslexia also have ADHD.

• ADHD alone does not cause significant word level reading problems. Children with ADHD may experience reading fluency difficulties as a result of reduced attention to detail in print.

Dyslexia and ADHD / Executive Dysfunction

• Attention and executive function problems are often implicated in reading comprehension performance, particularly in the middle and high school years.

• Sustained attention and working memory are necessary for recognizing internal cohesion within long texts.

• Self-monitoring (executive skill) is necessary for comprehension monitoring in complex texts.
DYSLEXIA SCREENING

Who gets screened?

- Districts are required to screen all students in grades K, 1 & 2, who exhibit “one or more potential indicators of dyslexia or other reading disabilities.”

- The recommended best practice is universal screening in grades K, 1 & 2, in order to find at-risk students, rather than waiting for indicators to arise.

- Oral language, vocabulary, and phonological problems are potential indicators of reading disabilities.

What should screening tools examine?

<table>
<thead>
<tr>
<th>Grade</th>
<th>Areas</th>
</tr>
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<tbody>
<tr>
<td>K</td>
<td>phonological awareness, phonemic blending and segmenting, RAN, letter-sound knowledge, phonological memory (nonword repetition)</td>
</tr>
<tr>
<td>1</td>
<td>phonemic segmentation and manipulation, RAN, letter-sound knowledge, phonological memory, oral vocabulary, sight word fluency, oral reading fluency (second half of year)</td>
</tr>
<tr>
<td>2 and beyond</td>
<td>word reading, oral reading fluency, reading comprehension</td>
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</tbody>
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Screening Tools

No single screening instrument is going to cover all of the potential indicators at each grade level. Tools will need to be carefully selected to suit the needs of the school and the student, and often combined to form a comprehensive consideration of risk factors.

The Center on RTI has a comparison chart of reading screening tools available here: http://www.rti4success.org/resources/tools-charts/screening-tools-chart

What can SLPs do to help?

- Bring children on your caseload with phonological and/or oral language weaknesses to the attention of the screening team.
- Offer insights into language assessment tools that have brief, reliable measures of PA, RAN, auditory/phonological memory.
- Contribute to evaluation planning when there are any indicators of potential language problems.

The SLP’s Role in Comprehensive Assessment of a Struggling Reader
Comprehensive Assessment

Typically Covered in Psych/Ed Testing
- Intellectual ability
- Letter-sound knowledge
- Decoding
- Word identification
- Reading fluency
- Reading Comprehension
- Spelling
- Written composition
- Writing fluency

What SLPs Can Contribute
- Phonological awareness
- Auditory/phonological memory
- Rapid automatized naming
- Word retrieval
- Exp & receptive language
- Discourse level language skills

Phonological Awareness, Rapid Automatized Naming & Phonological Memory

- Critical components of any evaluation of a struggling reader
- Assessment tools targeting these areas can be administered by psychologists, LDTCs, or SLPs. Who administers measures of these foundations is less important than ensuring they are included in an evaluation plan.

Diagnostic Assessment
- Tasks involving phoneme manipulation have highest sensitivity to reading problems.
- Comprehensive Test of Phonological Processing-2
- Lindamood Auditory Conceptualization Test-3
- Phonological Awareness Test-2 (Substitution)

Ecological Assessment
- Tasks should assess skills across the hierarchy of development in order to inform intervention plans.
- PAT-2
- Criterion-referenced inventories
Comprehensive Assessment
Phonological Awareness

- Research shows that children with PA at or below the 25th percentile experience long term reading difficulties (without phonological intervention).

- Beware “cheating” - use of a visual spelling strategy for phonetically regular words in phonological tasks. Solution - focus on the student’s management of phonetically irregular words.

- Speed - Most PA tests are untimed, but applied PA skills must be fast in order to support literacy. Slow, accurate responses will yield high scores but not reflect the level of PA development needed.

Comprehensive Assessment
Rapid Automatized Naming

- CTOPP-2

- Rapid Automatic Naming and Rapid Alternating Stimulus Tests (RAN/RAS)

Tasks using digits and letters are more valid than tasks using colors and objects, though the latter may be necessary for young children who have not yet mastered letter/number identification.

Comprehensive Assessment
Rapid Automatized Naming

Interpretation of results:

- Students with RAN deficits are likely to have more persistent, long term reading challenges.

- Stronger PA reduces negative impact of RAN, so students with RAN deficits are particularly good candidates for PA intervention.

- Students with RAN deficits are likely to have greater need for functional accommodations.
Comprehensive Assessment
Phonological Memory
- Phonological short term memory (PTSM) is correlated with word-level reading.
- PTSM is subtly different from, but strongly related to, working memory. Students with weak PTSM will likely have WM problems. (WM influences reading comprehension.)
- There is no strong evidence for positive treatment effects on PTSM. Awareness of difficulty in this area should inform how we intervene and accommodate to help the student compensate.

Comprehensive Assessment
Language Skills
- Consider limitations of “oral language” assessment included in general cognitive & achievement batteries.
- Assessment of discourse level language comprehension and verbal expression often offer deeper insights than sentence-level tests.
- Knowledge of narrative structure influences reading comprehension and written expression.
- Single word vocabulary (naming/ID) skills do not always represent semantic reasoning or lexical use in connected production.

General language comprehension will constrain reading comprehension.

Cain & Oakhill, 2007
The SLP’s Role in Comprehensive Intervention for Students with Dyslexia

The Simple View Revisited

Framework for therapy planning

How can language intervention support each of these processes?

For dyslexic students, support for WR is likely the highest priority.

The PA Problem

- PA training is one of the most thoroughly researched and validated interventions we have in language & literacy.
- Efficacy studies of literacy interventions clearly show the largest effect sizes for programs that include PA training.
- PA training is presumed to be a part of structured phonics programs, but is often absent or under-utilized.
- Many teachers do not understand the difference between PA training and phonetic instruction and so do not truly implement it.
- Many dyslexic students never have goals & objectives for PA in their IEPs.

Decades of research, including longitudinal studies, show that PA training yields statistically significant improvements and is a critical component of intervention for students with dyslexia.
Enter the SLP

- SLPs have specific and unique training in the sound structure of spoken language.
- SLPs have specific and unique insights into the nature of speech sounds that are invaluable to individualizing and troubleshooting phonological and phonemic awareness training.
- SLPs can administer PA training to students individually, in small groups, or via collaboration with classroom and support teachers.

What kinds of PA do I teach?

- Teach phonological skills (like rhyming, alliteration, syllabification) only as much as you need to to get your student ready for phonemic awareness.
- Move as efficiently as possible through the hierarchy until phonemic blending and segmenting are possible. Then work intensively at this level. Do not move on before mastery with 5 phonemes.
- With students in 2nd grade and beyond- continue to train through substitution and manipulation levels, until these processes are accurate and efficient.
Instructional Sequence
Phonological Phase

• Sentences into words
• Words into syllables
• Rhyme judgement, matching, and sorting
• Rhyme generation

Syllable Segmentation

The Jaw Trick
Basic premise of the jaw trick- place your hand under your jaw (about a centimeter) and say a word. Each time your jaw hits your hand, that’s one syllable.

Problems with this approach:
1. Not all vowels cause a drop in jaw position
2. We count some vowels as a single syllable when there are actually multiple drops (i.e. select diphthongs and r-controlled vowels)

Solutions:
1. Use words with low vowels (see following chart)
2. Stay away from diphthongs and r-controlled vowels
3. Pair the jaw trick with clapping or tapping to transition away from it once the student has developed an improved awareness of syllable division

Jaw Heights

Vowel Circle Map

[Diagram showing vowel circle map with examples of no drop and usable drop]
Instructional Sequence

Phonemic Phase

- Initial sound matching and sorting
- Initial sound segmentation
- Initial sound generation
- Final sound matching and sorting
- Final sound segmentation
- Final sound generation
- Segmentation of VC and CV words (first words that can be stretched, then words that can’t)
- Segmentation and blending of CVC words
- Segmentation and blending of CCVC and CVCC words

Schuele and Murphy, 2014

Phonemic Awareness Training Activities

Videos & Handouts

PA Goal Development

Step of the staircase + range of complexity + conditions of skill performance + accuracy level

Jeanne will syllabicate words ranging from one to four syllables using blocks as placeholders, with 90% accuracy.

Jeanne will phonemically segment 3-phoneme words without manipulatives with 90% accuracy.
PA Training is a Means, Not an End

• The reason we do PA instruction is to support phonetic reading instruction.
• Make sure the teachers of literacy in your students’ program are applying your great work to phonetic reading and spelling instruction.

Suggested EBP PA Resources

FREE
• Student Center Activities from the Florida Center for Reading Research (http://fcrr.org/resources/resources_sca.html)

Books
• Scheule
• Kilpatrick
• Road to the Code

Comprehensive program
• Lindamood Phoneme Sequencing (LiPS)

Language Intervention

• Delayed mastery of morphology/irregulars
• Discourse-level expressive language (e.g. narrative, explanatory)
• Word retrieval
• Short-term auditory memory (AKA phonological memory)
Assistive Technology—A Simple View

Technology can be a valuable form of accommodation for individuals with dyslexia, though it is never a replacement for intervention.

Functions of AT for Students with Dyslexia

- Providing access to text (e.g. text-to-speech softwares/features)
- Supporting movement of expressive language to print (e.g. speech-to-text software, word prediction software, typing vs. handwriting)
- Identifying and supporting correction of spelling and grammar errors (spelling and grammar checker softwares/features)
- Supporting creation of notes (e.g. recording devices, mind-mapping softwares, multimedia note collection apps)

AT decisions for struggling readers must be informed by the student’s profile.
Students who benefit from text-to-speech have listening comprehension
skills at or above grade level.

“If the text exceeds not only the student’s silent reading ability but also
the student’s listening comprehension ability, text-to-speech will offer little
support.” (Erickson, 2013)

Listening Comprehension is Key!

SLPs are experts in listening comprehension. Assessment
data from a full language evaluation provides valuable input
for AT decisions.

Strong comprehender / Struggling word identifier

- Audio texts that are professionally read are preferred by most students.

- Reader options that access text in web browsers & PDFs should be available on a
  laptop/tablet.

- Consider: Read & Write for Google Chrome or Voice Dream Reader

Vulnerable comprehender & Struggling word identifier

- Text-to-speech support alone may not significantly improve outcomes for a
  student with comprehension vulnerabilities.

- Softwares that provide language-level comprehension supports
  as well as read aloud features should be considered.
The Simple View for Writing, Too

- The same considerations of word-level vs discourse-level skills should be applied to considerations of AT for writing.

- For students with word-level difficulties:
  - Speech-to-text softwares/features
  - Spell check (specialized versions are available)
  - Word prediction

- For students with word and discourse-level difficulties, all of the above plus:
  - Mind-mapping softwares for topic development (e.g. Inspiration)
  - Grammar check (e.g. Ginger, Grammarly)

How else can we help?

- Students need instruction and practice to learn to use the tool effectively.

- The goal of AT for student with Dyslexia is to access and produce language with greater ease.

- Have your students bring their AT to your sessions and integrate use of speech-to-text or text-to-speech (or other) software in your language therapy activities.
We have questions!

Sources & Suggested Reading

Books
• Kilpatrick, David A. Equipped for Reading Success.

Journal Articles
Sources & Suggested Reading

Web-Based Resources

- International Dyslexia Association: dyslexiaida.org
- Become a member and access Perspectives online!
- Fact Sheets make great handouts to parents and colleagues
- Florida Center for Reading Research: fcrr.org
- National Center for Learning Disabilities: ncld.org
- Center on Instruction: centeroninstruction.org
- Coming soon- The New Jersey Dyslexia Handbook (keep an eye on the DOE website)

Contact

Jeanne Tighe, M.A. CCC-SLP, CDP
Beyond Communication, LLC
108 Straube Center Blvd. Suite I3
Pennington, NJ 08534

609.737.3006
www.bcpractice.com
jeanne@bcpractice.com

facebook.com/bcpractice
@TigheJeanne, @BCPractice