DYSLEXIA: DEFINITION, THE RESEARCH BASE, PERSPECTIVES, AND POINTS OF CONTENTION

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My Background

- Reading researcher
- Psychologist
- Teacher educator

What is Dyslexia?

- According to the National Institute of Child Health and Human Development:
  - "Dyslexia is a specific learning disability that is neurological 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 and reduced reading experience that can impede growth of vocabulary and background knowledge."
    - Lyon, Shaywitz, & Shaywitz, 2003, p. 2

Problems with the Concept

- All human functioning is neurological in origin!
- Reading and writing are relatively recent cultural developments – unlike for spoken language, the human brain is not "pre-wired" for literacy acquisition.
- The process of learning to read involves neurological changes as connections between printed and spoken words are made.

Problems with the Concept

- For individual children it is virtually impossible to determine whether their reading difficulties are neurological in origin.
  - Autopsies
  - Twin Studies
  - Brain Scans
- Individuals can experience word reading difficulties for a variety of reasons.
- Criteria for diagnosis are inconsistent across districts, states and countries.

How is Dyslexia Identified?

- According to Vellutino, Fletcher, Snowling, & Scanlon (2004)
  - In the research literature, there is little agreement about how dyslexia should be defined/diagnosed. None of the existing theories provide "a clear-cut, definitive, and unequivocal set of diagnostic criteria that would pinpoint the ultimate (neurobiological) origin of the child's reading difficulties" (p. 28).

What is the difference between dyslexia, (specific) reading disability, and reading difficulties in general?

- In the research literature, the terms dyslexia and reading disability tend to be used interchangeably.
- Until 10-15 years ago, the distinction between reading disability/dyslexia and poor reading was based on the existence of an IQ-Achievement discrepancy.
  - Research leading to the adoption of RtI as a diagnostic criterion for LD demonstrated that the IQ – Achievement discrepancy was unrelated to students' response to remedial efforts.
- Today, limited response to instruction/intervention(s) is often the criterion used to place readers in the disabled/dyslexic category.

How Prevalent are Dyslexia/Severe Reading Difficulties?

- Several estimates suggest that as much as 20% of the population is dyslexic
  - International Dyslexia Association
  - NICHD (2007)
  - Shaywitz (1996)
- Other estimates and research evidence suggest that most long-term reading difficulties can be prevented through early and appropriately intensive intervention.
  - Only 1% to 3% of children who demonstrate early difficulties may demonstrate long term difficulties when provided such supports.

Reading Disability is a More Inclusive Term than Dyslexia

- The reading disabled population is heterogeneous:
  - Some individuals experience difficulty with word identification/word learning
    - These are the individuals who are likely to be identified as dyslexic
    - They are likely to experience difficulty with comprehension BECAUSE of word identification problems.
  - Some experience difficulty with comprehension only
  - Some have difficulties with both word identification and comprehension

Instructional Implications of Heterogeneity among Students with Reading Difficulties

- What works for some doesn't work for others.
- No one instructional approach is the ideal for all.
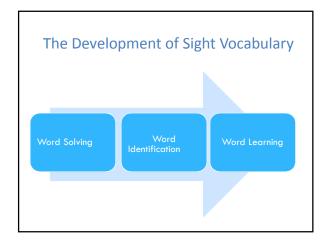- Instruction needs to be responsive to the students' current capabilities.

Despite the Protestations of Certain Advocacy Groups, No Approaches to Instruction Have Been Found to be Universally Effective

- Shaywitz, Morris, and Shaywitz (2008) state "Evidence is not yet available that would allow the selection of one specific program over others or to support the choice of an individual program that would be specifically more beneficial to particular groups of dyslexic readers" (p. 463).

There are Multiple "Treatments" for Dyslexia for which there is No Evidence of Effectiveness

- Perceptual-motor training – intended to address issues related to neural circuitry in the brain
- Visual training
  - Eye–tracking training
  - Prisms
  - Scotopic sensitivity training – Irlen lenses
- Auditory interventions
  - Fast ForWord – Auditory temporal processing – purports to treat language and reading difficulties.

What Works for Struggling Readers?

- Students who have difficulty learning to read words benefit from explicit instruction in phonemic awareness and phonics.
- Most words that students learn to read are learned through effective word solving while reading.
  - Students need to be taught how to apply their phonics skills in context, in combination with information provided by the context.
  - They need to read a lot in texts that provide some but not too much challenge.

The Development of Sight Vocabulary

Word Solving → Word Identification → Word Learning

Phonemic Awareness and Skill with the Alphabetic Code are Not Enough

- The English writing system is filled will spelling irregularities that make it difficult, using phonics knowledge alone, to accurately identify a large proportion unfamiliar words encountered in context.
- Developing readers need to learn to use context to direct and check their initial hypotheses about the identity of unfamiliar words.

What is the Research Evidence in Support of the Most Widely Touted Approaches to Treating Dyslexia/Reading Disability?

- The National Reading Panel found only four studies using the Orton-Gillingham approach that had sufficient methodological rigor for inclusion and only two demonstrated positive effect sizes.
- Vaughn and Linan-Thompson (2003) say research has "offered no compelling evidence" (p. 142) that a multisensory approach can benefit children with reading difficulties.
- Brooks, 2007 and Singleton, 2009 - suggest a generally favorable value for structured programs that emphasize phonological skills but identify little evidence of a particular contribution of multisensory aspects.

Does it make sense to try to differentiate between "dyslexics" and others who struggle with reading?

- Would it make a difference in instructional planning?
  - Not that we can tell.
- Should we do away with the label reading disability/dyslexia?
  - Not until we get better at preventing reading difficulties.
  - In the current system, such classifications entitle students to access to support services.

Compensated Dyslexics?

- Are students who respond well to intervention:
  - False positives? (Meaning they were wrongly identified as having reading problems.)
  - Or, compensated dyslexics? (Meaning they are and always will be dyslexic – but they have learned to compensate for their difficulties.)

Common Myth Related to Dyslexia

- Dyslexics "see" things backwards.

b   p

d   q

Addressing Letter and Word confusions in the Interactive Strategies Approach
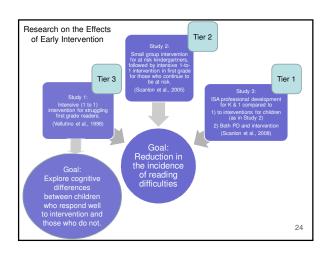
B b
D d

Points of Disagreement among Educational Professionals

- Dyslexics have special talents.
- Fifteen to twenty percent of the population is dyslexic.
- Dyslexics require an explicit, systematic, multi-sensory program in order to learn to read.
- Dyslexia is different from poor reading (garden variety reading difficulties)

Points of Agreement among Educational Professionals

- Some children experience difficulties in literacy acquisition.
  - Sometimes extreme difficulties
- Genetic factors contribute to some literacy learning difficulties.
- Many literacy learning difficulties can be traced to instructional factors.

Research by Scanlon, Vellutino and Colleagues Related to Reading Difficulties and Prevention of Reading Difficulties

Research on the Effects of Early Intervention

Tier 2

Study 2:
Small group intervention for at risk kindergartners, followed by intensive 1-to-1 intervention in first grade for those who continue to be at risk.
(Scanlon et al., 2005)

Tier 3

Tier 1

Study 1:
Intensive (1 to 1) intervention for struggling first grade readers.
(Vellutino et al., 1996)

Study 3:
ISA professional development for K & 1 compared to
1) to interventions for children (as in Study 2)
2) Both PD and intervention
(Scanlon et al., 2008)

Goal:
Reduction in the incidence of reading difficulties

Goal:
Explore cognitive differences between children who respond well to intervention and those who do not.
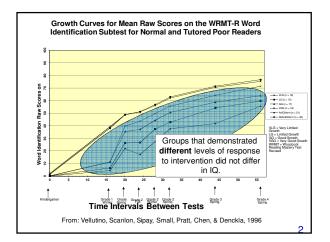
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Logic for Vellutino et al. 1996:

- ☐ Distinguish between children whose reading difficulties are (apparently) attributable to experiential vs. basic cognitive factors
- ☐ Compare the cognitive characteristics of children who respond well to intervention vs. those who do not.

Study 1 Design/Procedures

- ☐ Conducted in middle/upper middle class schools
- ☐ Longitudinal measurement of literacy, language and other cognitive skills in grades K – 4
- ☐ Identification of children with poor reading skills in mid-first grade
- ☐ Random assignment to intervention (tutoring) and comparison groups
- ☐ Implementation of daily 1-to-1 tutoring
  - ☐ January to June of first grade for all intervention students
  - ☐ September to January of second grade for children who continued to struggle.

Growth Curves for Mean Raw Scores on the WRMT-R Word Identification Subtest for Normal and Tutored Poor Readers

Word Identification Raw Scores on

Time Intervals Between Tests

Groups that demonstrated **different** levels of response to intervention did not differ in IQ.

VLG = Very Limited Growth
LG = Limited Growth
GG = Good Growth
VGG = Very Good Growth
WRMT = Woodcock Reading Mastery Test Revised

From: Vellutino, Scanlon, Sipay, Small, Pratt, Chen, & Denckla, 1996

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Selected Findings from 1996 Study:

S.28

- ☐ Child characteristics, measured at kindergarten entry, that predicted first grade reading performance:
  - ☐ Letter identification (letter naming)
  - ☐ Phonemic awareness (sorting by sound similarities)
- ☐ Characteristics that did not predict first grade reading performance:
  - ☐ Age at K entry
  - ☐ Measured intelligence

Selected Findings from 1996 Study:

S.29

- ☐ Most children who qualified for intensive intervention in first grade:
  - ☐ Showed rapid growth in reading skills during the intervention period.
  - ☐ Maintained their status relative to peers after the intervention was concluded.
- ☐ 15% of the children who qualified for intensive intervention continued to demonstrate serious difficulties despite the intervention.

Selected Findings from 1996 Study:

S.30

- ☐ Comparisons of groups that showed rapid growth during intervention and those that showed little growth revealed:
  - ☐ Little or no difference on measures of IQ, syntactic, semantic and visual processing abilities
  - ☐ Large differences on measures of phonologically based skills pre and post intervention

Logic for 2005 Study:

- Intensive one-to-one intervention is time consuming and expensive, so...
  - Need to reduce the number of children who qualify for such intervention
- Need to try to reduce the number of children who continue to struggle despite intensive intervention
- Prediction studies indicated that it is possible to predict, at kindergarten entry, which children are at risk for experiencing early reading difficulties.
- Classroom observation studies indicated that the likelihood of an at risk child demonstrating reading difficulties depended on characteristics of the language arts program in kindergarten.

2005 Study - Purposes/Goals:

- Reduce the number of children who qualify as poor readers in first grade by providing small group intervention kindergarten
- Reduce the severity of reading difficulties by beginning intervention efforts early in kindergarten
- Evaluate the relative benefits of emphasizing different aspects of early literacy instruction

2005 Study Design & Procedures:

S.33

- Conducted in lower-middle/middle class schools
- Longitudinal measurement of literacy and literacy-related skills K – 3
- Identified at-risk children at kindergarten entry
  - Letter identification
- Randomly assigned at-risk kindergartners to Intervention or Comparison groups
- Provided small group intervention in kindergarten
- Identified children continuing to struggle at the beginning of first grade
- Randomly assigned struggling first graders to one of two intervention conditions or a control (BAU) condition

2005 Study – Kindergarten Intervention

S.34

- Small group
  - 3 children
  - Usually from the same classroom
  - Grouped by skill level
    - With periodic regrouping if needed/possible
- Half hour lessons, twice each week
- Taught by certified teachers who were provided with an initial professional development workshop and periodic collaboration and coaching
- Fidelity encouraged via audio recordings of lessons.

2005 - Kindergarten Intervention:

S.35

- Instruction was based on the Interactive Strategies Approach (ISA) and guided by several foundational principles including:
  - Children who struggle need explicit guidance in order to understand how the writing system works.
  - Children learn to read and write by having the opportunity to read and write (with explicit modeling and guidance).
  - Children need to understand that the purpose of written language (like spoken language) is communication.
  - Children need to learn to be strategic and active readers and writers.

2005 Study - Kindergarten Intervention:
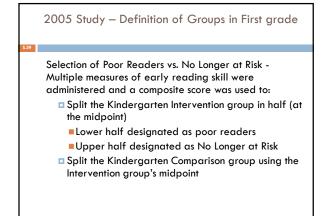
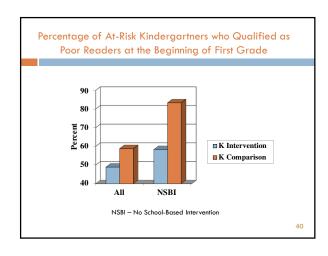S.36
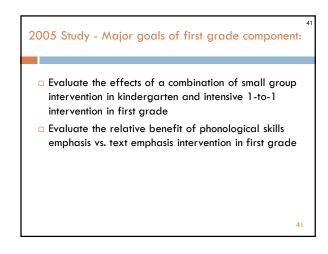
- Kindergarten lessons were developed for each group individually based on:
  - Informal, ongoing assessment of the children's skills and competencies
  - Characteristics/expectations of the classroom language arts program
    - Kindergarten intervention supported children in developing the skills and utilizing the resources available in their classroom language arts program
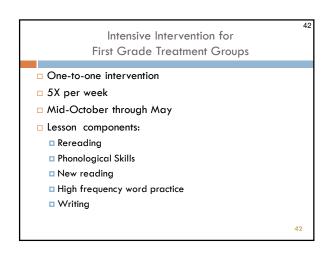
2005 Study –
Kindergarten Lesson Format:

S.37

- □ Reading to and with children
  - ■ Application of skills and strategies
- □ Development of phonemic analysis skills
- □ Letter & word work
- □ Writing
  - ■ Application of skills and strategies
- □ High frequency word practice

2005 Study – End of Kindergarten Outcomes

S.38

- □ At the end of kindergarten, the intervention and comparison groups differed on virtually all of the outcomes assessed, except
  - ■ Letter naming – ceiling effect

2005 Study – Definition of Groups in First grade

S.39

Selection of Poor Readers vs. No Longer at Risk - Multiple measures of early reading skill were administered and a composite score was used to:

- ■ Split the Kindergarten Intervention group in half (at the midpoint)
  - ■ Lower half designated as poor readers
  - ■ Upper half designated as No Longer at Risk
- ■ Split the Kindergarten Comparison group using the Intervention group's midpoint

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Percentage of At-Risk Kindergartners who Qualified as Poor Readers at the Beginning of First Grade

NSBI – No School-Based Intervention

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2005 Study - Major goals of first grade component:

- □ Evaluate the effects of a combination of small group intervention in kindergarten and intensive 1-to-1 intervention in first grade
- □ Evaluate the relative benefit of phonological skills emphasis vs. text emphasis intervention in first grade

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Intensive Intervention for
First Grade Treatment Groups

- □ One-to-one intervention
- □ 5X per week
- □ Mid-October through May
- □ Lesson components:
  - ■ Rereading
  - ■ Phonological Skills
  - ■ New reading
  - ■ High frequency word practice
  - ■ Writing

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Slide 43

Comparisons among Six Groups
(2 kindergarten conditions X 3 first grade conditions).

**Basic Skills Cluster of the Woodcock
Reading Mastery Test - Revised
September Grade 1**

Legend: G1 TE, G1 PSE, G1 Comp

X-axis: K Intervention, K Comparison
Y-axis: Standard Scores (60, 80, 100, 120)

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Slide 44

End of first grade results for Poor Reader groups
(TE = Text Emphasis, PSE = Phonological Skills Emphasis, Comp = Comparison)

Percent scoring BELOW the 15th percentile at the end of first grade

Percent scoring ABOVE the 50th percentile at the end of first grade

Legend: G1 TE, G1 PSE, G1 Comp

Note: The children who had intervention as kindergartners and still qualified for intervention as first graders might be considered to be "harder to remediate." Nevertheless, as a group, they performed better than the kindergarten comparison groups at the end of first grade.
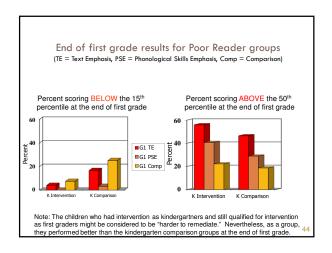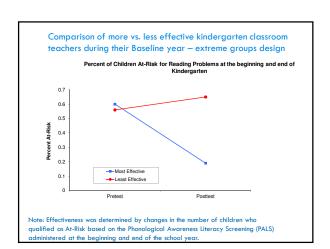
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Selected Findings from 2005

- At the beginning of first grade, fewer children from the kindergarten intervention group qualified for intensive intervention
- The two first grade intervention conditions
  - Had similar 'average' outcomes – both significantly better than the BAU comparison group
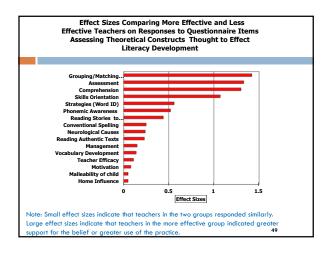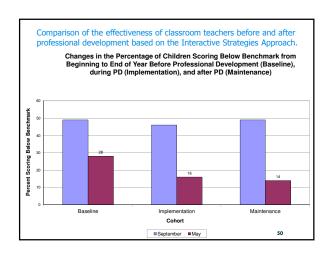 - Yielded different distributions

2008 Study - Logic

- Classroom instruction plays a powerful role in early literacy learning – so need to:
  - Explore the characteristics of early elementary classrooms that are differentially effective
  - Attempt to enhance the quality of classroom instruction – through professional development
  - Compare the relative effectiveness of
    - Professional development for teachers
    - Direct interventions for students
    - Professional development for teachers PLUS interventions for children
  - Focus on the children at risk for literacy learning difficulties

2008 Study - Design

- Conducted in schools serving high proportions of children eligible for free/reduced-price lunch
- Random assignment at the level of the school
- Classroom teachers in K & 1 followed longitudinally as they taught three cohorts of incoming kindergartners
  - Baseline cohort
  - Implementation cohort
  - Maintenance cohort
- Children followed longitudinally from kindergarten entry to the end of second or third grade

Slide (Comparison)

Comparison of more vs. less effective kindergarten classroom teachers during their Baseline year – extreme groups design

Percent of Children At-Risk for Reading Problems at the beginning and end of Kindergarten

Legend: Most Effective, Least Effective

X-axis: Pretest, Posttest
Y-axis: Percent At-Risk (0 – 0.7)

Note: Effectiveness was determined by changes in the number of children who qualified as At-Risk based on the Phonological Awareness Literacy Screening (PALS) administered at the beginning and end of the school year.

Effect Sizes Comparing More Effective and Less Effective Teachers on Responses to Questionnaire Items Assessing Theoretical Constructs Thought to Effect Literacy Development

Note: Small effect sizes indicate that teachers in the two groups responded similarly. Large effect sizes indicate that teachers in the more effective group indicated greater support for the belief or greater use of the practice.

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Comparison of the effectiveness of classroom teachers before and after professional development based on the Interactive Strategies Approach.

Changes in the Percentage of Children Scoring Below Benchmark from Beginning to End of Year Before Professional Development (Baseline), during PD (Implementation), and after PD (Maintenance)
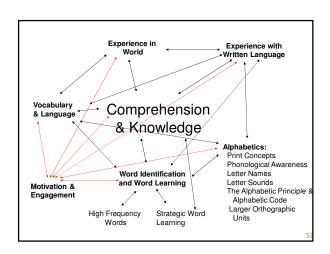

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Across Studies – Selected Outcomes/Conclusions

- ☐ Classroom/core instruction has a large impact on students' early literacy development
- ☐ Professional development for teachers can help them to reduce the number of children who experience difficulties
- ☐ Small group instruction beyond the classroom can accelerate students' literacy learning
- ☐ Intensive one-to-one instruction can accelerate the progress of children who do not respond well to small group instruction
- ☐ The mix of skills focused and more wholistic instruction needs to be responsive to the students' developing abilities.

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Preventing Reading Difficulties vs. Treating Reading Difficulties

- Early intervention reduces the number for children who demonstrate long-term reading difficulties.
- Intervention in the early primary grades is more effective in reducing the incidence of serious reading difficulties than intervention provided in the middle elementary grades and beyond.
  – We need to close the gaps in literacy skill early before they grow and become disabling.

Conclusions Based on Research

- Most reading difficulties related to word reading skills can be prevented through effective instruction provided by classroom and intervention teachers in the early grades.
- There is no evidence to support the claim that scripted programs based on Orton-Gillingham-type (multi-sensory) instruction is more effective than other approaches to instruction or intervention.
- Teacher knowledge and practice is an important determinant of literacy learners' development – especially for those who demonstrate the weakest skills.

What is the Utility of the Concept of Dyslexia/Reading Disability?

- On the upside:
  - It helps to convey that reading and writing difficulties are not due to low intelligence.
  - Students with a documented learning disability are eligible for extra supports that MAY help them succeed in school.
- On the downside:
  - Such a designation has the potential to lower expectations among students, parents, and teachers.
  - Students who are identified as dyslexic/reading disabled are likely to develop a belief system about themselves makes them disinclined to engage in reading.
    - Thereby slowing their growth as readers

Thanks for your interest in this important topic.