TEXAS CENTER for LEARNING DISABILITIES

Learning for SUCCESS
www.texasldcenter.org

The Texas Center for Learning Disabilities (TCLD) investigates the classification, early intervention, and remediation of learning disabilities.

Problemas de aprendizaje: de la identificación a la intervención

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X Congreso Argentino de Neuropsicología Sociedad de Neuropsicología de Argentina
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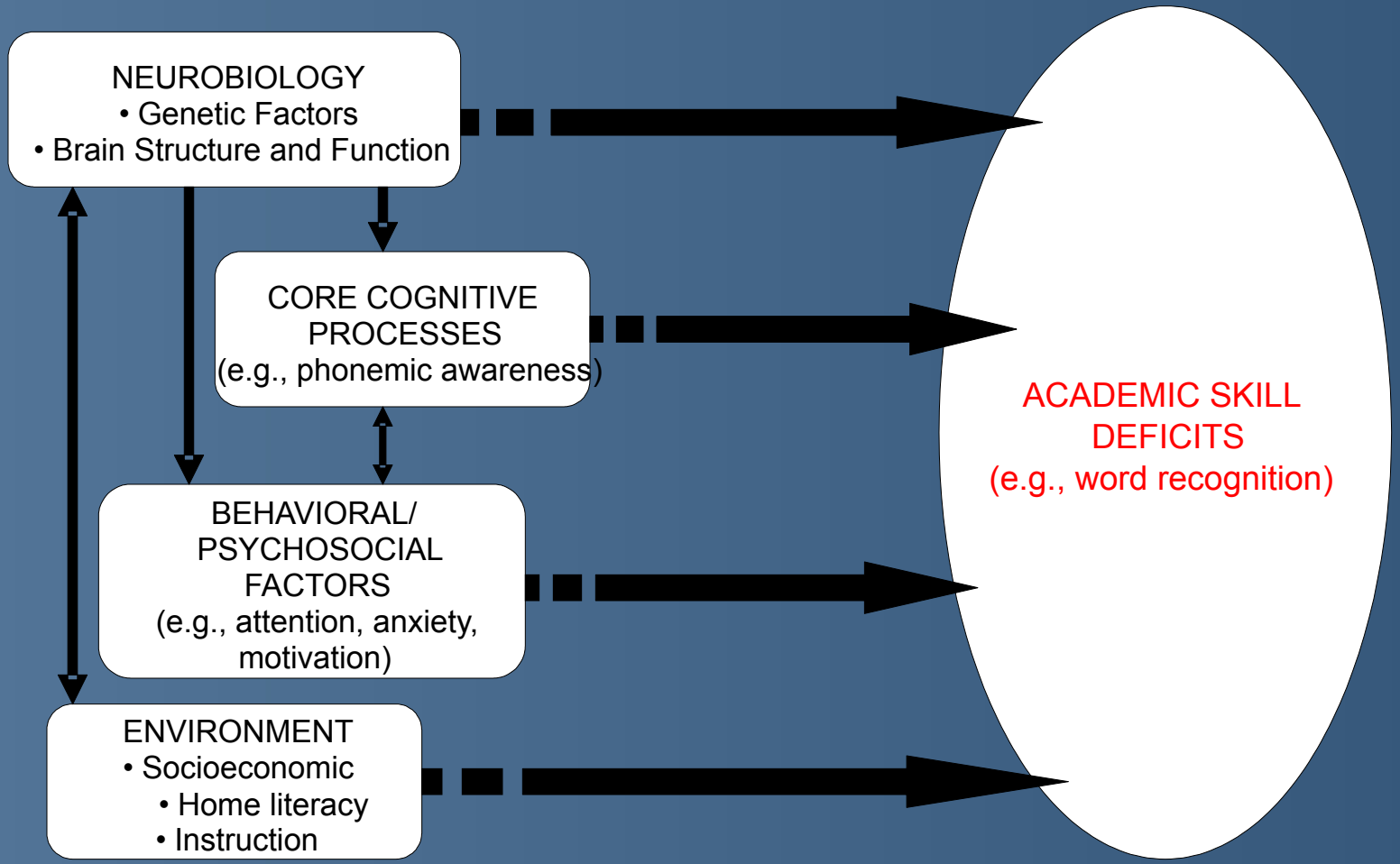
A Comprehensive (Instructional) Model of LD (Fletcher, Lyon, Fuchs, & Barnes, 2007)



Academic Skills Deficits are Necessary but Not Sufficient

- Homogeneity is at the level of the academic skill
- Processing subtypes duplicate academic subtypes because they are correlated deficits and don't explain independent variability
- Define academic subgroups based on inherently arbitrary criteria tied to a dimension
- Leads to coherent classification that is reliable and valid
- Simplifies identification process; fueled research in other domains
- Instruction first and then identification: add intractability

Triangle Approach to Identification: Instructional Model of LD

- Specify Low Achievement
- Evaluate Instructional Response
- Apply the Exclusions

Children with LD are hard to teach, not unable to learn. Current concepts emphasize intractability to standard instructional approaches

Hypothetical Classification of LD: Marker Variables involving:

- 1. Word Recognition (Dyslexia)
- 2. Reading Fluency
- 3. Reading Comprehension
- 4. Math Computations (Dyscalculia)
- 5. Math Problem Solving
- 6. Written Expression (Handwriting, Spelling, Text Generation?)

Occur in isolation and concurrently, but basis for defining samples and interventions

Core Cognitive Processes

- Vary with academic domain
- Supports validity of the hypothetical classification
- Do not require assessment for identification, but do represent precursors
- Don’t add value to intervention (no aptitude X treatment interaction)
- Do help understand neural mechanisms and essential for comprehensive understanding of LD

Connor: ATI studies for cognitive achievement, not cognitive processes

- Code vs. meaning-focused instruction *interacts* with child characteristics: providing more code- focused instruction for students weak in word reading and mode meaning-focused instruction to students weak in vocabulary/comprehension resulted in significantly higher reading comprehension scores compared to controls

Connor et al., *Science*, 2007, 315, 464-5.

Behavioral/Psychosocial Factors

- Comorbid associations, especially ADHD
- Experience of failure
- Reaction of peers and family
- Motivation

Major source of heterogeneity in research and practice. Must be assessed in order to plan treatment, but not part of identification.

Neurobiological Factors

- Reading, math, and writing are heritable traits, but individual gene effects small
- In reading, heredity accounts for 50- 80% of variance in outcomes
- No genes specific to poor development (e.g., no dyslexia genes)
- Strong understanding of neural systems, which are malleable and mostly normalizing
- Field is moving away from "bad- gene, bad brain" theory to the idea of genes that make brains at risk and risk is modified by environment
- No simple biological test for LD

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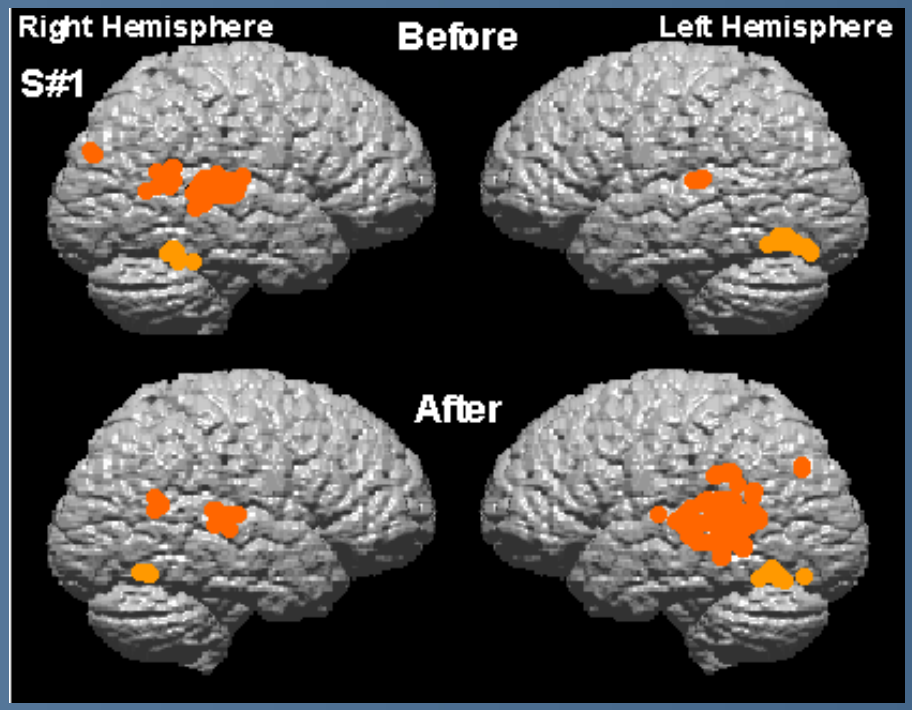
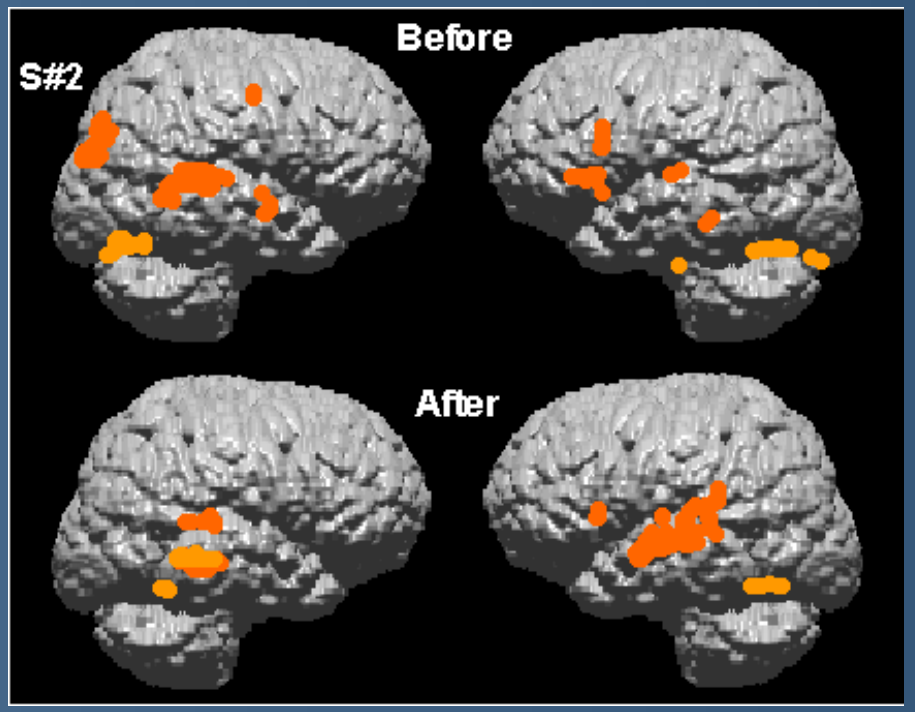
Neural Response to intervention; (Simos et al., 2002)





Environmental Factors

- Home environment and quality of language
- Socioeconomic factors: parental education, economic disadvantage
- Instruction

Word Level Reading Difficulties

Most common and best understood form of LD (Dyslexia)

- A common problem: Largest single group of students with LD in North America
- Almost 2/5 of all children identified for special education
- Many children not identified for special education have word level difficulties

Intervention: Word Recognition

- Teach word level skills in the context of an approach that includes comprehension and fluency components
- Prevent word recognition problems because remediation is difficult
- Even older students and adults can be taught word recognition if the approach is sufficiently intense (but normalization is difficult)

Word Reading: Multiple Meta-Analyses

- Lipsey and Wilson (1993) Average ES = .34 for educational interventions; Stuebing et al., JEP, 2008:small ES (.20) improve lots of kids
- Swanson (1999) .57 for word reading in LD
- NRP: .98 K-2; .49 G2-6 for word reading in poor readers
- Similar effects in multiple studies of children identified with word reading problems
- Effects stronger if programs more comprehensive, begin earlier, last longer, in smaller groups with more intensity, and focus on reading; smaller for fluency and comprehension, esp. if remedial

Early Development of Reading Skills: A Cognitive Neuroscience Approach (Jack M. Fletcher – PI)

Early Reading Intervention (Mathes et al., RRQ, 2005; Denton et al., 2007)*

Brain Activation Patterns (Simos et al., NP, 2005; 2007; JLD, 2007)

The Core Sample

Children – sampled across 2 years (2001- 2002)

- 300 At-Risk Readers - assigned randomly to intervention in Grade 1
- 100 Low Risk Readers

Teachers

- 6 Intervention teachers (tier 2)
- 30 General Education 1st-grade Teachers (tier 2)

Schools

- 6 elementary schools in a large urban school district
- (91% minority; 82% low socioeconomic status)

The Interventions

Enhanced Classroom Instruction

- District provided extensive professional development and new materials
- All children identified as at-risk for principal, teachers, and parents
- Progress monitored with feedback to principal, teachers, and parents

Supplemental Instruction

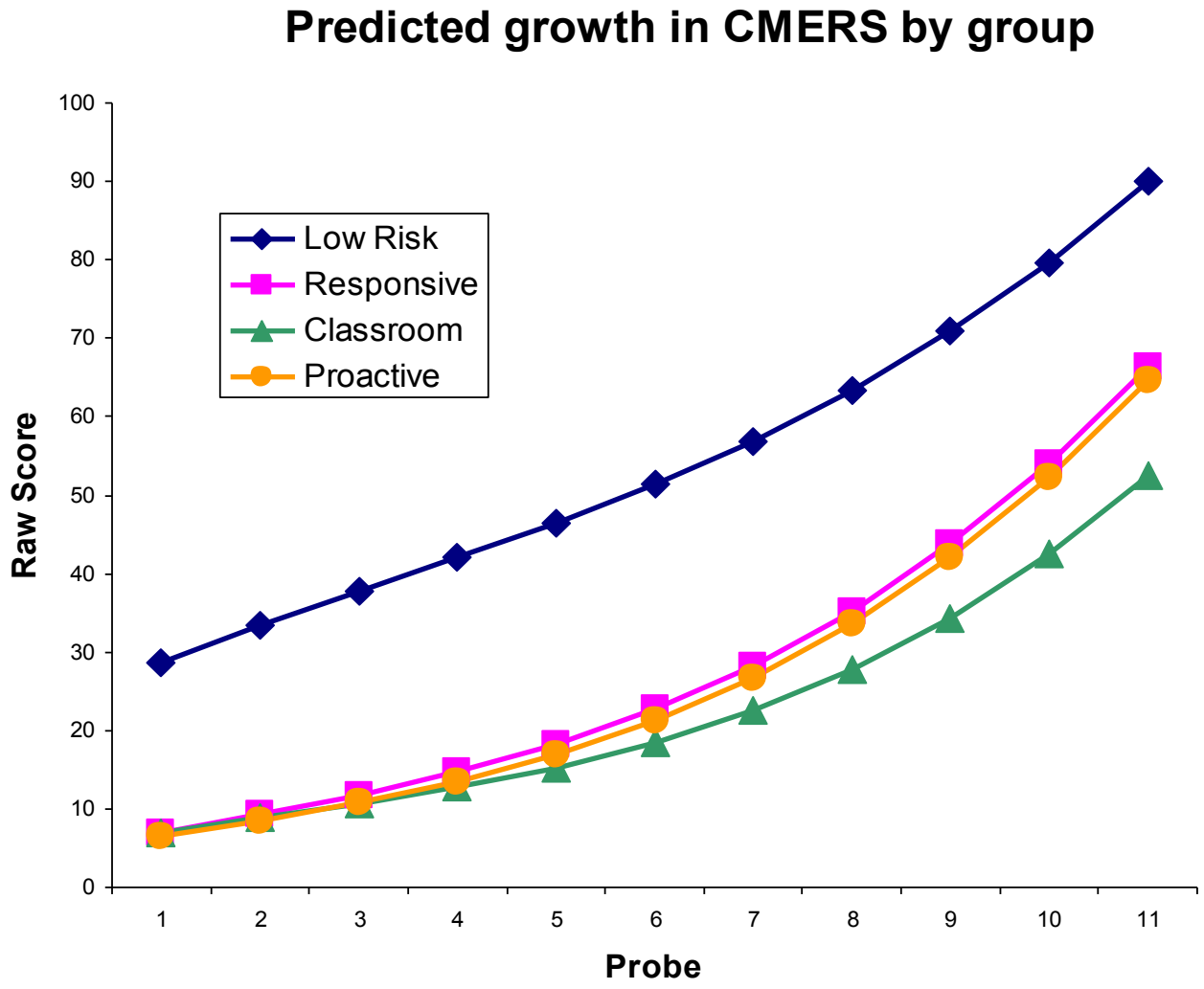
- Some children also received an additional 40’ of daily small group instruction for 30 weeks

Proactive Intervention (Mathes, Torgesen)

- Explicit instruction in synthetic phonics, with emphasis on fluency.
- Integrates decoding, fluency, and comprehension strategies.
- 100% decodable text
- Carefully constructed scope and sequence designed to prevent possible confusions.
- Every activity taught to 100% mastery everyday.

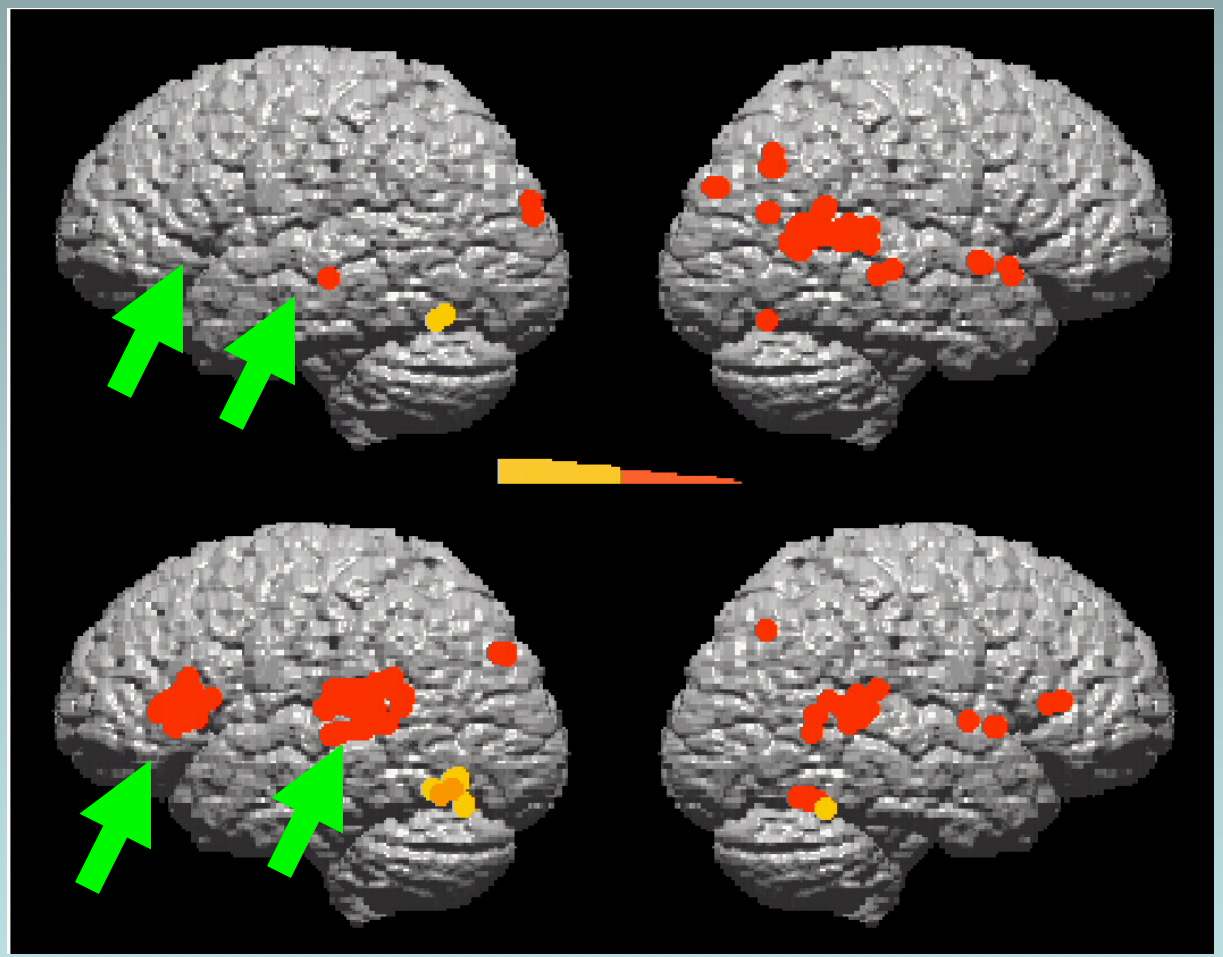
Responsive Intervention (Denton)

- Explicit instruction in synthetic phonics and in analogy phonics
- Teaches decoding, using the alphabetic principle, fluency, and comprehension strategies in the context of reading and writing
- No pre-determined scope and sequence
- Teachers respond to student needs as they are observed.
- Leveled text not phonetically decodable


Predicted growth in CMERS by group
Raw Score
Probe
Low Risk
Responsive
Classroom
Proactive
0
10
20
30
40
50
60
70
80
90
100
1
2
3
4
5
6
7
8
9
10
11

Left Right

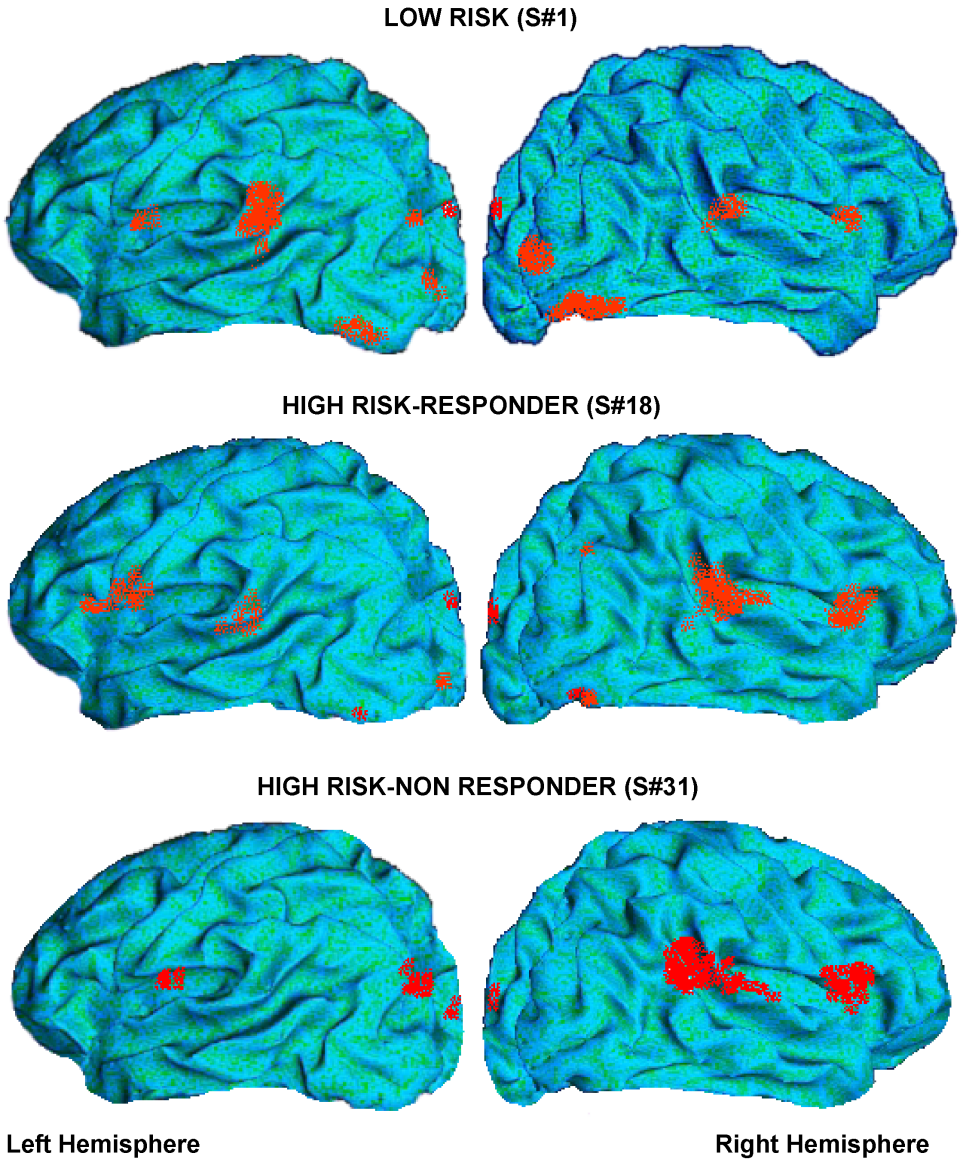
Kindergarten



First Grade

Simos et al., *Journal of Child Neurology,* 2002
Simos et al., *Neuropsychology,* 2005

Simos et al., NP, 2005



What percentage of children don't respond adequately to quality intervention?

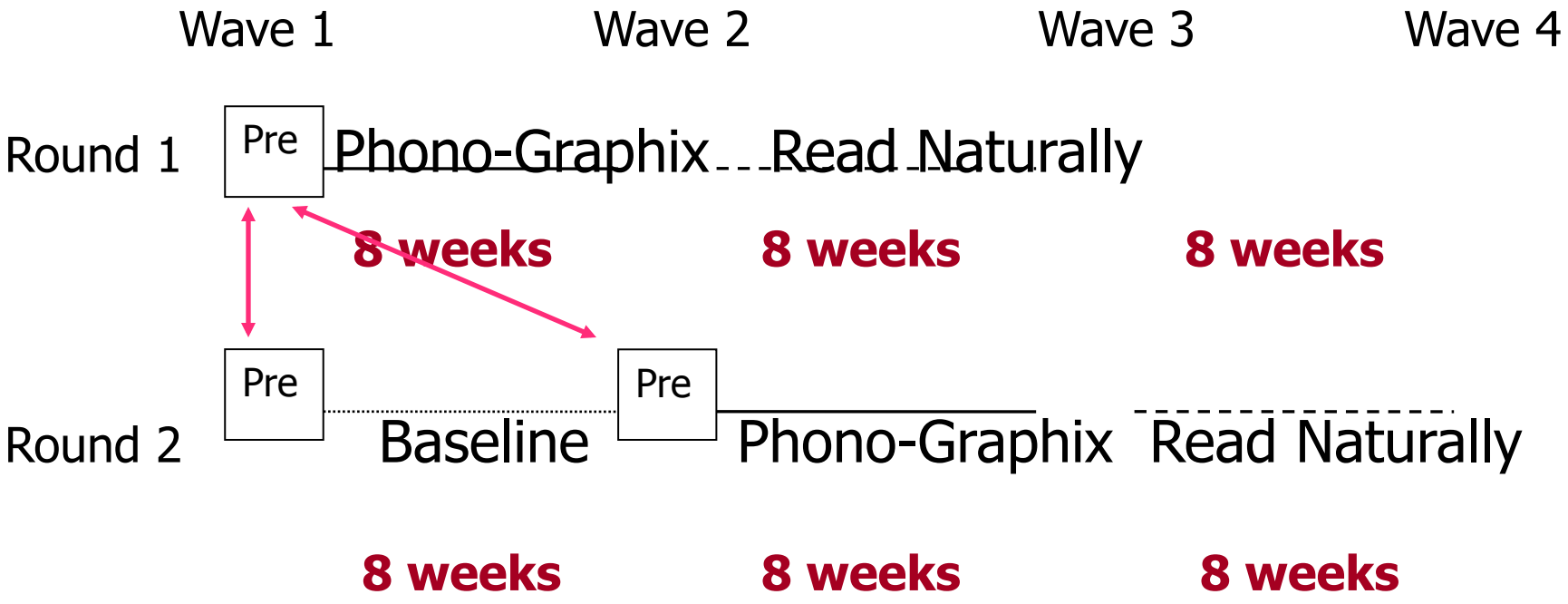
Enhanced classroom only: 15/92 = 16% (3.2% of school population)

Enhanced classroom and tutoring: 7/165 = 4% (<1% of school population)

(Woodcock Basic Reading < 30th percentile)

- **5 more students if fluency/comprehension criteria are used**

Denton et al. (JLD, 2007)



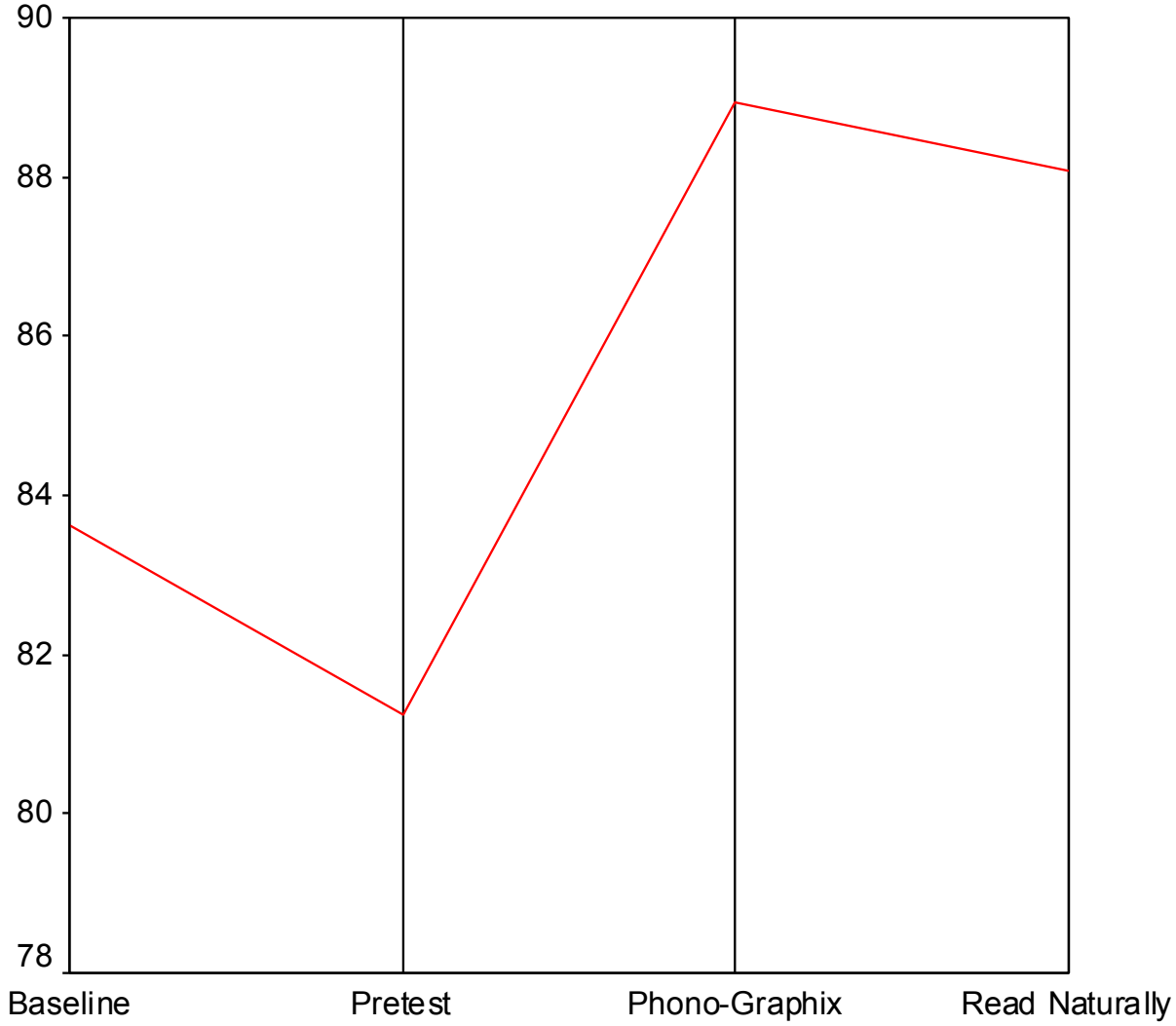
Phono-Graphix (McGuiness et al., 1996): 2 hours per day X 8 weeks

- Designed to teach reading and spelling by teaching the nature of the written code
- Teaches that letters and letter-combinations are pictures of sounds
- Includes manipulation of letter and word cards
- Lots of repetition and practice
- Students read decodable text
- Full week of rigorous training (same certified teachers who provided secondary interventions)

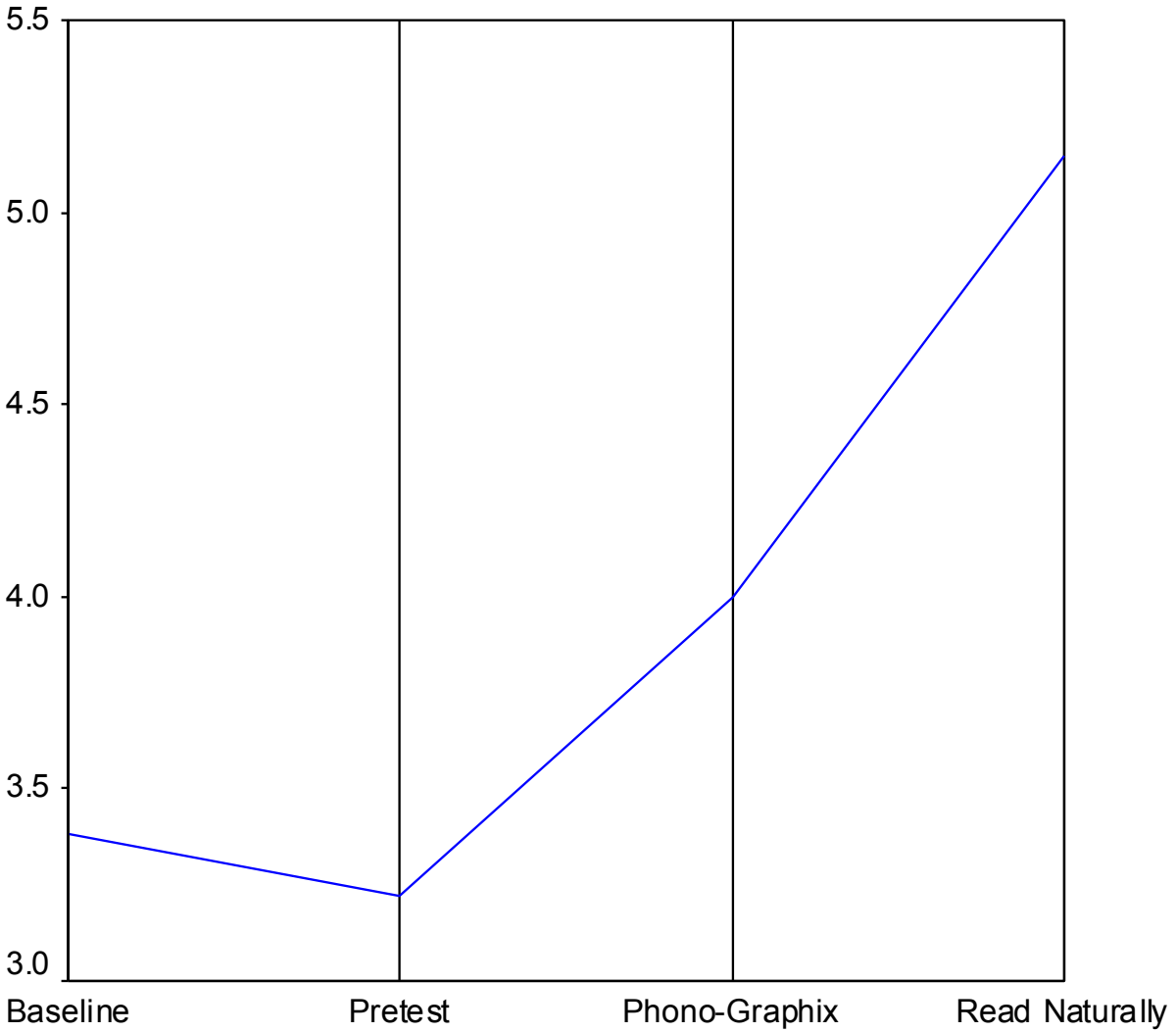
Read Naturally (Ihnot, 1992): 1 hour per day X 8 weeks

- Designed to promote oral reading fluency
- Nonfiction passages at grade levels 1 through 8
- Students:
  - Practice oral reading of short, interesting passages (repeated reading)
  - Read along with an audio tape recorded at a pace that is reasonably challenging
  - Time their readings and graph their fluency rates (Students and teachers are aware of even small increments of progress.)
  - Answer comprehension questions and discuss the passages with the teacher

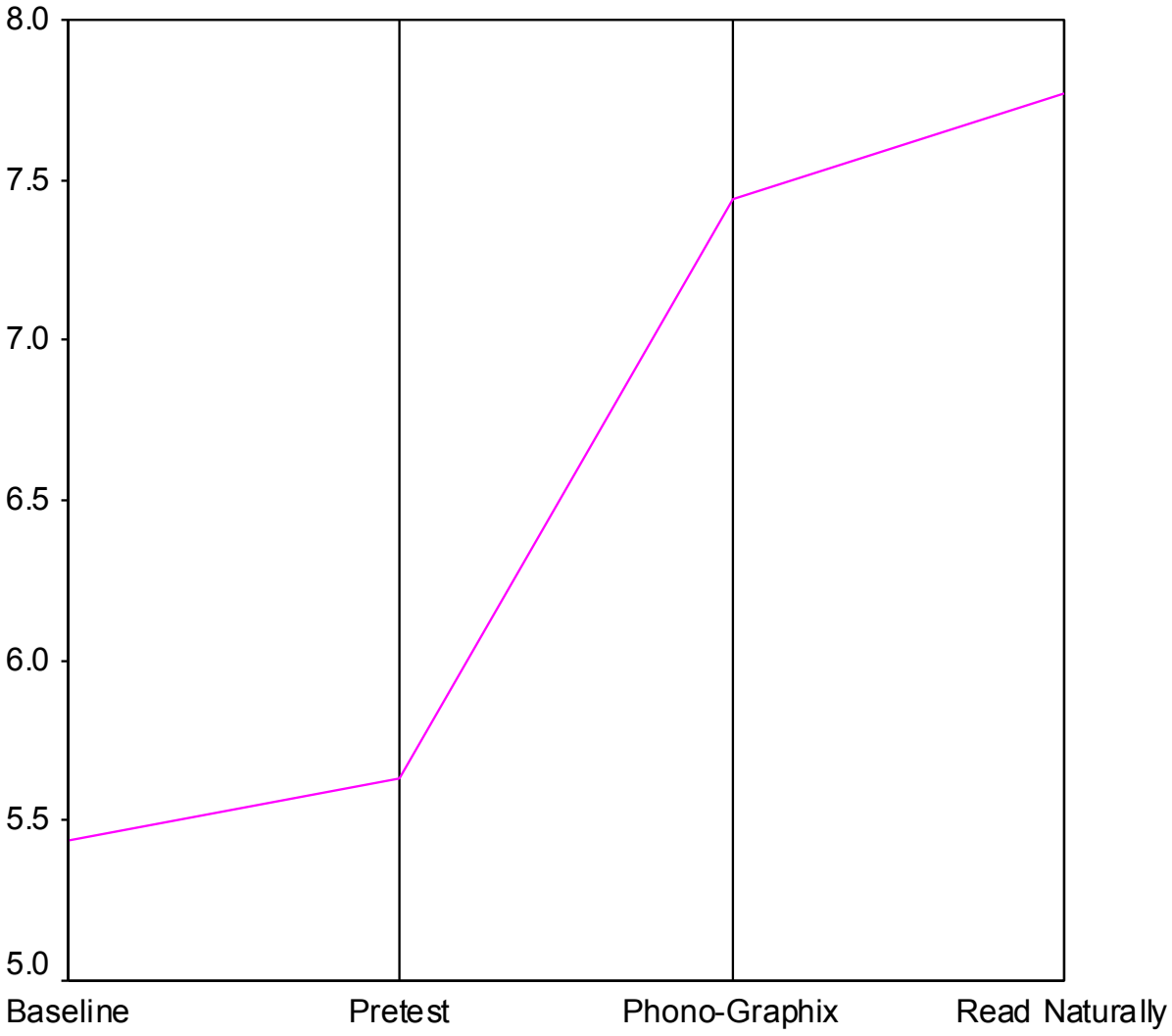
Woodcock-Johnson III Basic Skills Standard Scores



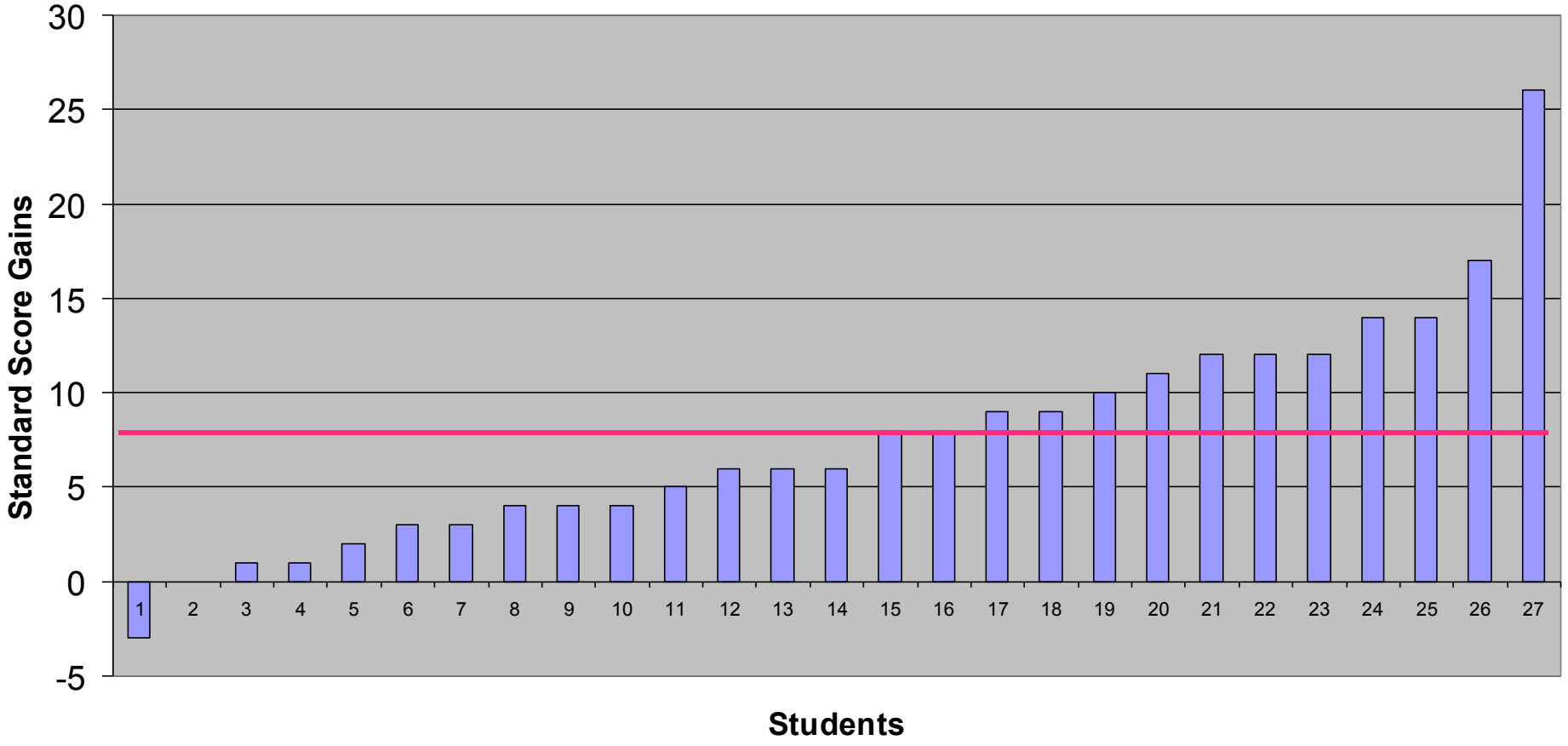
Gray Oral Reading Test Fluency Standard Scores



Gray Oral Reading Test Comprehension



Gains in Basic Skills Standard Score Points During 16-Week Intervention



Why is Remediation of Word Level Skills Difficult?

- Students who don't master word level skills early are delayed in their ability to access print
- Leads to lack of opportunity, which impacts experiences needed to develop automaticity
- Fluency problems emerge
- Reading is frustrating; leads to avoidance and compounding of the lack of engagement
- Motivation and interest never emerge
- Matthew effect: rich get richer and poor get poorer

Reading Fluency Difficulties

- Rate deficit in children who are accurate word readers- often after intervention
- Related to poor automaticity of word reading skills – an outgrowth of word recognition (inadequate development of sight word vocabulary)

Current Perspectives

Fluency is partly an *outcome* of word recognition

- "ability to read connected text rapidly, smoothly, effortlessly, and automatically with little conscious attention to decoding" (Meyer, 2002)
- "rate and accuracy in oral reading" (Shinn et al., 1992)
- "immediate result of word recognition proficiency" (NRP, 2000)

Current Perspectives

Fluency is also a matter of automaticity related to the ability to process increasingly large units of words

- In other countries, fluency and spelling are primary indicators of reading problems (more on this later!)
- Key concept is automaticity- reading with little conscious attention to decoding

Interventions: Fluency

- Improved word recognition
- Spelling instruction
- Repeated reading
- Practice with a wide range of text

Repeated Reading

National Reading Panel: guided oral reading (repeated reading and reading wide range) effective with ES of .41

Chard et al., JLD (2002)

- RR with model: .68
- RR without adult model: .46

Repeated Reading

Therien (RSE, 2002)

- Same passage: .83 (F), .67 (C)
- Different passage: .50 (F), .25 (C)
- ES similar for children with and without LD
- Multiple repetitions of same passages (3-4 times) associated with largest ES)

Kuhn et al. (J of Literacy Research, 2006)

- Contrasted scaffolded Repeated Reading of same text (Fluency Oriented Reading Instruction; Stahl) with Wide Range Reading Approach (scaffolded, 3 different grade level texts, but not repeated)
- Both effective with ES in the high moderate range (>.6 relative to controls)

Reading Exposure

- NRP: little evidence that silent sustained reading is effective for fluency and comprehension
- Lewis and Samuels (unpublished?):

Correlation of .10 for exposure and reading achievement; ES = .42 for studies with random assignment

Cunningham & Stanovich, 1999)

Table 3

%	Independent Reading Minutes Per Day	Words Read Per Year
98	65.0	4,358,000
90	21.1	1,823,000
80	14.2	1,146,000
70	9.6	622,000
60	6.5	432,000
50	4.6	282,000
40	3.3	200,000
30	1.3	106,000
20	0.7	21,000
10	0.1	8,000
2	0.0	0

Variation in Amount of Independent Reading

Independent Reading

- Reader should be able to read text with 90% accuracy
- Ratio of known and unknown words should be below 1:20 to facilitate vocabulary acquisition
- Content of independent reading should relate to classroom content
- Follow-up activity and discussion based on independent reading
- Teacher and student share understanding of the purpose of the reading assignment

Reading Comprehension Disabilities

- Most children with word level disorders have comprehension problems
- Subset with intact word recognition and deficient comprehension estimated as high as 5-10%
- More apparent in older children

Important Research Findings

Disabilities related to comprehension are related to oral language.

"The comprehension deficit experienced by the poor comprehender is clearly not specific to reading, but rather represents a general language comprehension limitation."

-Stothard & Hulme, 1996

Interventions: Reading Comprehension

- Teach comprehension strategies explicitly
- Work on oral language development, esp. vocabulary
- Teach learning adjuncts in content: graphic organizers, summarization
- Provide organizational support (works for everyone)

Enhancing Reading Comprehension: Carnegie Report

1. Direct, explicit instruction in the strategies and processes that support proficient reading instruction

- summarizing, questioning, clarifying, predicting
- comprehension monitoring: awareness of how they understand while they read
- Teacher modeling, scaffolding, and apprenticing

http://www.all4ed.org/publications/ReadingNext/index.html

Explicit Instruction

- Regardless of the approach, teachers make instruction explicit when they explain how and when to use strategies and model implementation; help students use them in multiple contexts in different content areas and genres; scaffold support
- Move away from passive reading as a strategy for reading comprehension

Eight strategies that can be effectively taught (NRP)…

- Comprehension monitoring
- Cooperative learning
- Graphic & semantic organizers
- Story structure questioning (who, what, where, when and why)
- Question answering with feedback & correction
- Question generation
- Summarization
- Multiple strategy – using several interactively with teacher

Three types of interventions

- Structured Cognitive Strategies (summarizing, activating background knowledge, self-monitoring, questioning)
- Text enhancement (highlighting, illustrating, embedded questions)
- Skills reinforcement (reinforcement, repeated reading, vocabulary instruction)

Berkeley et al., 2010

- Strategy instruction: .48
- Text enhancement: .46

Within both:

Peer mediation (Y= .45; no = .58)

Self regulation (Y = .54; no = .34)

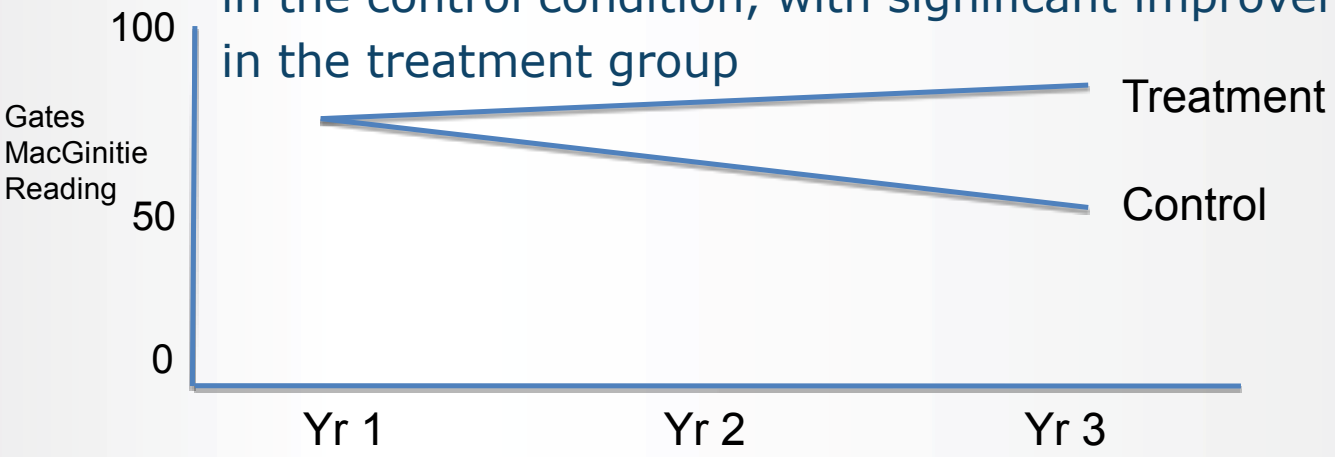
Scammacca et al., 2011 (Center on Instruction)

Older poor readers

- Strategy instruction: .54
- Word study .40
- Fluency practices (mostly SSR): -.07
- Multicomponent: .59

- NICHD middle school studies – intensive interventions for adolescents with severe reading difficulties

Cohort of minimal responders followed for three years indicated a decline in performance for the participants in the control condition, with significant improvement in the treatment group



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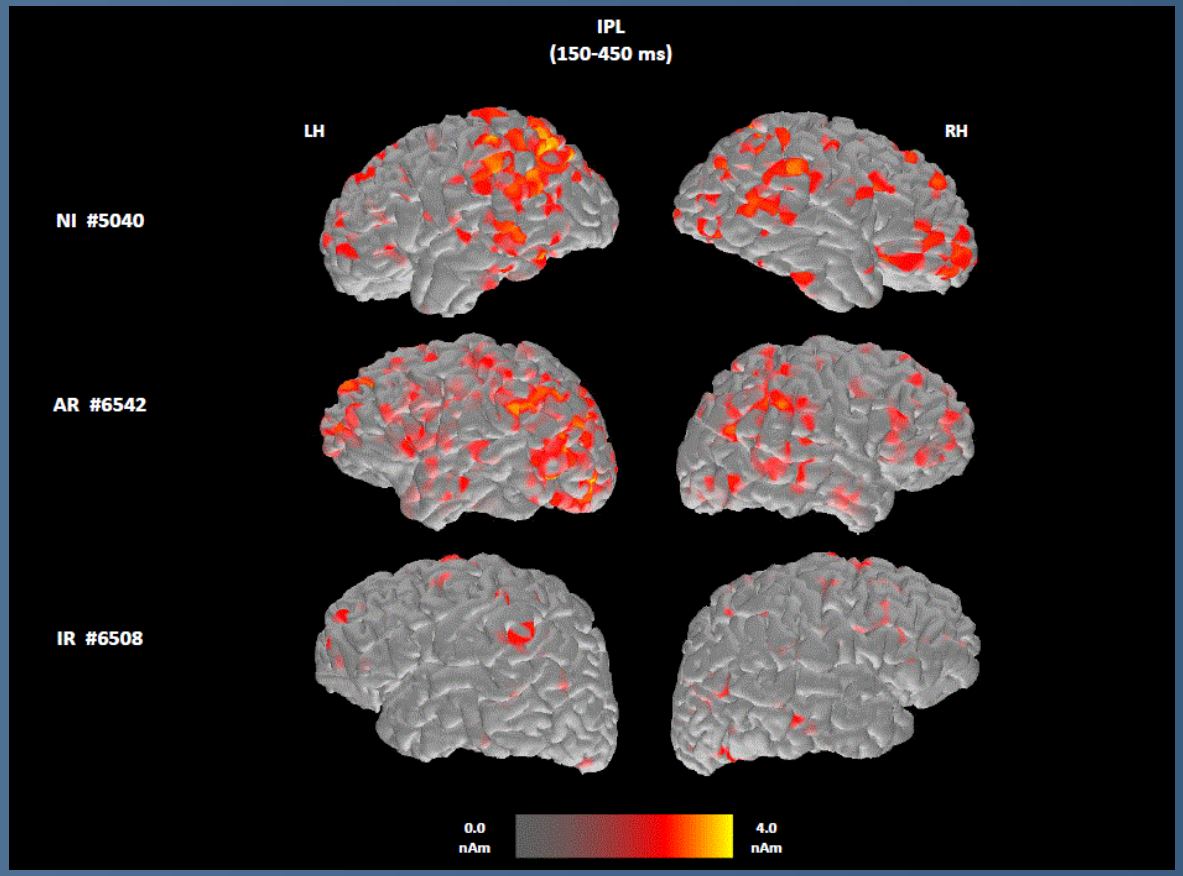
Baseline MEG Patterns for Adolescent Adequate and Inadequate Responders (Rezaie et al., 2011)



Spanish vs. English

- Extensively studied in North America; confounded by economic disadvantage
- Academic problems very high in in Latino children and adolescents
- Language proficiency in English (and Spanish) vs. language development in both languages?

Spanish vs. English

- Is bilingualism an advantage (produces more development of executive skills because of need to switch language (Bialystok) or a disadvantage because each language is used less frequently? (Gollam; frequency lag hypothesis)
- Is Spanish an advantage because of the more transparent representation of phonology and orthography?

Spanish vs. English

- Psycholinguistic grain theory (Ziegers & Goswami): what is the size of the unit that must be processed; Phonemes vs. syllables
- English- irregular representation of words vs. regular representation in Spanish
- In more transparent languages, is dyslexia more apparent in fluency and spelling difficulties (Wimmer)?

Spanish vs. English

- Regardless of surface representation, neural correlates similar across languages (Paulescu)
- Interventions addressing either language in Spanish speakers in North America comparably effective (Vaughn)
- Many Spanish speakers in US have word level difficulties
- Key for intervention is still assessment of academic proficiencies and instructional response

Preventing Reading Difficulties Among Spanish-Speaking Children

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Research Design (Grade 1, all language minority students < 25th percentile in word reading and oral language in both Spanish and English)

SPANISH Instruction

- Cohort 1
  - 33 Treatment
  - 34 Comparison
- Cohort 2
  - 42 Treatment
  - 47 Comparison

ENGLISH Instruction

- Cohort 1
  - 25 Treatment
  - 25 Comparison
- Cohort 2
  - 45 Treatment
  - 49 Comparison

The Interventions

- Primary focus on reading
- Parallel in Spanish and English
- English version previously validated as effective (Proactive)
- 50 minutes per day October-May
- 1:4 Teacher to Student ratio
- Provided in addition to daily language arts instruction

Lesson Cycle

- Story Retell (@ 10 minutes)
- Reading Lesson (@ 35 minutes)
- Embedded Language Support (@ 5 minutes)

Intervention Comparison

English

- Focus on phonemic awareness—segmenting and blending—until children are sensitive to phonemes within blends
- Focus on reading monosyllabic cvc words before moving into multisyllabic and other syllable types
- Sounding out is the primary decoding strategy
- Children are taught to be "flexible" decoders since English has many irregular words
- Much time assisting children to process connected text fluently through the reading of decodable stories
- Basic comprehension strategies are taught and practiced daily
- Spanish inserts ensure that children have the necessary concepts and vocabulary to participate in each lesson

Intervention Comparison

Spanish

- Significantly less phonemic awareness instruction
- The cv syllable type is given major emphasis
- Reading multisyllabic words begins almost immediately
- The phoneme is focused on syllables within words, but children don't sound out an entire multisyllabic word phoneme by phoneme
- Processing words syllable by syllable is the primary decoding strategy
- Children read much more complex word structures much sooner than they do in English
- Spanish text becomes richer much more quickly, allowing for the inclusion of more advanced comprehension strategies

Results for Spanish Intervention Cohort 1

Statistically significant differences in favor of Spanish Intervention treatment group for outcomes in Spanish. Time × Treatment Interaction effects for:

- Letter sounds
- Blending phonemes — words and non-words
- Word attack
- Oral reading fluency — Spanish
- Passage comprehension
- Overall language development

Results for English Intervention

Statistically significant differences in favor of English Intervention treatment group for outcomes in English.
Time × Treatment Interaction effects for:

- Letter naming fluency
- Letter sound identification
- Phonological composite (sound matching, blending words, blending non-words, segmenting words, elision)
- Word attack
- Spelling
- Passage comprehension

2nd Grade Follow-up Effect Sizes

	English	Spanish
Oral Lang Comp	.24	.04
Word ID	.43	.64
Word Attack	.45	.54
Fluency	.41	.45

2nd Grade Follow-up Effect Sizes

	English Int	Spanish Int
Reading Comp	.31	.49
Oral reading	.36	.39
Spelling	.43	.65

Follow up in 4th and 5th Grade

No Additional Treatment Provided:

Spanish Treatment Mean ES 0.33

English Treatment Mean ES 0.23

What we learned …

- Many of the critical content components that are essential for monolingual English speakers are effective for language minority students.
- Word Study and Phonics
- Listening Comprehension utilized strategies essential for Reading Comprehension
- Fluent Reading and Repeated Reading of text for speed, accuracy, and prosody
- Vocabulary and Concept Knowledge Development
- Effective Instructional Scaffolding

What we learned about instruction for at-risk readers (cont.)…

- All new information is modeled (Model – Lead – Test)
- Repetitive language and instructional routines
- Time to dialog with teachers and each other
- Daily practice opportunities
- Major differences in unit of word study
- Little transfer from one language to the other

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Teacher Reflections

This was the last week at Zavala Elementary… I believe all of my students have been successful in this intervention, without it, they would have struggled a great deal. Many times concepts introduced were a review of what they [intervention students] had already seen in their regular language arts. However, the intervention made sure they were not only familiar with the material, but accomplished mastery. Without the intervention, these kids would have stayed behind.

Written Expression

- Transcription versus generation

  1.Transcription: production of letters and spelling that is necessary to translate ideas into a written product.

  2. Generation: translation of ideas into language representations that must be organized, stored, and then retrieved from memory

Intervention

- For transcription difficulties, teach handwriting and spelling explicitly; permit adjuncts- word processors, keyboards, spell checks, and minimize demands for motor output- in older students
- For generation problems, teach written expression as a self regulation strategy; permit oral expression (if it really is specific to writing) and dictation as compensatory approaches for students who have not responded to instruction
- **Harris et al: Powerful Writing Strategies for All Students (Brookes)**

Interventions: Generation (Harris et al.: Self regulated strategies)

Self- Regulated Strategy Development

- Pick a topic
- Organize a plan
- Modify the plan while writing
- Self regulation- set goals and monitor progress (use graphs)

Graham et al. (2010) meta-analysis: google Writing Next

1. Overall efficacy of writing interventions: .55
2. Strategy instruction: 1.02

---SRSD: 1.17; other approaches: .59

4. Peer Assistance: .89
5. Teaching transcription: .55
6. Teaching text structure: .59
7. Product goals: .71

Graham et al. meta-analysis

- 8. Word processing: .43
- 9. Process approach: .40
- 10. Prewriting activities: .54
- 11. Composing: .30
- 12. Imagery/Creativity instruction: .70
- 13. Assessment and feedback: .42 (adult: .80; peer/self: .37
- 14: Comprehensive programs: .70
- 15. Teaching grammar -.41

Math Disabilities

- Computations vs. Problem Solving
- MD vs. MD/RD

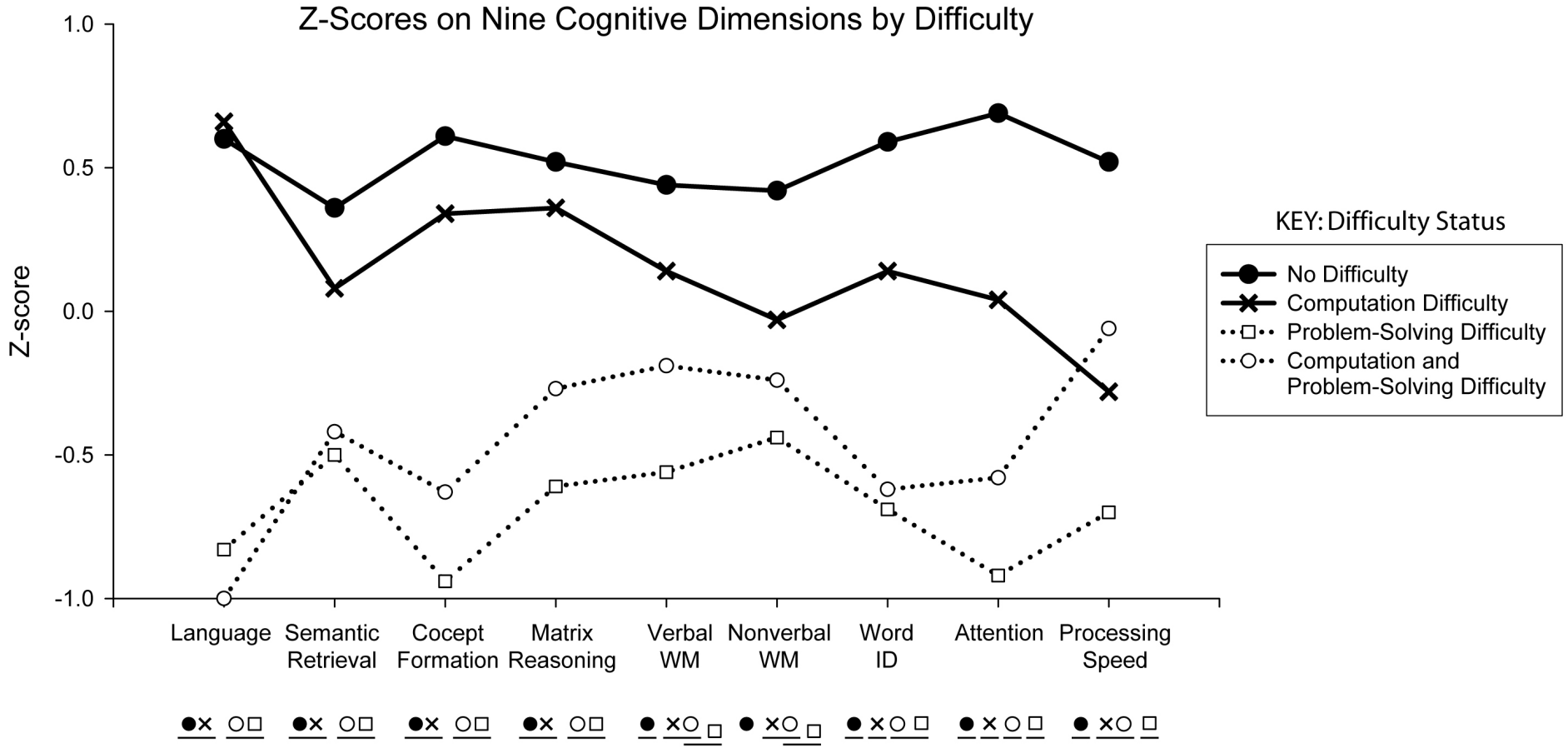
- When problem solving is involved, language (and reading) is more of an issue

Types of Math Disabilities

Traditional: MD vs. RD/MD

- RD/MD more pervasive disturbance of language and working memory
- Learning, representing, and retrieving math facts (RD/MD)
- Difficulties in the acquisition and use of strategies and procedures (MD- no RD)

More Contemporary: Computations vs. Problem Solving (Fuchs et al., 2007)



Intervention

- For MD/computational, make math as verbal and concrete as possible; teach algorithms as rules; rehearse; practice
- For PS,MD/RD, work on problem solving strategies in content, esp. word problems
- Teach math facts to automaticity as part of any intervention
- Permit adjuncts (calculators, graph paper) for older students

A Field-Based Randomized Control Trial

Lynn Fuchs, Sarah Powell, Pamela Seethaler, Paul Cirino, Jack Fletcher, Doug Fuchs, Carol Hamlett, and Rebecca Zumeta

Vanderbilt University and University of Houston

Journal of Educational Psychology, 2011

NICHD Grant #P01046261

Study Purposes

- Examine the efficacy of tutoring protocols for remediating
  - Math fact deficits
  - Word problem deficits
- Assess whether treatment efficacy is different for
  - Students with MD alone versus
  - Students with MDRD

Participants

- 924 students screened in 63 classrooms in 18 schools in Nashville and Houston (similar sample size at each site)
- Inclusion criteria:
  - WRAT-A: < 26th percentile
  - 5-item word-problem measure: score < 2
  - At least 1 (of 2) WASI subtest T score: > 36
- 162 students eligible for the study; 133 students remained at post test
- Blocking on site (Nashville and Houston) and MD status (MD vs. MDRD); students randomly assigned to tutoring conditions:
  - Math Facts Tutoring ("Math Flash")
  - Word Problem Tutoring ("Pirate Math")
  - Control

Examined Efficacy of Two Tutoring Protocols

Both Tutoring Protocols:

- Delivered individually
- 48 sessions: 3 per week for 16 weeks
- 20-30 minutes per session
- Scripted lessons, which tutors studied (not read)
- Motivational system to ensure on-task behavior and hard, accurate work

Examined Efficacy of Two Tutoring Protocols

- The exclusive focus of Math Flash was <u>math facts</u>
- The primary focus of Pirate Math was <u>word problems</u>
  - but it also addressed foundational skills (math facts, procedural calculations, and algebra skills)

Over Efficacy Results: Fluency with Math Facts

- Both tutoring conditions superior to control group
- No difference between tutoring conditions
- Notable, because MF tutoring spent 20-30 minutes per session on MFs whereas WP tutoring spent 4-6 minutes per session on MFs

Differential Efficacy? No

- No evidence of differential responsiveness to intervention as a function of difficulty status on any outcome.
- Raises questions about the tenability of the MD/MDRD subtyping scheme and suggests the need to pursue other avenues for subtyping mathematics disability
- Even so, across tutoring conditions and sites, students with MD outperformed students with MDRD at pre- and posttest (severity).
- Additional work to examine the tenability of the MD/MDRD subtyping scheme is warranted

Overall Conclusions

- MF tutoring enhanced fluency with MFs with transfer to procedural calculations but without transfer to algebra or WPs.

- For a comparable amount of tutoring time, WP tutoring (with work on foundational skills) enhances WP skill, fluency with MFs, procedural calculations, and algebra.

Intervention: Some Conclusions

- Effective interventions for reading, numeracy, and written expression are ***complex* cognitive** therapies more closely tied to domains, and less to disorders; continuum with little evidence of qualitative markers (dimensional view)
- Strong evidence of efficacy for comprehensive and less comprehensive interventions in preschool and Grades K-3 for with effects often moderate to large (.40-.80) against best practice
- Generalization to comprehension and other distal measures weaker (outcome measures not sensitive to far transfer?)

Complex Therapies in Reading and Numeracy

Effects stronger if interventions are:

- more explicit
- increase time on task (i.e., supplement, not supplant; Vaughn)
- reduce size of instructional group (small group, not 1:1; Vaughn)
- More comprehensive (multi-component; Mathes, Denton) and include self-regulation component
- differentiate according to instructional needs in the domain of interest (Connor)
- Teach in the context of academic content

Not every intervention is effective

Forness et al. (2001)

- Perceptual training: .08
- Dietary interventions: .12
- Modality training: .14

Hulme et al. (2011) on Cogmed

- Working memory: .55
- Math: .07

Not every intervention is effective

Pennington et al.,2011, IDA Perspectives, Winter: Reviews of alternative treatments

- Older version of Fast ForWord®, exercise and movement training, low level vision and oculomotor training show little evidence of efficacy for children with reading problems

Ineffective Intervention…

- Doesn’t focus on academic skills
- Defines academic proficiency narrowly
- Doesn’t increase instructional time, intensity, or differentiation
- Doesn’t continually monitor progress and adjust instruction or change program
- Teaches for the sake of learning rules, not to master principles
- Doesn’t engage the child in reading instructional level material or practice in math and writing
- Waits for the child to fail; leaves the child behind

Is plasticity an issue?

- The neural systems underlying reading seem malleable, show plasticity across the age range, and are not disorder-specific; continuum of severity (Vellutino).
- Mostly normalizing, not compensatory
- Don’t know much about inadequate responders
- Need to tie functional results to structural correlates (gray matter increases with intervention (Eden) and parallels differences in literate and illiterate adults (Castro-Caldes); coregister across imaging modalities
- Are neuroimaging measures effective predictors of growth and intervention response?

All professionals must…

- Focus on assessment of academic skills and move students to intervention as soon as possible- look at the pattern of academic strengths and weaknesses
- Address comorbid disorders and other factors
- Become experts on intervention
- Evaluate progress
- Reserve extensive evaluations for inadequate responders
- Focus on results

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