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



Texas Center *for* Learning Disabilities

Understanding Dyslexia: A Scientific Approach

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Some initial observations

- We know more about the science of reading than the science of reading instruction.
- Focus on assessing response to instruction and on building educators' capacity to deliver more intense, customized interventions.
- Assessments and interventions need to be delivered through a seamless system of well-coordinated general and special education.



President's Commission on Special Education (2004)

- 1. Focus on results, not process
- 2. Embrace a model of prevention, not a model of failure. Prevent, reduce the number who need remediation, and intensify remediation.
- 3. Children with disabilities are general education children first. SPED cannot be expected to deal with the range of reading difficulties experienced by students, esp. as an isolated service



Importance of explicit instruction at all levels of instruction

- *1. Provide explicit instruction that incorporates clear feedback.*
- Prior to teaching, identify what the students do or say.
- State what students need to know in a few words.
- Model what students should say or do.
- Ask students to demonstrate what they are taught.



Intentional, not accidental

- Provide prompt feedback that is specific and clear
- Give selected students opportunities to respond independently (and avoid only calling on the most capable students).
- Control task difficulty, gradually increasing it as performance improves.
- Maintain high levels of student success, engagement, and response.
- https://www.aft.org/ae/winter2020-2021/vaughn_fletcher

Word Level Reading Difficulties

Most common and best understood form of LD (Dyslexia)

- Largest single group of students in special education: almost 2/5 of all children identified for special education
- Many children not identified for special education have word level difficulties
- Addressed in IDEA as “basic reading” domain and often through 504
- Key to overcoming dyslexia is to prevent it through MTSS, with intensive remediation for inadequate responders



Important Research Findings

Dyslexia occurs primarily at the level of the single word and involves the ability to decode and spell printed words in isolation (accurately and automatically). It leads to problems reading text, but is not a text level disability. Many students not identified with dyslexia have word level problems



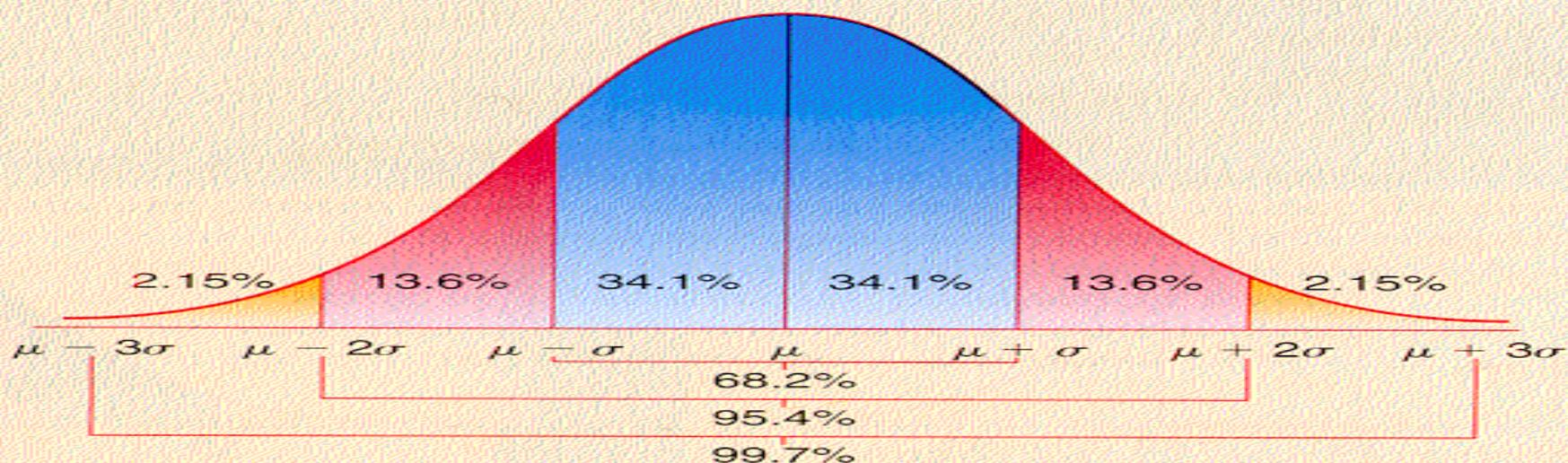
Alphabetic Principle

- Print represents speech through the alphabet or other visual symbol
- Regardless of surface appearance (orthography), words represent internal units based on sound (phonemes)
- In learning to read, the child makes explicit an implicit understanding that words have internal structures linked to sounds (phonological awareness)
- Reading is parasitic on language



Dyslexia- Prevalence Depends on the Threshold (Dimensional)

- Variation on normal development (like high blood pressure or obesity, not the flu or a broken leg)
- Caused and influenced by both genetic and environmental factors, including inadequate instruction



← Ease of Learning to Read →



Important Research Findings: Identification

Dyslexia is best identified through assessments of reading and spelling skills, and instructional response. Cannot be identified independently of instruction

IQ tests are not necessary (Dyslexia is uncoupled from IQ): Methods for identification of LD based on IQ-discrepancy or patterns of cognitive strengths and weaknesses lack validity. Documentation of processing deficits not required.



Screening for Dyslexia

- Screening is rapid triage that does not burden the teacher
- Goal is to determine who needs more assessment
- Should be <5 minutes
- Accuracy is best geared to minimizing false negative errors; false positive error
- Cannot separate students with dyslexia from others with foundational reading problems; instructional response is key!



Screening for Dyslexia

- KG: timed and untimed letter names and sounds, phonological awareness
- Beginning G1: timed and untimed word reading, phonological awareness
- End Grade 1, Grade 2: Timed and untimed word reading
- Positives need progress monitoring and/or reading inventory
- Embrace the concept of risk and reserve eligibility for comprehensive evaluations. Dyslexia should not be diagnosed independently of efforts to treat it.



Progress Monitoring

- KG: timed knowledge of letter sounds
- G1-3: Timed word reading (lists or passages)
- G4-8: Timed Passages (Maze)



Specificity

- Dyslexia is often part of a complex presentation; generalist genes affect multiple LDs and ADHD (continuity hypothesis)
- Comorbidity: ADHD common; if language and working memory problems significant, math impaired; anxiety is common. Written expression and reading comprehension almost always impaired
- Phonological processing/decoding presentation shines through the glare of complexity, but must deal with the complexity, especially in inadequate responders



Important Research Findings

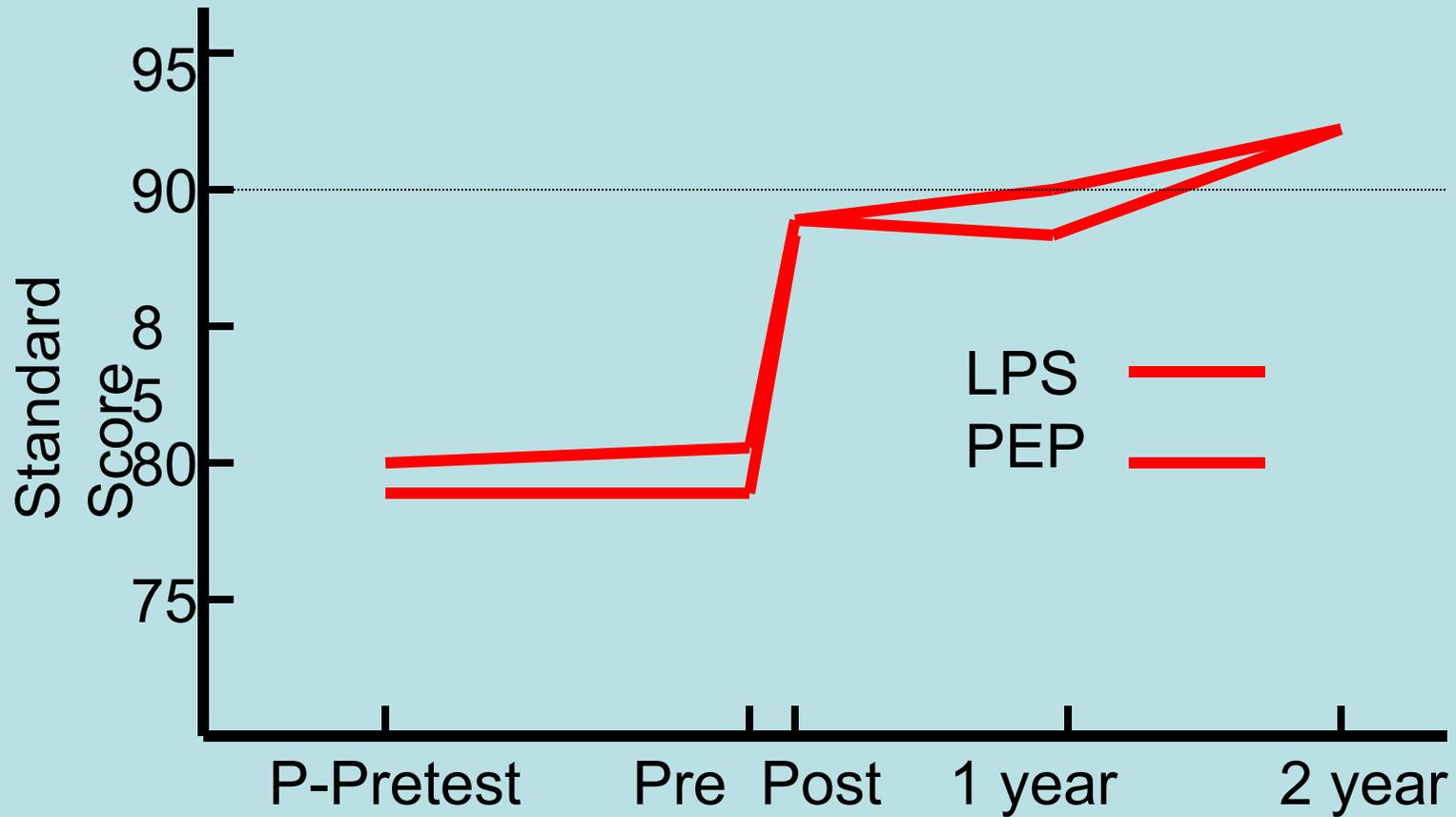
Dyslexia can (often) be prevented.

Remediation requires much more intensity

Skills that prevent dyslexia must be taught early in school

Remediation after Grade 2 demonstrably less effective (Connor; Lovett):
diminishing returns

Growth in Total Reading Skill Before, During, and Following Intensive Intervention

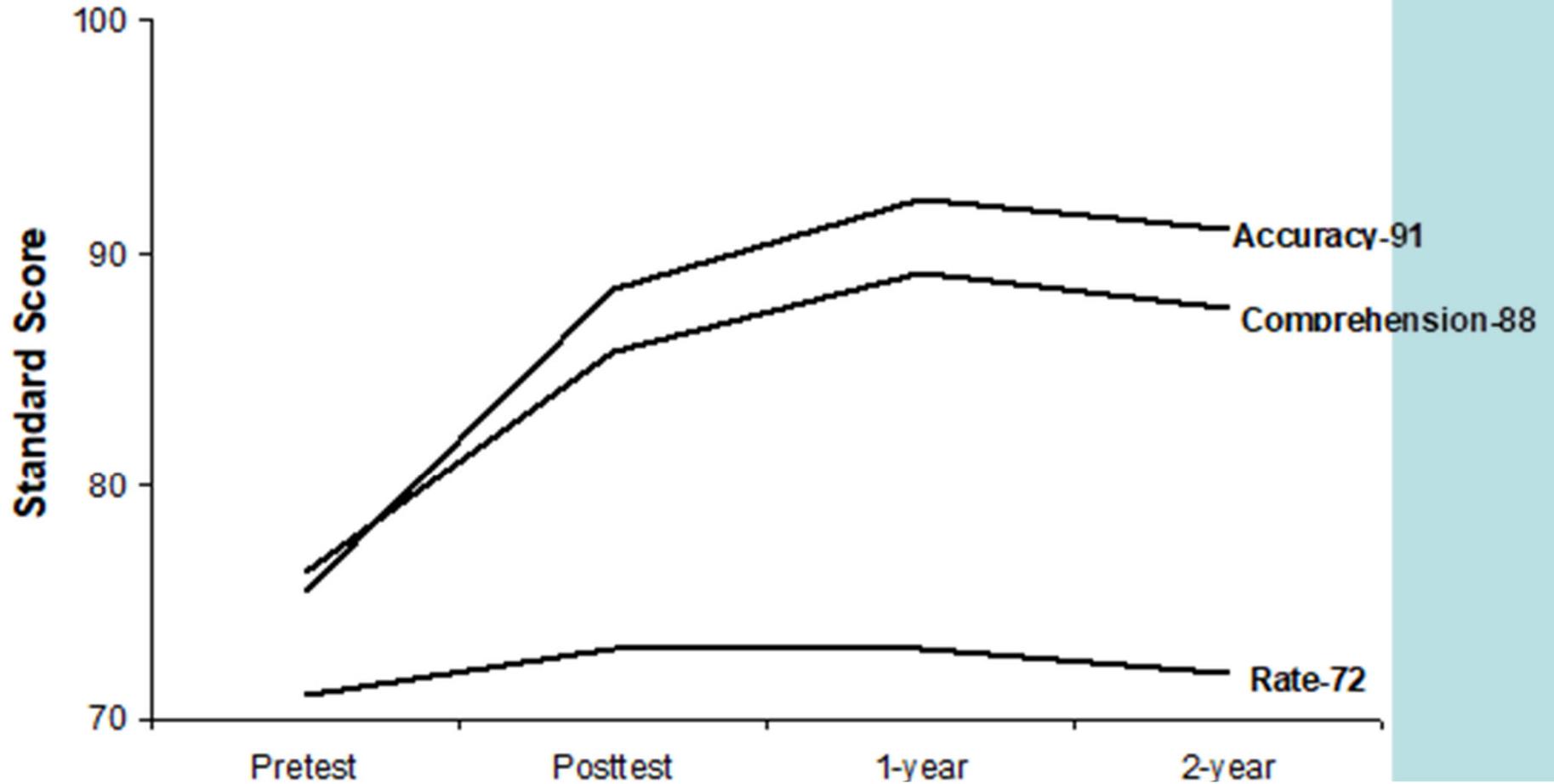


Torgesen et al., 2001

Time x Activity Analyses for the Two Intervention Approaches

	<u>LIPS</u>	<u>EP</u>
Phonemic Awareness and Phonemic Decoding	85%	20%
Sight Word Instruction	10%	30%
Reading or writing connected text	5%	50%

Automaticity!





Remediation is not a solution to overcoming dyslexia!

Decoding usually teachable at any age with sufficient intensity

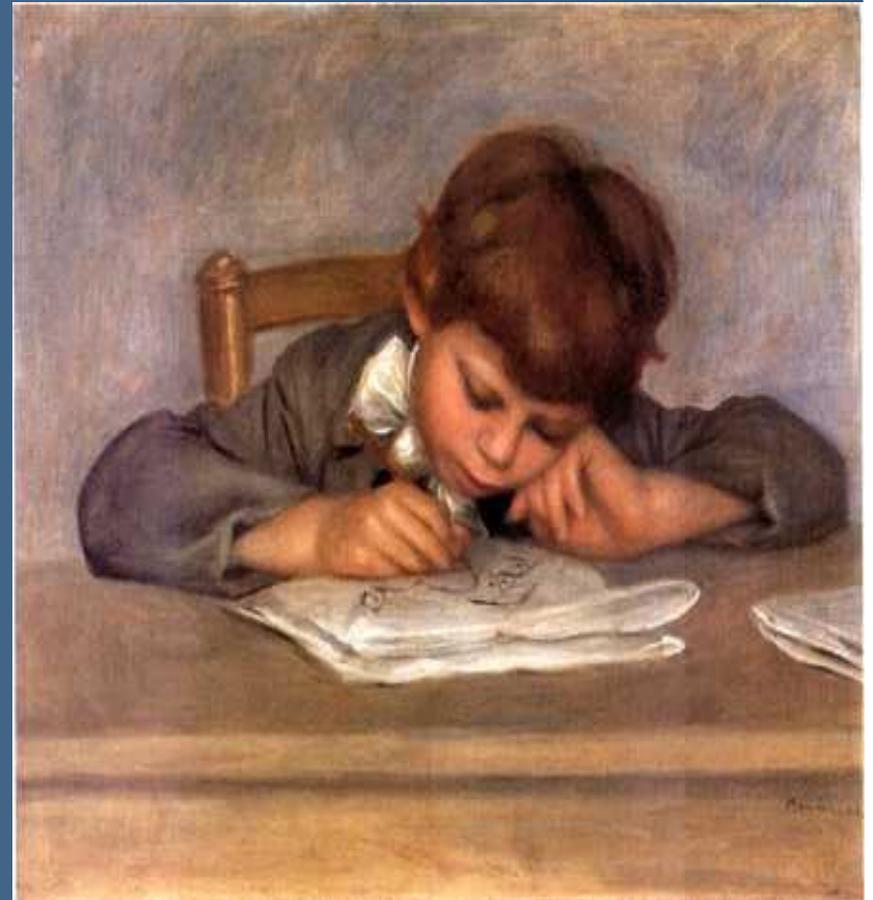
Reading rate is limited because the proportion of words in grade level passages that children can read "by sight" is less than for average readers.

How do you close the gap when the student is already 3- 5 years behind (exposure and experience, not age)?

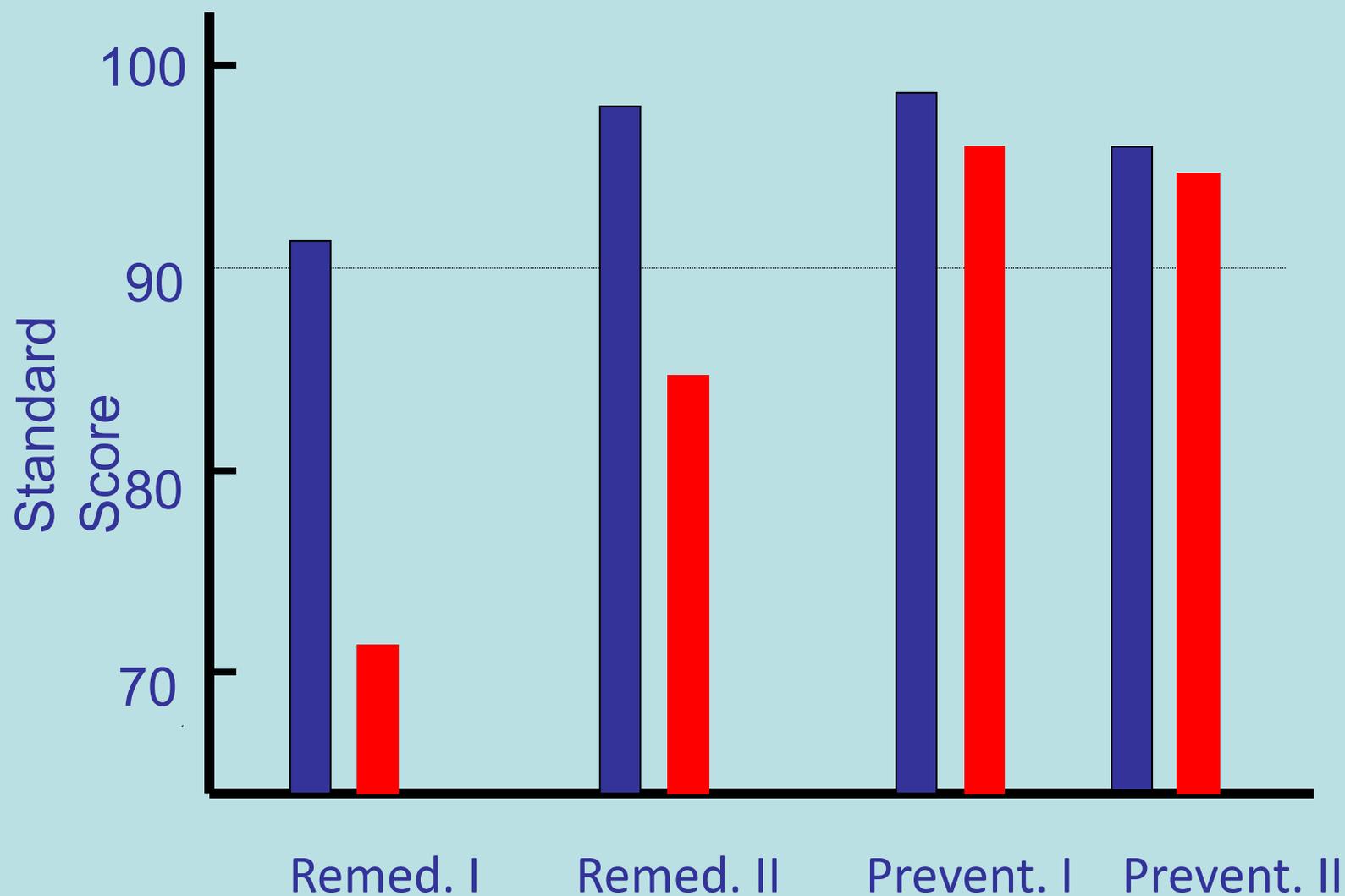


Early Intervention is Effective

- **Prevention studies show that 70- 90% of at risk children (bottom 20%) in K- 2 can learn to read in average range. Prevents automaticity problems.**



Differences in outcomes for Basic Reading Skills and Rate in Prevention vs. Remediation Studies





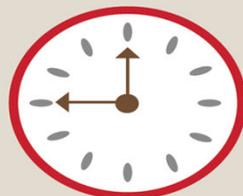
To prevent (and remediate), dyslexia must be treated in the context of MTSS

- Facilitates early identification through universal screening and progress monitoring
- Must focus on instruction and amplify the role of general education instruction
- Data on instructional response
- Isolating students with dyslexia as a disorder that must be remediated is a recipe for persistence
- Restricting eligible interventions to “multisensory” is not empirically supported unless multisensory means “multimodality:” see it, say it, write it, etc.



The Tiered

Schoolhouse



Tier 3



Few students who need intensive intervention not yet SPED identified



Tier 2

Some based on data, different from Tier 1, supplemental instruction



Tier 1

Everyone receives core curriculum delivered in whole group with small group instruction included



Effective Intervention

- Strong core reading program that teaches decoding, fluency practices, and comprehension (NRP).
- Add Tier 2 that builds on Tier 1 for struggling readers. Tier 3 may isolate an area that is not developing.
- Developmentally appropriate and personalized instruction practices (e.g., teach phonological awareness in K and 1 and to severely impaired readers, but move to letter-based component as PA skills are mastered to promote generalization
- If a component is missing in the core program, students will experience difficulties in that area



Effective Intervention

- No specificity of appropriate interventions. Research supports **explicit, comprehensive, and differentiated (personalized)** approaches at classroom and supplemental level
- Research does not support **multisensory** (in traditional sense), **balanced, manualized, multiple cuing systems, discovery or constructionist or rule-based approaches**
- In core classroom, code-based instruction much more effective in small groups than to entire class; no difference in comprehension instruction (Connor)



Intervention: Summary

- Teach phonics explicitly as part of a comprehensive program that addresses multiple competencies: decoding, fluency, comprehension
- Teach spelling in larger graphemic/morphological units
- Prevent word recognition problems because remediation is difficult and requires considerable intensity, especially for automaticity
- Older students and adults can be taught word recognition if the approach is sufficiently intense

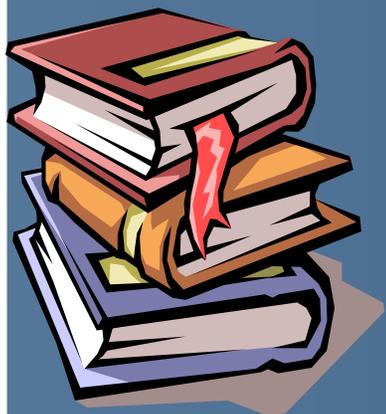


Early Development of Reading Skills: A Cognitive Neuroscience Approach (Jack M. Fletcher – PI)

Grade 1 Multi-Tiered Intervention Funded by NSF
through the IERI

Patricia Mathes and Carolyn Denton:
Early Reading Intervention (Mathes et al., RRQ, 2005; Denton et al., 2006, JLD). Recipient, Albert J. Harris award, 2007, IRA

A. Papanicolaou, P. Simos: **Brain Activation Patterns** (Simos et al., Neuropsychology, 2005; 2007; JLD, 2007)





Double Dose of Instruction for Struggling Readers

***90 Minutes of
Quality
Classroom
Reading/LA
Instruction***



***Intervention:
40 minutes per
day in groups of
3-4***



Proactive Intervention (Mathes, Torgesen)

- Explicit instruction in synthetic phonics (blending), with emphasis on fluency.
- Integrated decoding, fluency, and comprehension strategies (authentic stories by hired authors with phonics principles).
- 100% decodable text, isolated practice
- Prescriptive: Carefully constructed scope and sequence designed to prevent possible confusions taught to mastery taught to mastery



Responsive Intervention

- Explicit instruction in synthetic phonics (blending) and analogy phonics (word families)
- Taught decoding, using the alphabetic principle, fluency, and comprehension strategies in the context of reading and writing
- No scope and sequence
- Teachers responded to student needs as they are observed.
- Leveled text, not phonetically decodable

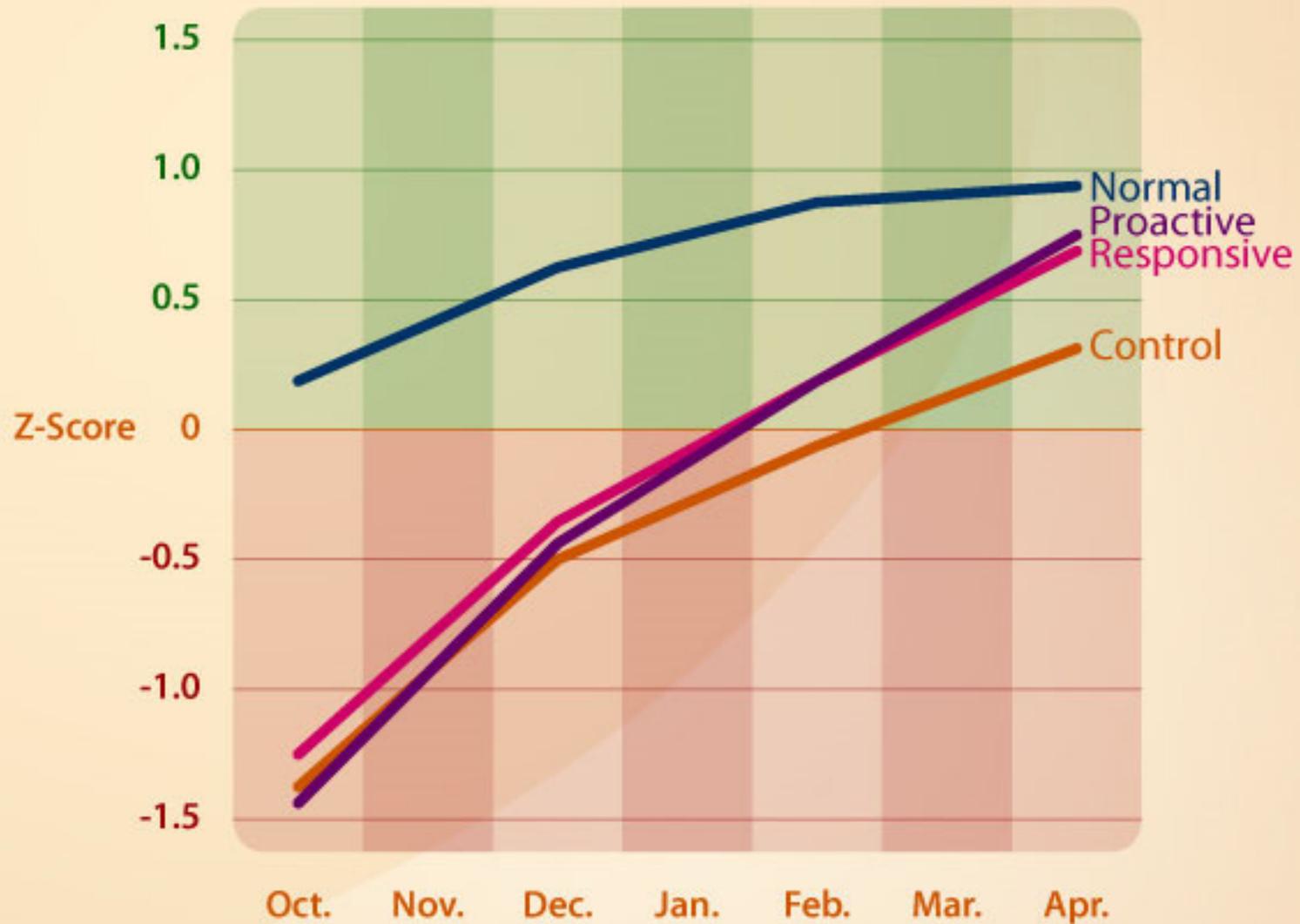


The Responsive Intervention

- Fluency Work (Repeated Reading) and Assessment: 8-10 minutes
- Word Work: 10-12 Minutes (only sounding out)
- Supported Reading
10-12 Minutes
- Supported Writing:
8-10 Minutes



Growth in Fluency by Intervention





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

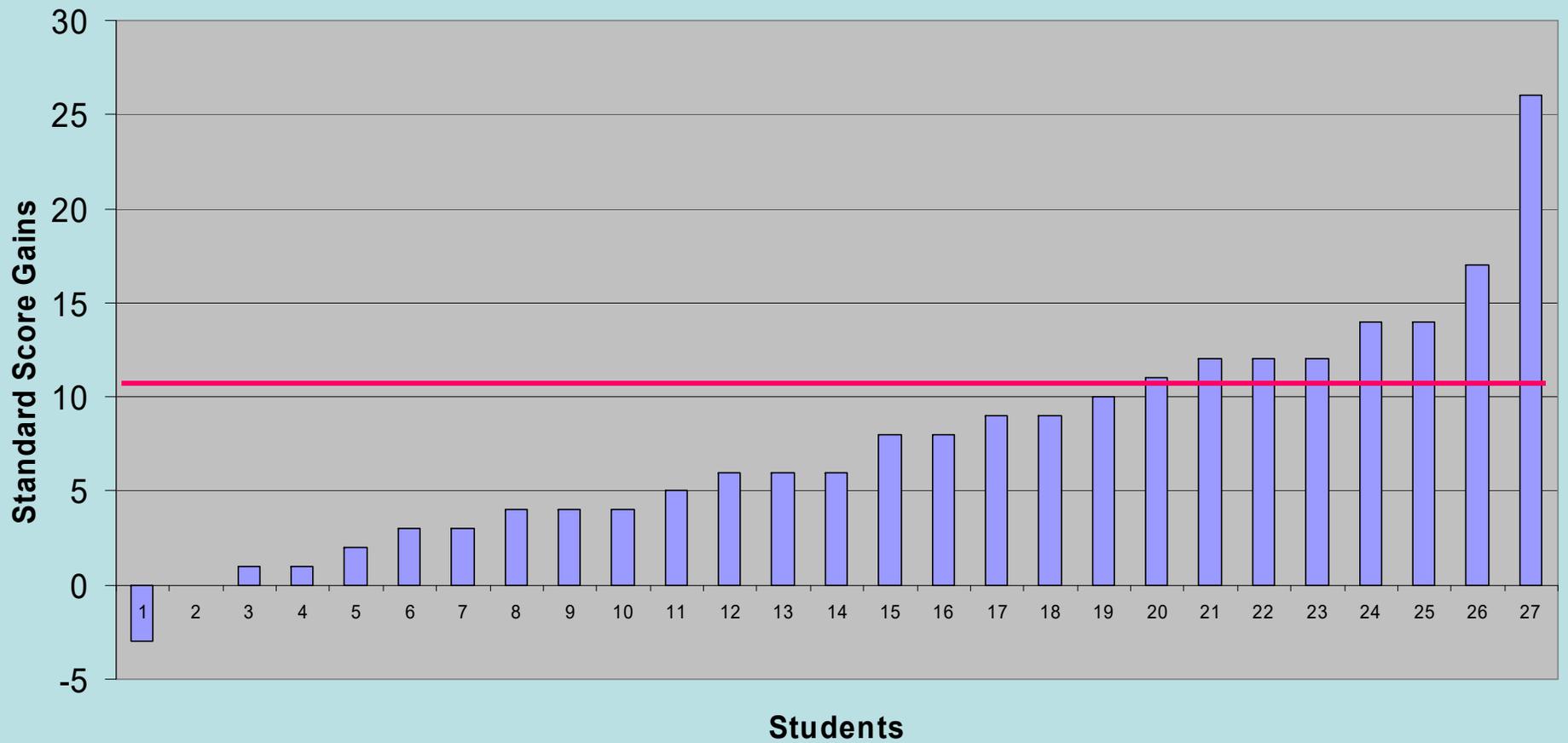
ECI only: $15/92 = 16\%$ (3.2% of school population)

ECI + Tutoring:

- $7/163 = 4\%$ (<1% of school population)

(Basic Reading < 30th percentile) (5 others did not meet fluency benchmarks)

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



(Denton et al., JLD, 2006)



Fletcher et al., 2021

Table 2

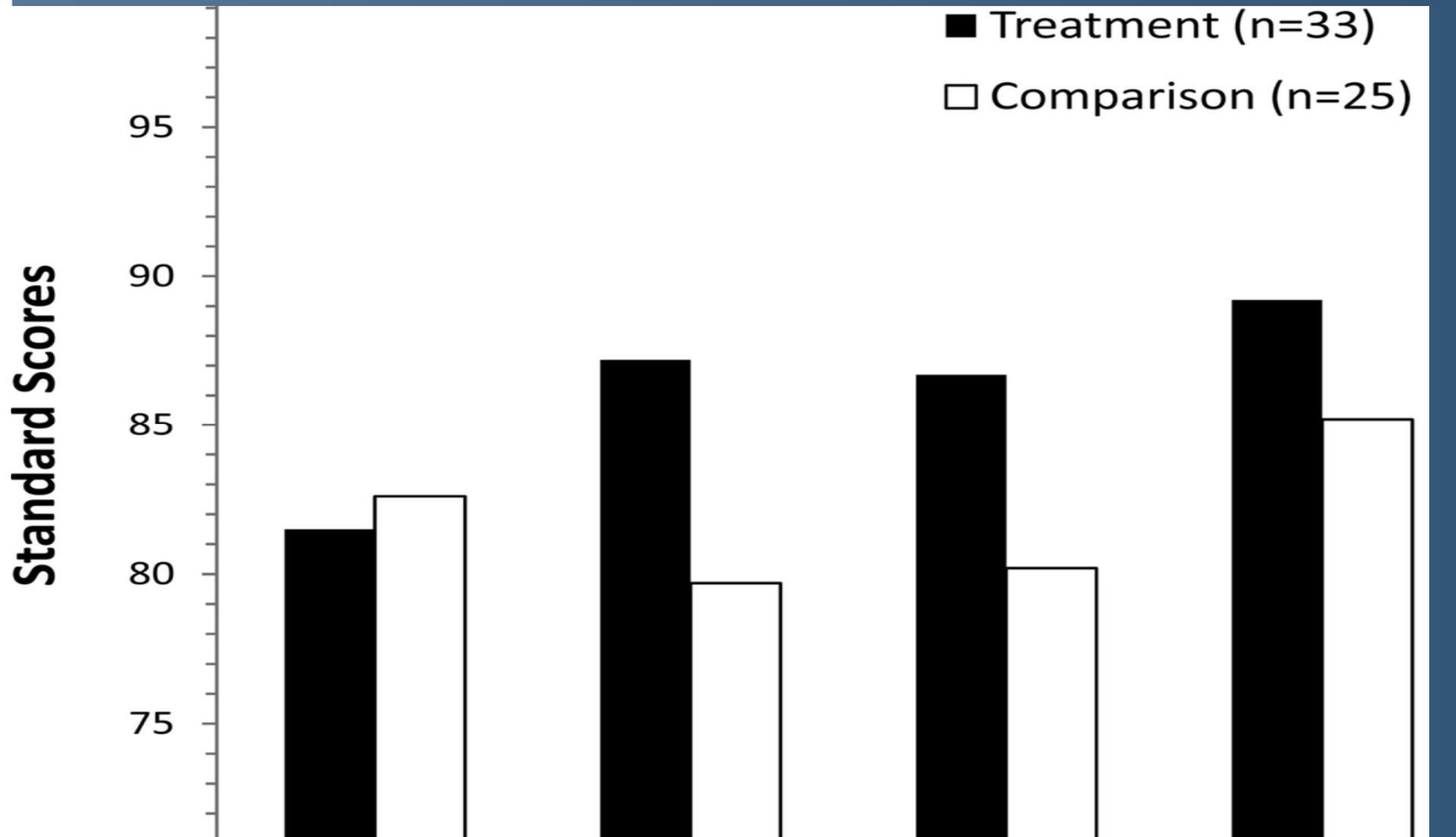
Effect Sizes and Confidence Intervals for Comparisons of Interventions for Poor Readers that Taught Multiple Reading Strategies and Systematic Phonics (PHAST+PHAB) Versus Systematic Phonics and Classroom Survival Skills (PHAB+ CSS)

Measure	PHAST (n = 73)		PHAB+CSS (n = 69)		g	Variance of g	SE	95% (low)
	Mean	SD	Mean	SD				
WRMT-R Word Attack	11.68	6.67	7.49	5.36	0.69	0.03	0.17	0.3
WRMT-Word Identification	38.51	12.41	32.21	13.24	0.49	0.03	0.17	0.0
TOWRE Word Reading Fluency	25.80	12.31	20.72	12.44	0.41	0.03	0.17	0.0
WRMT-R Passage Comprehension	19.68	8.12	15.87	8.44	0.46	0.03	0.17	0.0
WRMT-R Spelling	20.33	2.64	19.1	2.85	0.45	0.03	0.17	0.0
GORT-3 Accuracy	3.88	4.68	2.54	3.94	0.31	0.03	0.17	-0.0
GORT-3 Fluency	2.37	3.03	1.33	2.01	0.40	0.03	0.17	0.0
GORT-3 Comprehension	9.77	6.58	9.66	6.38	0.02	0.03	0.17	-0.0

Note. WRMT-R = Woodcock Reading Mastery test- Revised; TOWRE = Test of Word Reading Efficiency; GORT-3 = Gray Oral Reading Test (3rd Ed.)

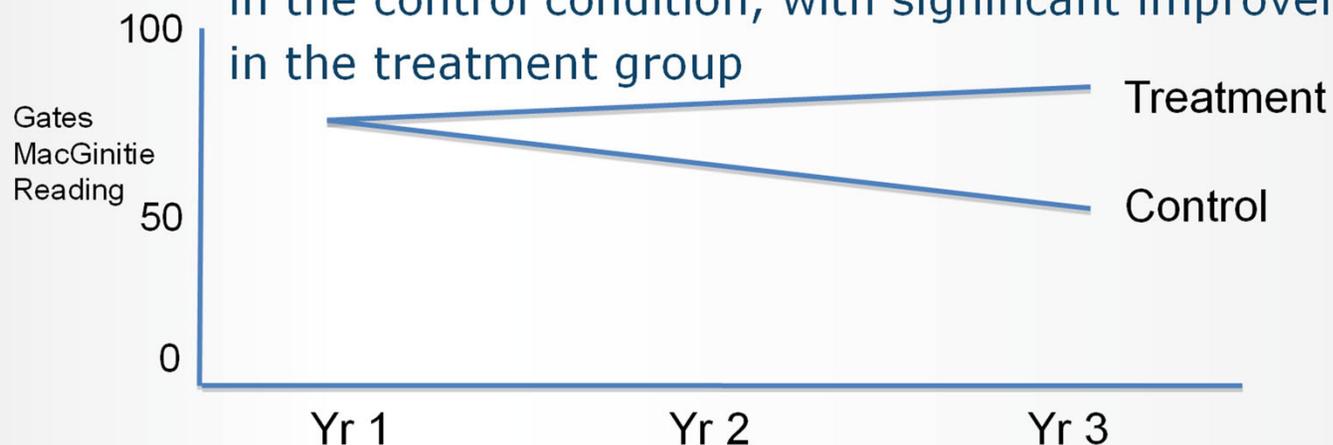


Persistence: Blachman et al., 2014: 10 Year Follow-up



- 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





Neuroscience explains why

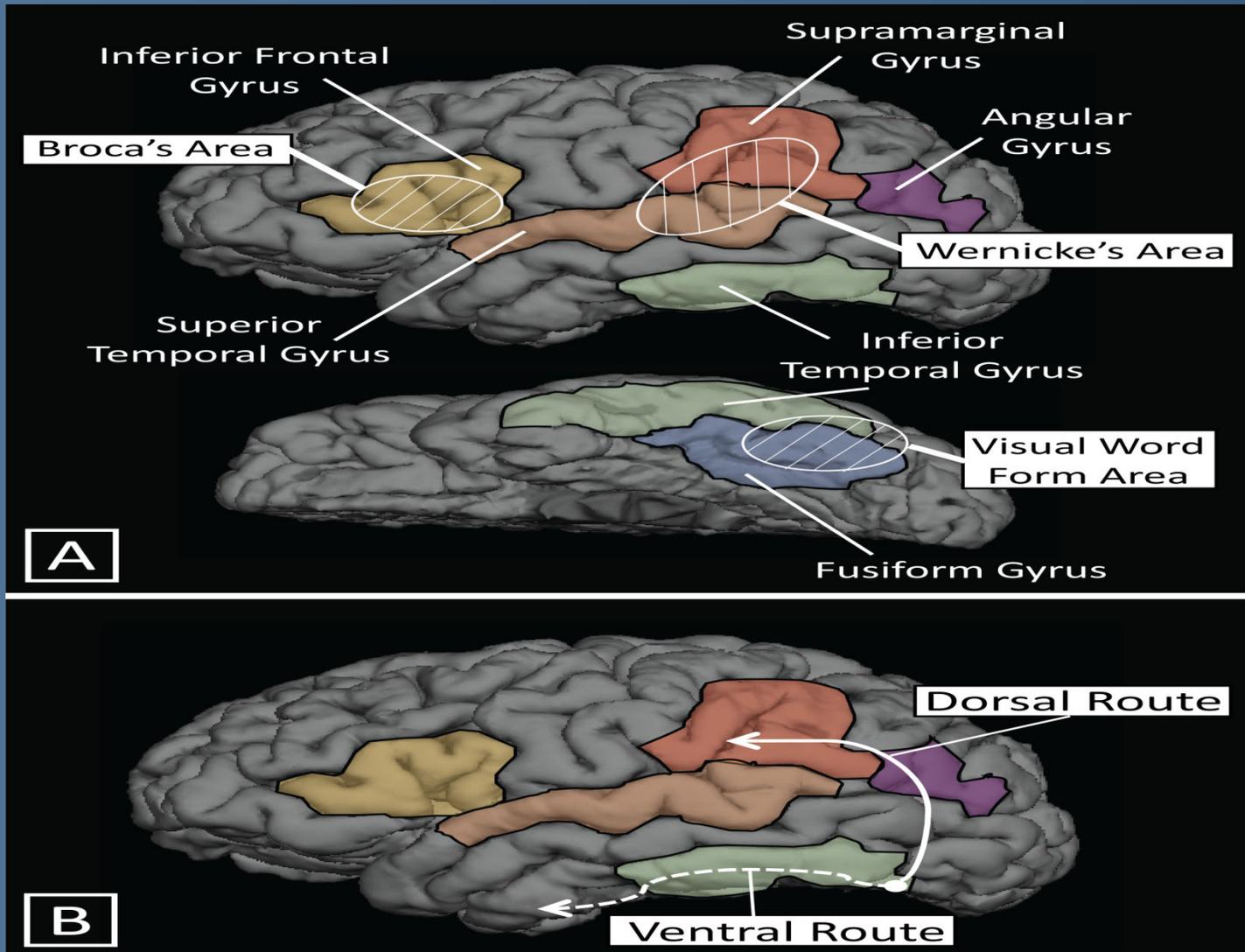
- Two metaphors
 1. Reading is parasitic on speech (Liberman; sublexical, dorsal system)
 2. Reading is unlocking language from vision (Dehaene) or language at the speed of sight (Seidenberg)
- Malleability in development and in instructional response, but access and experience is key for automaticity



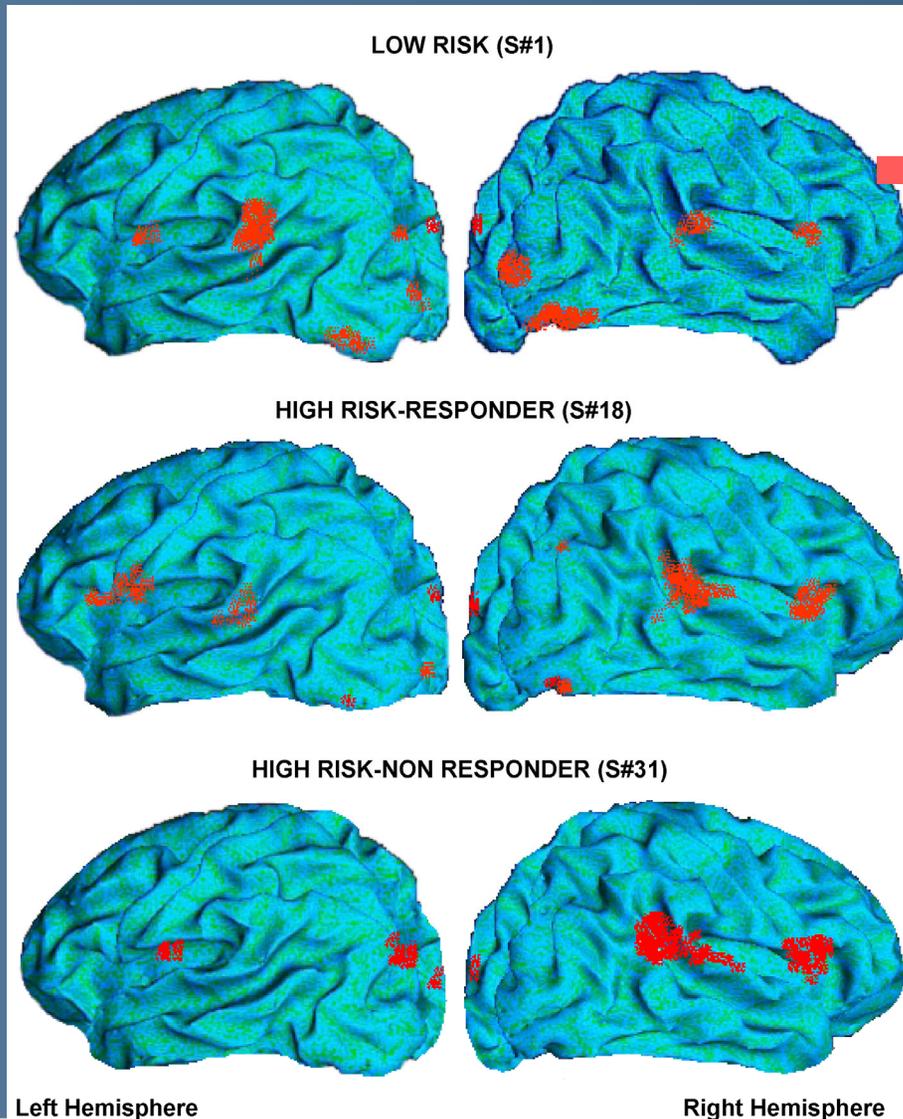
Dual Route Theory

- Dorsal (assembled) route: sublexical, must access phonological representation and identify substituent parts (indirect)- (reading is parasitic on language; sound and print)
- Ventral (stipulated or addressed) route: lexical, directly from word form to pronunciation (Reading is unlocking language from vision; language at the speed of sight; print and meaning; requires experience)
- Operate in parallel depending on the properties of the word

The Reading Brain



Grade 1 Intervention (pseudoword task)



Simos et al
(Neuropsychology, 2005)-
after Grade 1
intervention
in Mathes et
al. (RRQ,
2005)



Four Things We Need to Know

- 1. How to harmonize interventions across tiers- Core and Tier 2 interventions are often not aligned
- 2. Diverse learning needs of students with reading problems- benefits of differentiation apparent at all tiers, but how to help teachers personalize...
- 3. Large group versus small group in Tier 1
- 4. Automaticity- how to close the practice gap



Who is Dyslexic?

- The student who does not respond to quality instruction: *hard to teach, not unable to learn*
- Low achievement and inadequate instructional response
- Often preventable with early intervention
- Heritable, but neural systems are malleable in development and instructional response



Reading Sculpts the Brain, But Must Be Taught!!

- “We are all born with dyslexia. The difference among us is that some are easy to cure and others are not.”

- Liberman, 1997

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