TEXAS CENTER for LEARNING DISABILITIES

Learning for SUCCESS

www.texasldcenter.org

The Texas Center for Learning Disabilities (TCLD) investigates the classification, remediation , and the cognitive and neural correlates of learning disabilities.

One of four national NICHD-funded (P50 HD052117) multidisciplinary learning disability research centers (2006-2017)

University of Houston
UT Austin
UT Medical School- Houston

Objectives

Evaluate individual differences in instructional response from cognitive, instructional, and neurobiological perspectives focusing on:

1. definition, classification, and measurement issues through simulation and synthesis; redefine LDs (unexpected underachievement) as inadequate response to instruction. (Project 1)
2. role of executive functions in LD in relation to reading comprehension (Project 2)
3. reading comprehension interventions that address the role of executive functions in struggling readers and bridge the gap between early elementary and middle school interventions (Project 3)
4. multimodal neuroimaging studies of reading disabilities in relation to instruction (Project 4).

Texas Center for Learning Disabilities

Project 1 (Classification)	David Francis- UH
	Greg Roberts-UTA
Project 2 (Executive Functions)	Paul Cirino- UH
	Marcia Barnes-UTA
Project 3 (Intervention)	Sharon Vaughn- UTA
Project 4 (Neuroimaging)	Jenifer Juranek-UTH
	Jessica Church-Lang-UTA
Core A (Administrative)	Jack Fletcher – UH
Core B (Service)	Greg Roberts- UTA
Core C (Data)	David Francis – UH
Core D (Recruitment)	Jack Fletcher- UH

Supported by NICHD P50 **HD052117,** Texas Education Agency, Meadows Foundation, Enterprise Products Foundation, TRIP

How LD is Identified and Treated Depends on the Conceptual Model

- Neurological: *"Disorder of constitutional origin"': special signs*
- Cognitive Discrepancy:
  - IQ-achievement discrepancy: cognitive discrepancy
  - Processing strengths and weaknesses: cognitive discrepancy
- Instructional Discrepancy
  - Instructional response: intractability

What's Wrong With IQ- Discrepancy?

- IQ- discrepant and non- discrepant low achievers do not differ significantly in behavior, achievement, cognitive skills, response to instruction, and neurobiological correlates once definitional variability accounted (Siegel, 1992; Stuebing et al., 2002).
- IQ does not predict intervention response (Stuebing et al., 2009).
- No difference in brain activation profiles (Tanaka et al., 2011; Simos et al., 2014)
- Status methods for identification may not be reliable based on a single assessment or cutpoint (Macmann et al., 1985; 1989; 1997; Francis et al., 2005)

Alternative Views: The “Third Method”

- Evaluate strengths and weaknesses in cognitive processes for inadequate responders to determine best TX (Aptitude by Treatment Interactions [ATI] framework)
- Multiple “research-based” methods based on cognitive and achievement batteries:
  - Cross Battery Assessment Method (Flanagan);
  - Concordance-Discordance (Hale);
  - Discrepancy/Consistency (Naglieri)
- Hale et al. (2010) survey of LD professionals: PSW methods needed not just for diagnosis, but also for treatment; mandated by statute

Value of Cognitive Tests in Comprehensive Evaluation

- Statutes defining LD in legislation mandate cognitive assessments (Hale et al., 2010).
- Cognitive assessments are correlated with achievement domains (Johnson, 2014)
- Patterns of cognitive strengths and weaknesses discriminate LD from non-LD "slow learners" (Fenwick et al., 2015).
- Cognitive tests permit better treatment planning and intervention outcomes (Hale et al., 2010; Reynolds & Shaywitz, 2009).
- Clinicians using cognitive tests make more informed decisions (Kaufman)

Problems with PSW Approaches

- Statute does not mandate that cognitive skills be assessed- just their manifestations
- Correlations don't validate a classification
- Little research on whether PSW methods actually work, discriminate hypothetical subgroups, or are related to instruction
- Do clinicians make better judgments because of cognitive tests or direct assessment and observation?
- Predicated on a straw person view of RTI (no standalone RTI identification method, comprehensive evaluation always required)
- Psychometric issues with discrepancy scores of any kind are well known, especially the use of rigid cut points, profile interpretations, difference scores, etc.

Federal Statute (1968 Definition)

- "The term “specific learning disability” means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, speak, read, write, spell, or to do mathematical calculations” (U.S. Office of Education, 1968, p. 34).

Federal Regulatory Guidance

- “The Department does not believe that an assessment of psychological or cognitive processing should be required in determining whether a child has an SLD. There is no current evidence that such assessments are necessary or sufficient for identifying SLD. Further, in many cases, these assessments have not been used to make appropriate intervention decisions” (Individuals with Disabilities Education Act (IDEA) regulations, 2006, p. 46651).

Simulation of PSW Methods (Stuebing et al., SPR, 2012)

- Created data sets where LD status of child is known; asked how well 3 PSW methods identified those children known to demonstrate LD at the observed level.
- Based on the idea that cognitive assessments should occur after Tier 2
- For all 3 methods, number of children identified as LD low (about 2-3% depending on size of discrepancy)
- For “not LD,” highly accurate (high specificity and few false negatives), but if “yes LD”, many false positives (low PPV)

Of 10,000 assessments:

- CDM: 1,558 identified as LD (8,436 as not LD); 25 correct, so 1,533 are false positives and get the wrong treatment
- DCM: 362 identified as LD (9,638 not LD); 89 correct, so 273 are false positives and get the wrong treatment
- XBA: 678 would be identified as LD (9,322 not LD); 353 correct, 325 are false positives and get the wrong treatment

Empirical Studies

- Kranzler et al., 2016
- Used WJIII normative sample (cognitive and achievement batteries) and XBA computer program to estimate sensitivity and specificity of LD identification (3 age groups; 900 participants)
- Identified very few children as LD-about 2%

Kranzler et al., 2016

- Very accurate for "not LD" assessments: Specificity = .92; Negative predictive Value = .89
- Very Inaccurate for "Yes LD": Sensitivity = .21; Specificity = .34
- "*In sum, results of this study do not support the use of the XBA method for identifying SLD.*"

Empirical Studies of PSW

- Conducted as part of TCLD intervention studies; large battery of cognitive and academic assessments permits us to classify students as “LD” or “not LD” according to PSW criteria.
- Classifications permit comparisons of:
  - LD identification decisions (agreement between methods); Chance corrected agreement (Kappa >.40)
  - Academic characteristics
  - How they respond to intensive reading interventions

Study 1: Miciak, Fletcher, et al., 2014

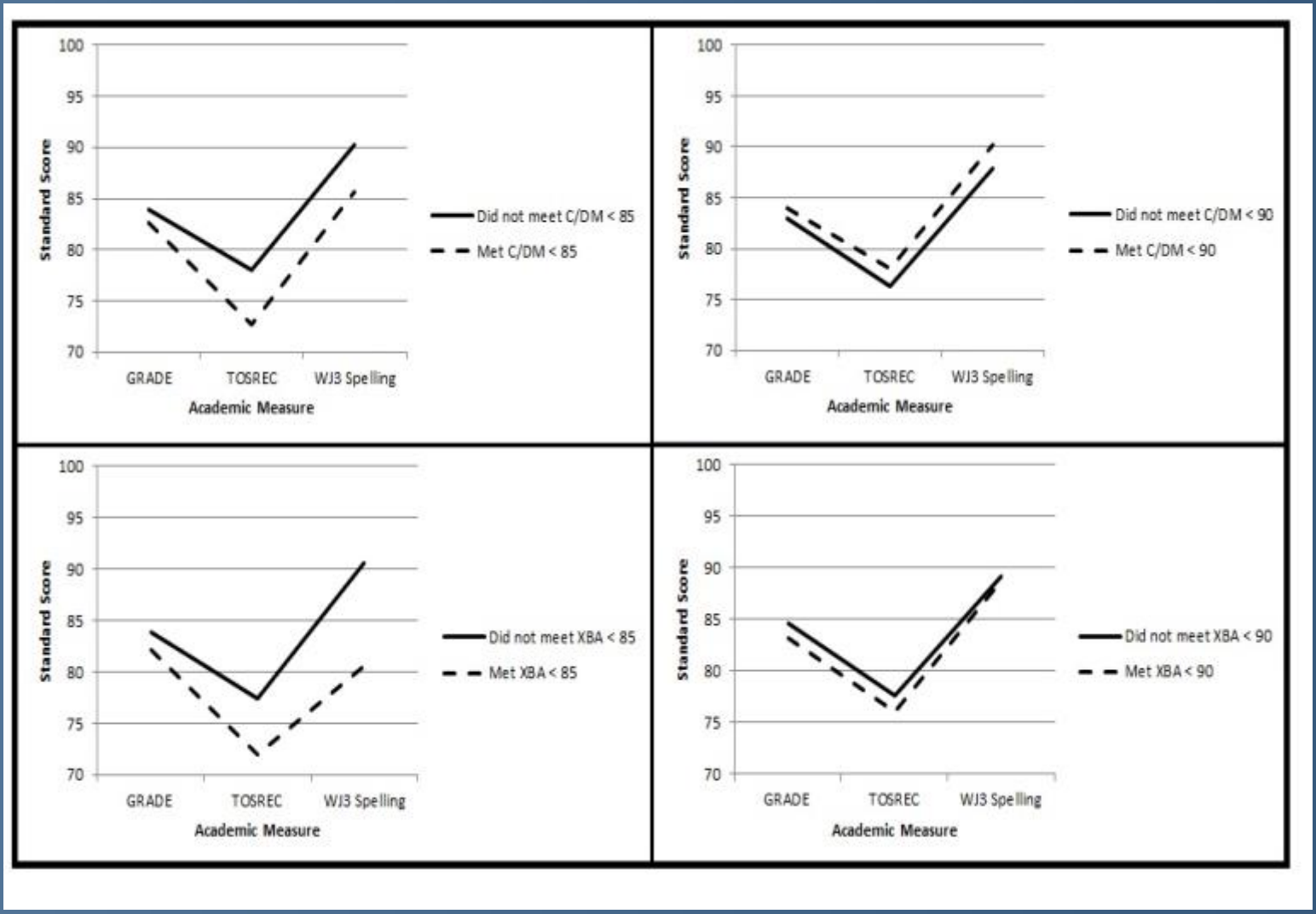
- The C/DM (Hale Model) and XBA Method (Flanagan Model) are frequently presented as equivalent PSW models (e.g. Hale et al., 2010)
- Do they identify the same students as LD or not LD?
- Is LD status (based on C/DM and XBA) associated with qualitative differences in academic functioning?

Agreement on LD identification between the C/DM and XBA methods at different low achievement cut points (Miciak, Fletcher et al., 2014)

	Approach			
Approach	C/DM < 85	C/DM < 90	XBA < 85	XBA < 90
C/DM < 85	-	62.1	30.0	13.6
C/DM < 90	0.63	-	20.0	20.5
XBA < 85	0.31	0.11	-	23.4
XBA < 90	-0.04	0.03	0.22	-

Below diagonal = kappa; above diagonal = percentage overlap (total identified by both approaches/ total identified).

Performance on external reading variables of groups that met and did not meet PSW LD identification criteria



Study 2: Miciak, Taylor et al., 2014

- What is the level of agreement achieved by two comparable, but different assessment batteries utilized for LD identification within the C/DM? (word ID, Fluency, Comprehension)
- 2. What is the level of agreement achieved by the two assessment batteries on the academic domain of eligibility for LD?

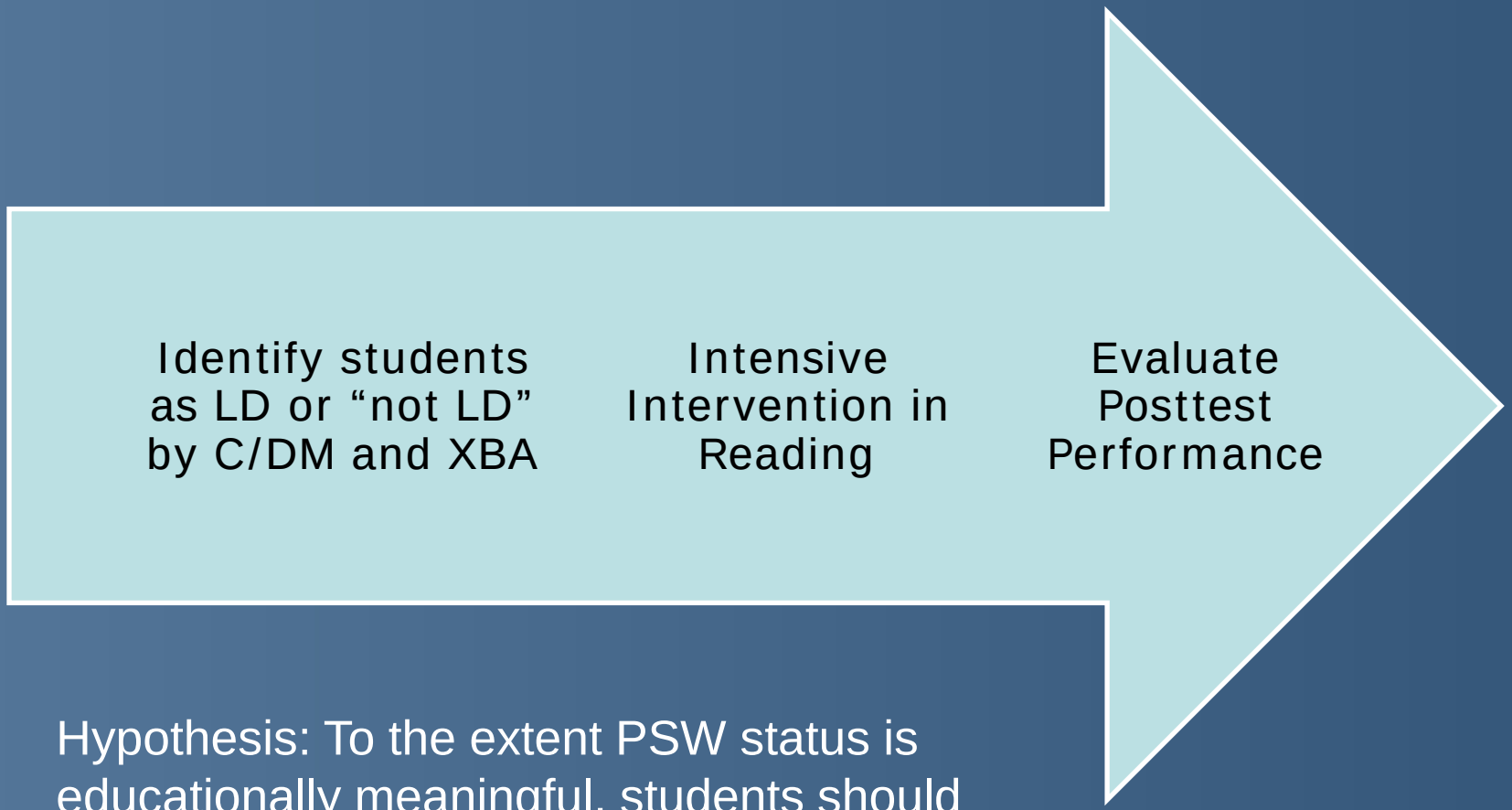
Two Batteries Varying in Achievement tests

Reading Domain	Assessment Battery 1	Assessment Battery 2	Cognitive Tests
Basic Reading	WJ3 Letter/Word ID	WJ3 Word Attack	CTOPP Phonological Awareness
Reading Fluency	TOWRE Phonemic Decoding	TOWRE Sight Words	CTOPP Rapid Letter Naming
Reading Comprehension	WJ3 Passage Comp	Gates MacGinitie Passage Comp	KBIT-2 Verbal Knowledge

Results (cut point < 90): Poor Agreement (Chance corrected agreement (Kappa) > .40

- *Kappa* = .28
- Percent agreement = 65%;
- Percent positive agreement = 62%
- Percent negative agreement = 67%
- Also little overlap in the achievement domain identified as most impaired

Study 3: Miciak et al., 2016



Hypothesis: To the extent PSW status is educationally meaningful, students should respond differently to the same intervention.

But first, replication

- Do the XBA and C/DM Methods identify the same students as LD?

Table 3

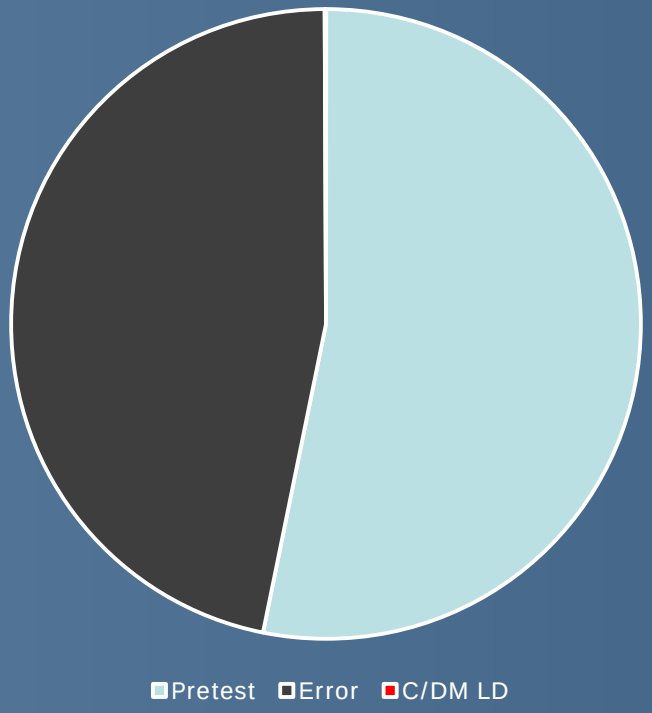
Agreement for LD identification decisions for the XBA and C/DM methods for LD Identification

	C/DM		
XBA Method	LD	Not LD	Total
LD	59	31	90
Not LD	64	52	116
Total	123	83	206

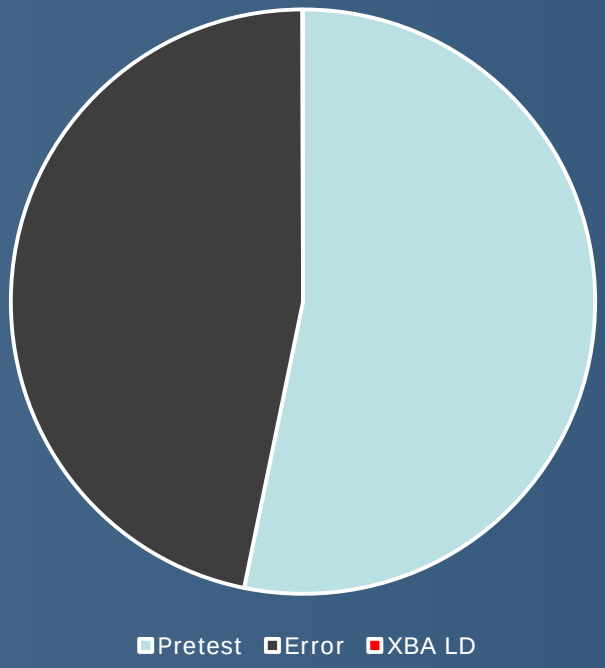
Kappa = -.10; XBA = Cross Battery Assessment Method (Flanagan et al. 2007); C/DM = Concordance Discordance Model (Hale & Fiorello, 2004);

Reading Comprehension at Posttest

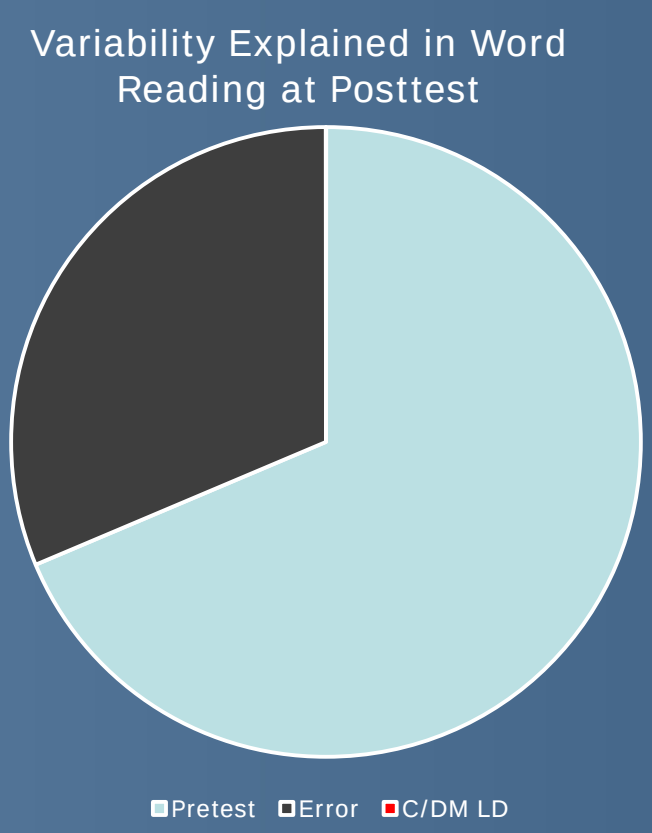
Variability Explained in Passage Comprehension at Posttest

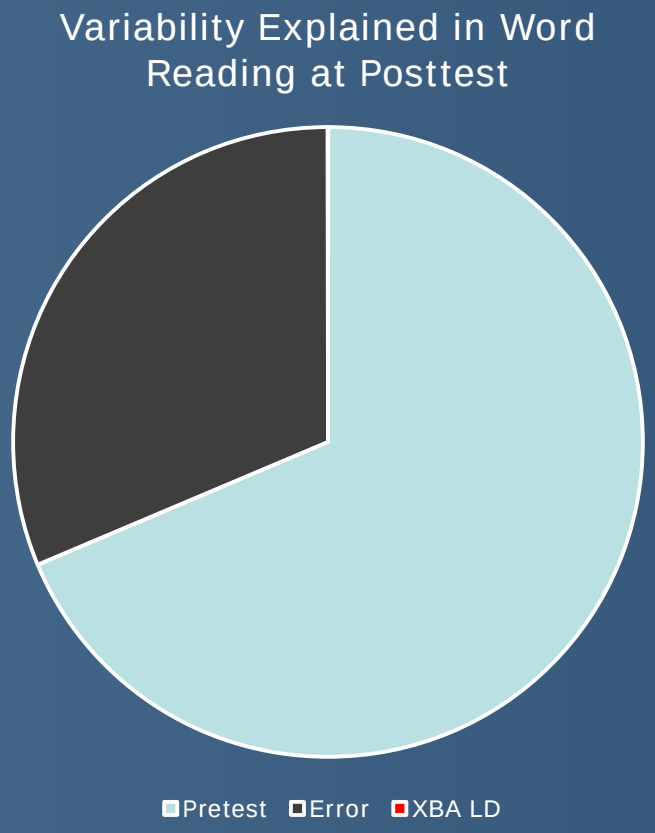


Variability Explained in Passage Comprehension at Posttest



Word Reading at Posttest





How much better can we predict responders?

Pretest only

Cross tabulation of predictions based on r^2 = .828 and a cut point for pass/fail of z < --.66

	Pass	Fail
Pass	670	76
Fail	76	178

Total number of misclassifications = 152

Pretest + Gc Status

Cross tabulation of predictions based on r^2 = .838 and cut point for pass/fail of z < -.66

	Pass	Fail
Pass	672	73
Fail	74	181

Total number of misclassifications = 147

PSW Empirical Research Summary

- PSW Methods do not overcome problems of poor reliability at the individual level
- Different PSW Methods identify different kids as LD and not LD and do not discriminate LD and non-LD low achievers
- Generally, PSW Methods identify few students. Lots of testing for every 1 student.
- PSW status does not predict differential treatment response
- Cognitive assessments do not answer “why.” Correlational data with no established treatment implications
- Clinicians make better decisions watching children as they read, write, and do arithmetic

Cognitive assessments do not answer "why." Correlational data with no established treatment implications

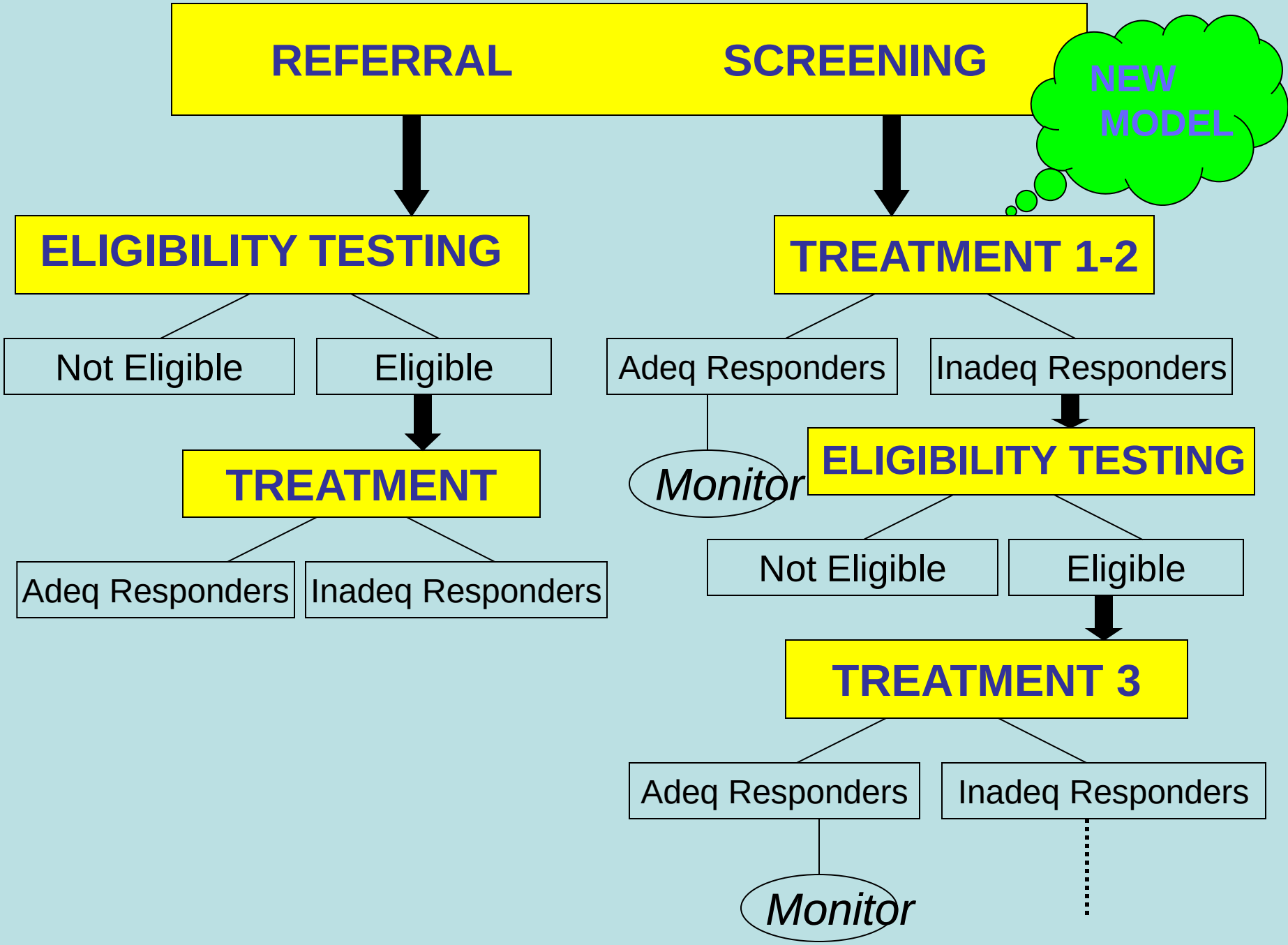
- Processing subtypes weakly related to intervention outcomes; little evidence that knowledge of cognitive strengths and weaknesses facilitates intervention (Kearns & Fuchs, 2014; Pashler et al., 2010)
- No additional information not found in achievement data, which is cognitive
- Is the question about whether the child is slow learner or SLD? Find the right child in order to intervene (or not)? OR
- Is the question "why doesn't this child respond to instruction that works with most kids?" More intensity and differentiation is the first step derived out of strong core instruction

New Alternatives: Response to Instruction (Intervention)

- Universal screening and serial curriculum-based assessments of learning in relation to instruction
- As one criterion, student may be LD if they do not respond to instruction that works with most students (i.e., unexpected underachievement)
- May identify a unique subgroup of underachievers that reflects an underlying classification that can be validated (Al- Otaiba & Fuchs, 2002; Vellutino et al., 2003)
- School-wide change- not just enhanced pre-referral services and an identification method by itself

Misconceptions of RTI

- RTI vs. MTSS (With ESEA, MTSS is a general education process providing multiple tiers of support; RTI is the identification process emanating from MTSS)
- Goal of RTI is to identify students as LD (MTSS is a service delivery framework and identification is a by product of the process)
- Inadequate instructional response equates to special education eligibility (Instructional response is just one criterion for LD)
- Evaluation procedures fundamentally different (a comprehensive evaluation is required and most components of evaluation/eligibility are universal)
- What you do before a cognitive assessment...


REFERRAL
SCREENING
NEW MODEL
ELIGIBILITY TESTING
TREATMENT 1-2
Not Eligible
Eligible
Adeq Responders
Inadeq Responders
TREATMENT
Monitor
ELIGIBILITY TESTING
Adeq Responders
Inadeq Responders
Not Eligible
Eligible
TREATMENT 3
Adeq Responders
Inadeq Responders
Monitor

LD Summit: Hybrid Method (Triangle Approach) to Identification (Bradley et al., 2002)

1. Establish Low Achievement
2. Evaluate Response to Instruction (Is underachievement expected?)
3. Apply the Exclusions

What is the validity of this hypothetical classification? (Low achievement is necessary, but not sufficient).

- www.air.org/ldsummit

TEXAS CENTER for LEARNING DISABILITIES

TN SLD Definition Made Easy

Condition 1

Underachievement in:

Basic Reading Skills
Reading Fluency
Reading Comprehension
Written Expression
Mathematics Calculation
Mathematics Reasoning

+

Condition 2

RTI:

Insufficient response to scientific, research-based intervention.

+

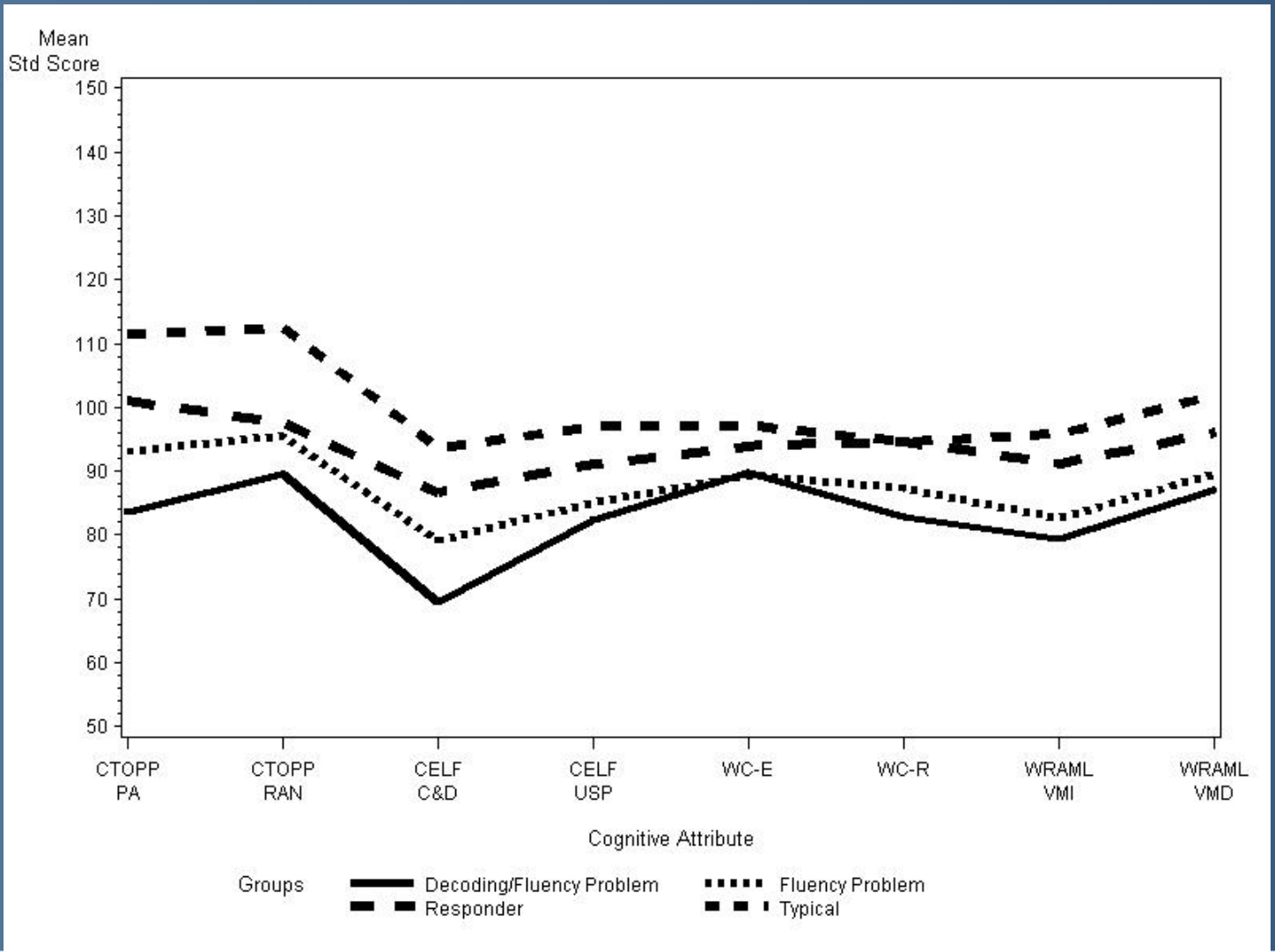
Condition 3

Exclusionary Factors:

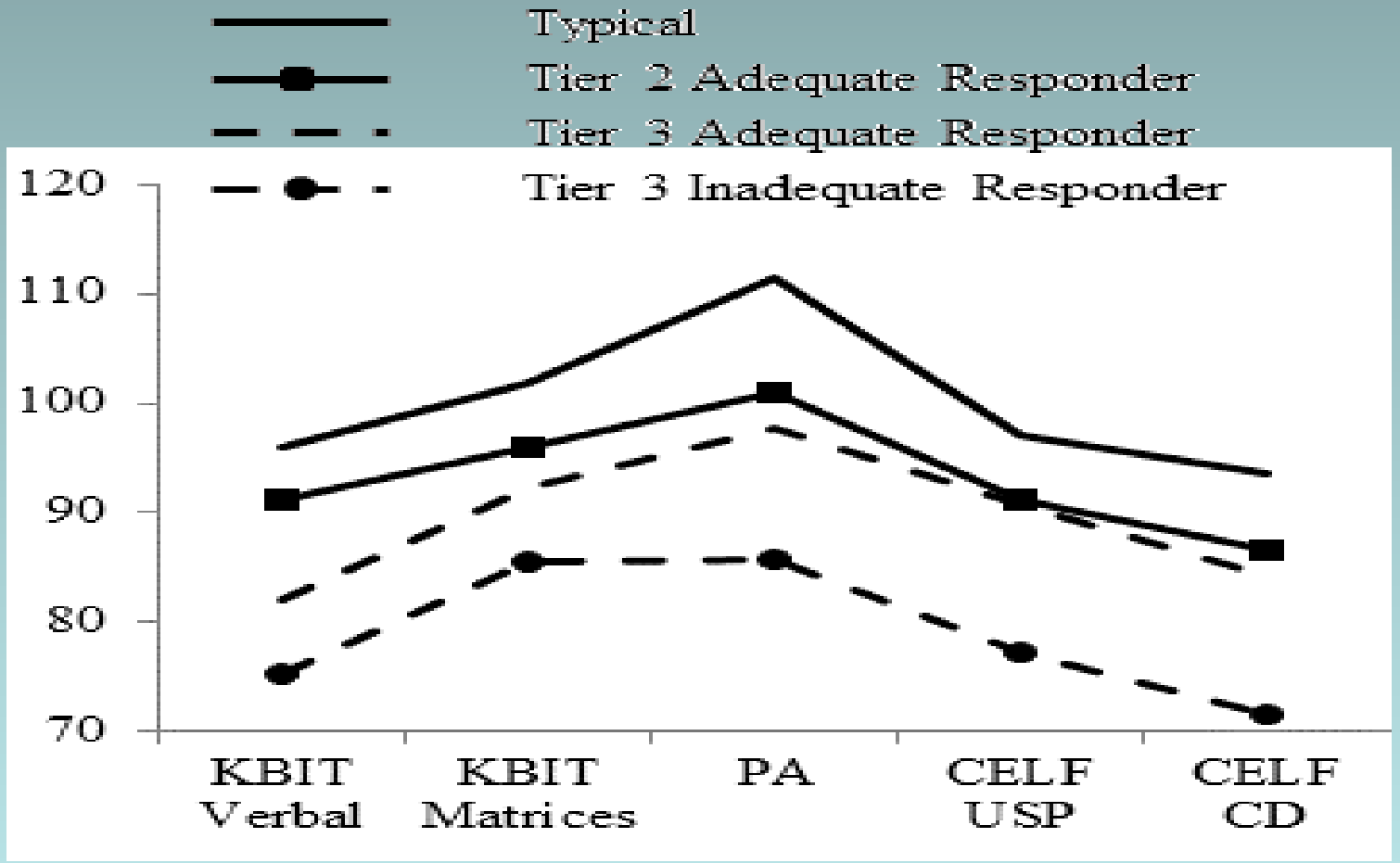
Conditions 1 and 2 are not primarily due to:

Visual, Hearing, or Motor Disability;
Intellectual Disability;
Emotional Disturbance;
Cultural Factors;
Environmental or Economic Disadvantage;
Limited English Proficiency; or,
Excessive Absenteeism.

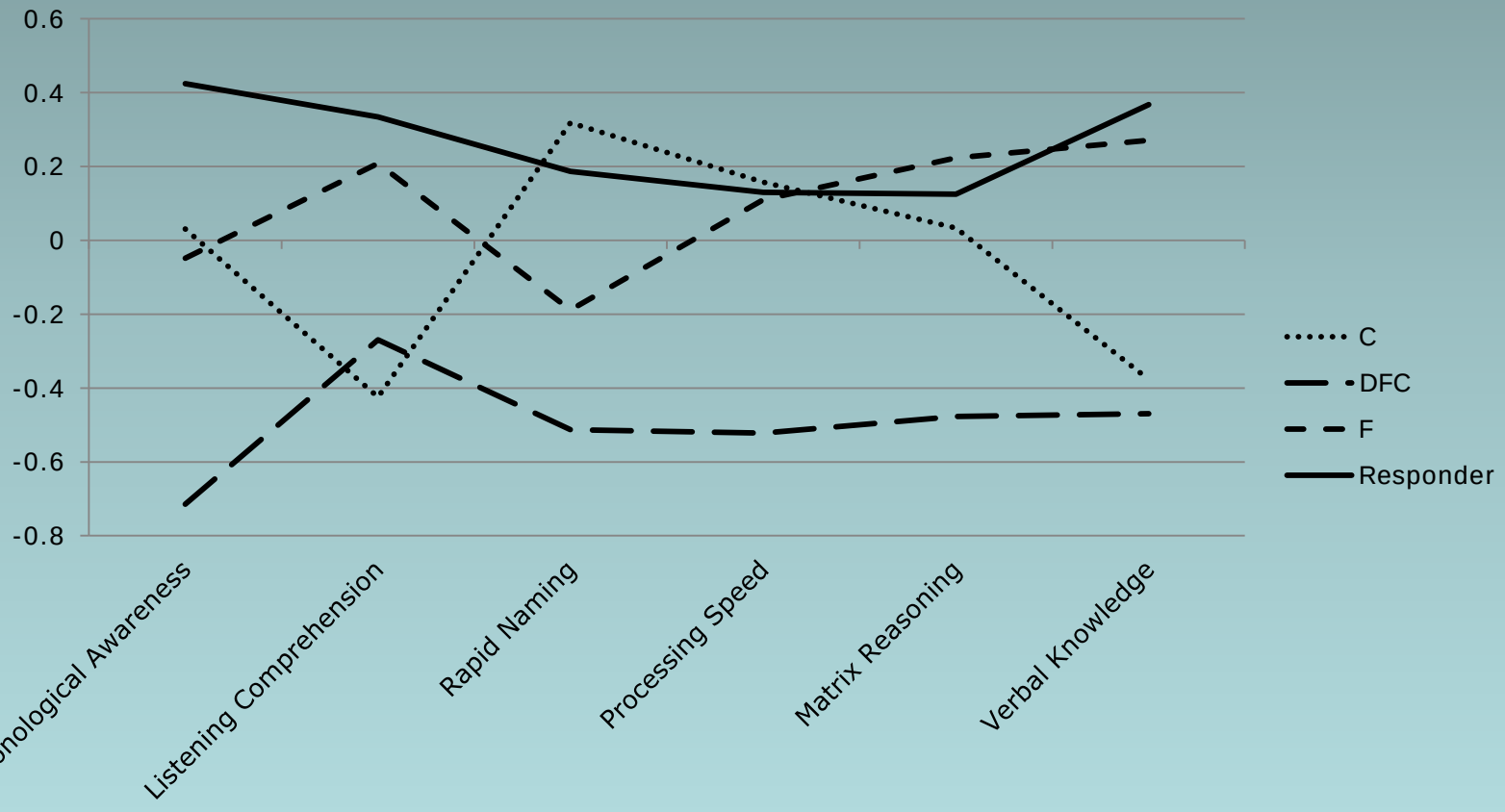
Validity of the hybrid method(Fletcher et al., SPR, 2011)



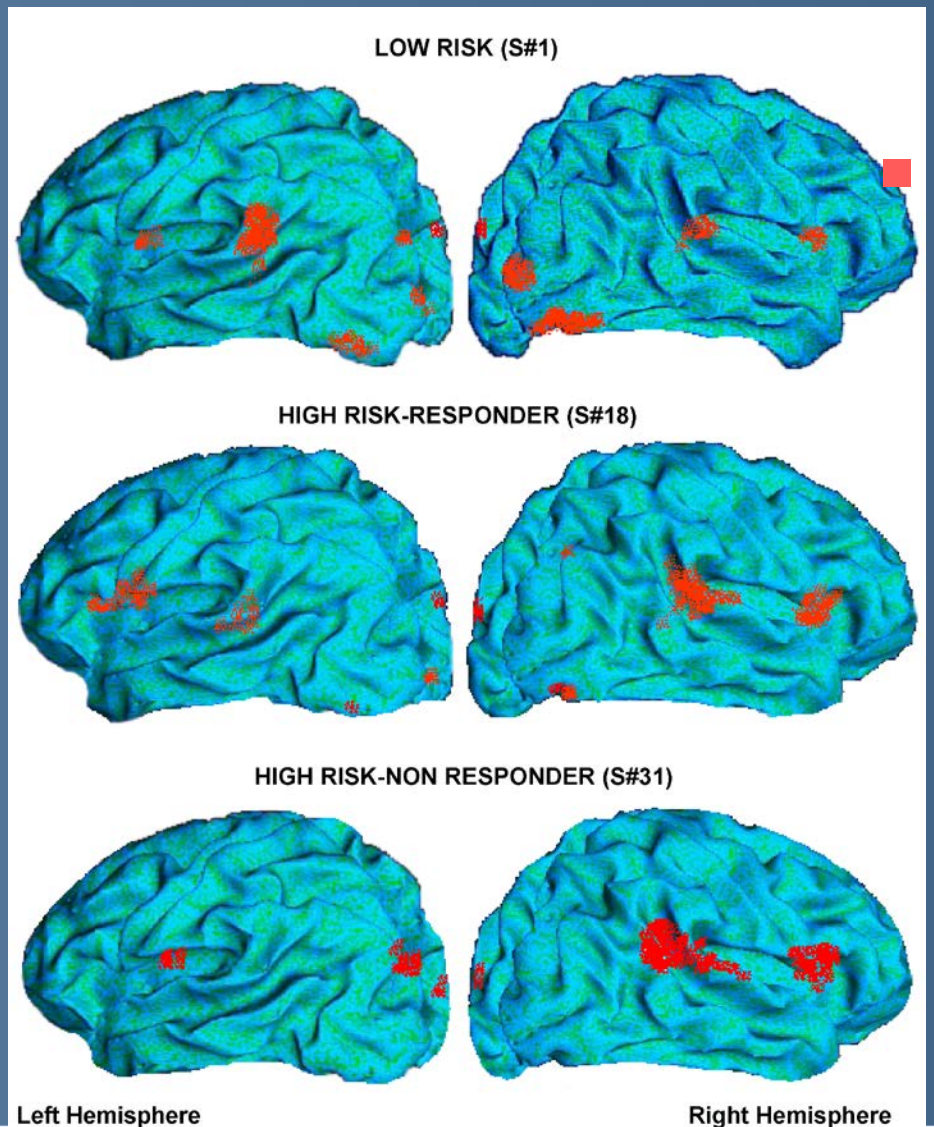
Inadequate Responders: Tier 3 (baseline cog characteristics) Denton et al., 2012



Adolescents: Tier 2 Cognitive Attributes Miciak et al., 2013)



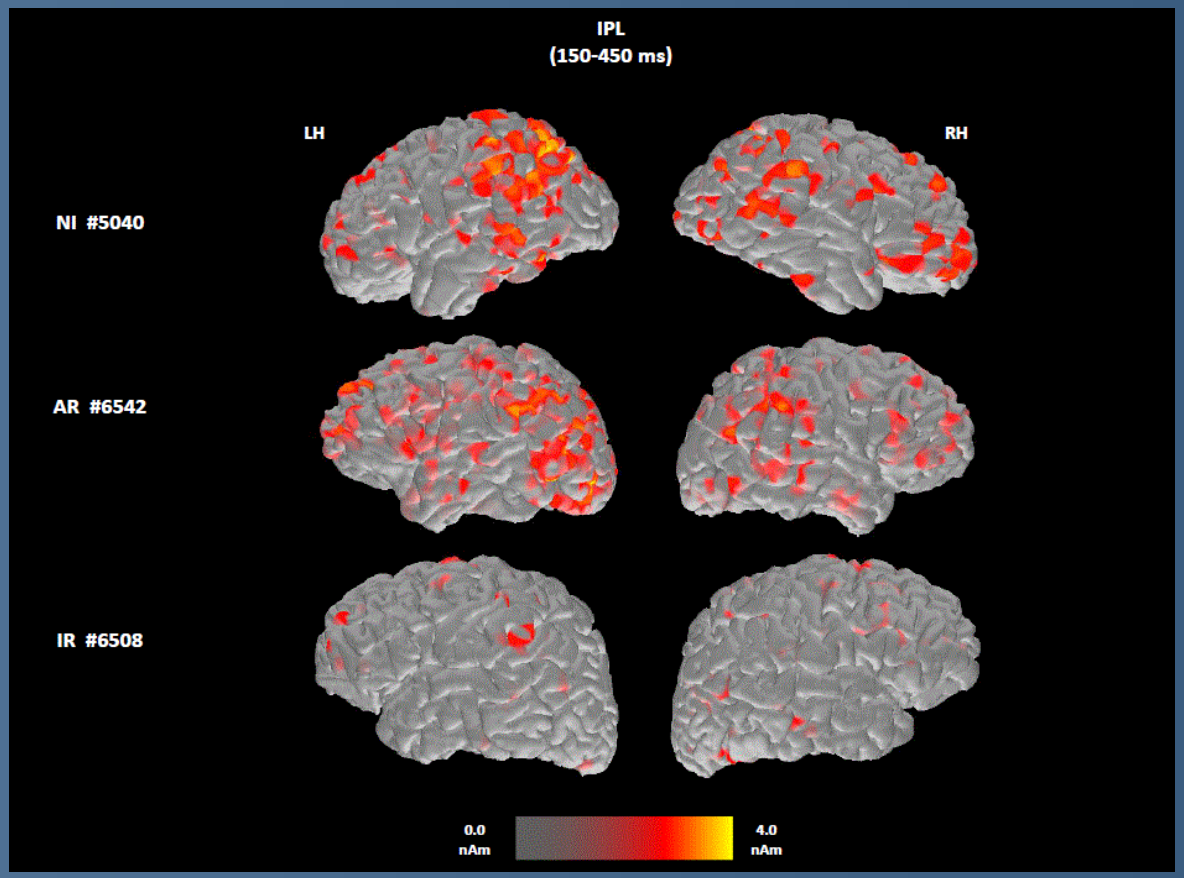
Grade 1 Intervention (pseudoword task)



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

TEXAS CENTER for LEARNING DISABILITIES

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



Reliability of the Hybrid Method Fletcher et al., 2013)

- If approach is to take a single assessment and set a cut point, identification of individual students will still be inadequately reliable
- Attributes of LD (low achievement, inadequate instructional response) are dimensional (continua)
- Difficult to assess people in relation to set cut point
- May be improved if multiple criteria are used and confidence intervals
- How many resources should be devoted to finding the right student? Treat, then test

TEXAS CENTER for LEARNING DISABILITIES

Understanding the agreement problem

- Consider WJIII Basic and TOWRE composite in Fletcher et al. (2011); r = .88 (.94 if corrected for unreliability). Set cut points at 25th %tile: agreement (k) = .76
- If correlation = 1.0, k = 1.0
- 50th %tile, k = .77; 10th%, k = .71
- If actual reliability (<.90), k =.76
- Adjust for normative differences (sample mean above normative mean for WJ and below on TOWRE, k = .39
- Sample size of 257, k = .27-.51

Actual Agreement

- WJ-TOWRE: k =.38
- WJ-CBM benchmark: k = .25
- CBM benchmark-TOWRE: k = .61
- Dual Discrepancy: k = .21 with WJ, .58 with CBM benchmark, .60 with TOWRE

Coverage

- Consider 104 inadequate responders as pool to be detected. How many NOT detected by each indicator?
- WJ: .72
- TOWRE: .14
- CBM benchmark: .30.
- Dual Discrepancy: .11 (but increases pool to 134, adding 29 inadequate responders and 1 typical (i.e., higher achievers)

Multiple Criteria

- CBM benchmark alone identified 14 children with reading scores on TOWRE, WJ, and other tests well above the average range (false positives?); this number increased dramatically with dual discrepancy
- TOWRE and CBM benchmark agreed on 90/104 children, excluding those only identified by CBM or the 30 added by dual discrepancy (about 5' of assessment time)
- Think about a pool; use multiple assessments; prioritize Type II over Type I errors (i.e., set the cut point high).

Identification issues are universal across methods

- No qualitative markers of LD (dimensional disorder
- Measurement error (why do we persist with rigid cut points?
- Instructional response may be a continuum; no qualitative markers of inadequate responders
- Specific issues in RTI are more than cut points and don't equate to the adequacy of the measurement of instructional response
- How does the field move to informed decision making using multiple criteria and stop relying on psychometric methods?

TEXAS CENTER for LEARNING DISABILITIES

Can We "Psychometrize" Individual Identifications of LD? Not a New Question!

"Even though the psychometric difficulties may never be completely resolved, classification systems should at least be based on a coherent psychology of helping…there is no shortage of children who experience problems…Assessments and classifications can be guided by principles of intervention design with expected errors of judgment and measurement partially moderated through a recursive {sequential} system of recursive and empirical practices… (Macmann et al., 1988, p. 146)

"The real dilemma may be that procedures no more technically adequate than {formula-based procedures} are in wide use today. One wonders if a technically adequate solution to the problem of LD identification exists" (Danielson & Bauer, 1978, p. 175)

Best Practice

- Use assessments that are reliable, well-normed on same sample, and valid
- Assess multiple domains and consider comorbidity
- Assess in relation to treatment
- Use confidence intervals
- Multiple criteria; comprehensive data gathering process

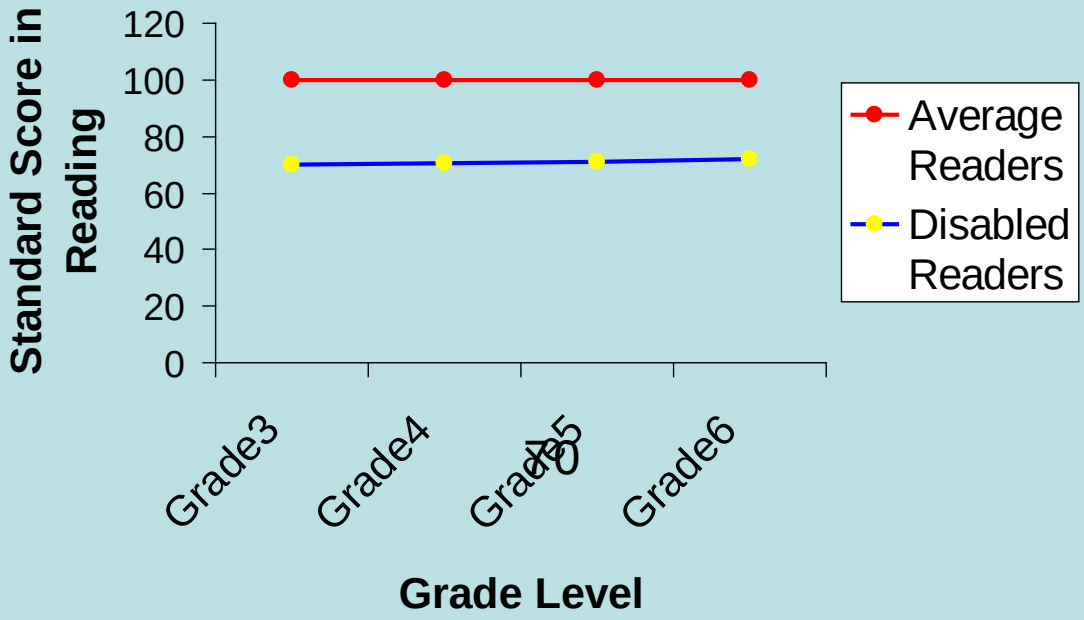
How do We Move from Identification to Intervention

- Use assessments of academic domains to differentiate instruction
- Increase intensity: More time on task (supplement, not supplant)
- Comprehensive programs
- MTSS framework focused on early identification and prevention; link prevention and remediation

Effective Intervention for Basic Reading (Dyslexia)

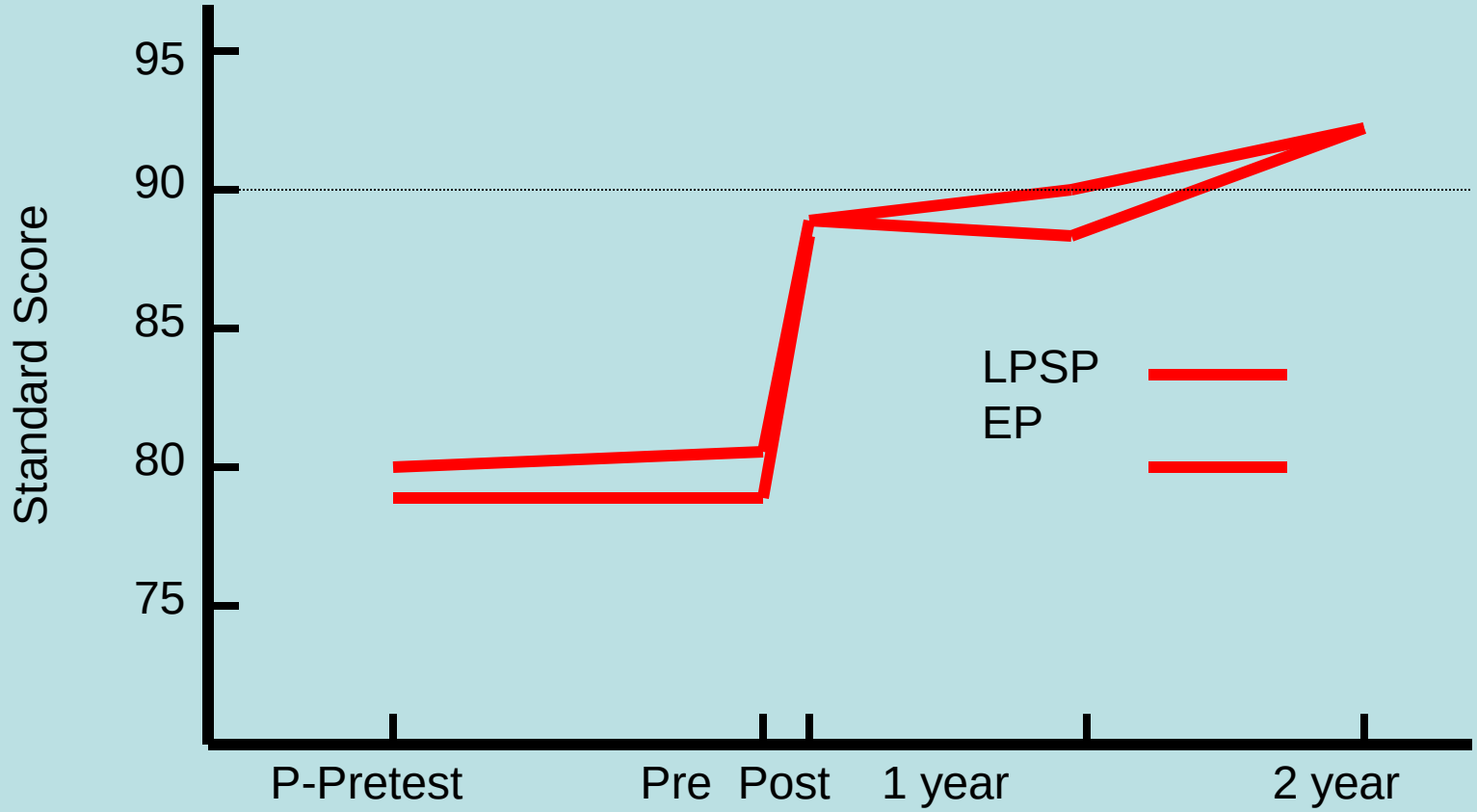
- Teach phonics EXPLICITLY in the context of an approach that includes comprehension and fluency components (NRP about explicitness, not phonics)
- Prevent word recognition problems because remediation is difficult and requires considerable intensity, especially for automaticity
- Older students and adults can be taught word recognition if the approach is sufficiently intense
- No specificity of appropriate interventions
- Traditional service delivery models ineffective

Change in Reading Skill for Children with Reading Disabilities who Experience Growth in Reading of .04 Standard Deviations a Year



71.8

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

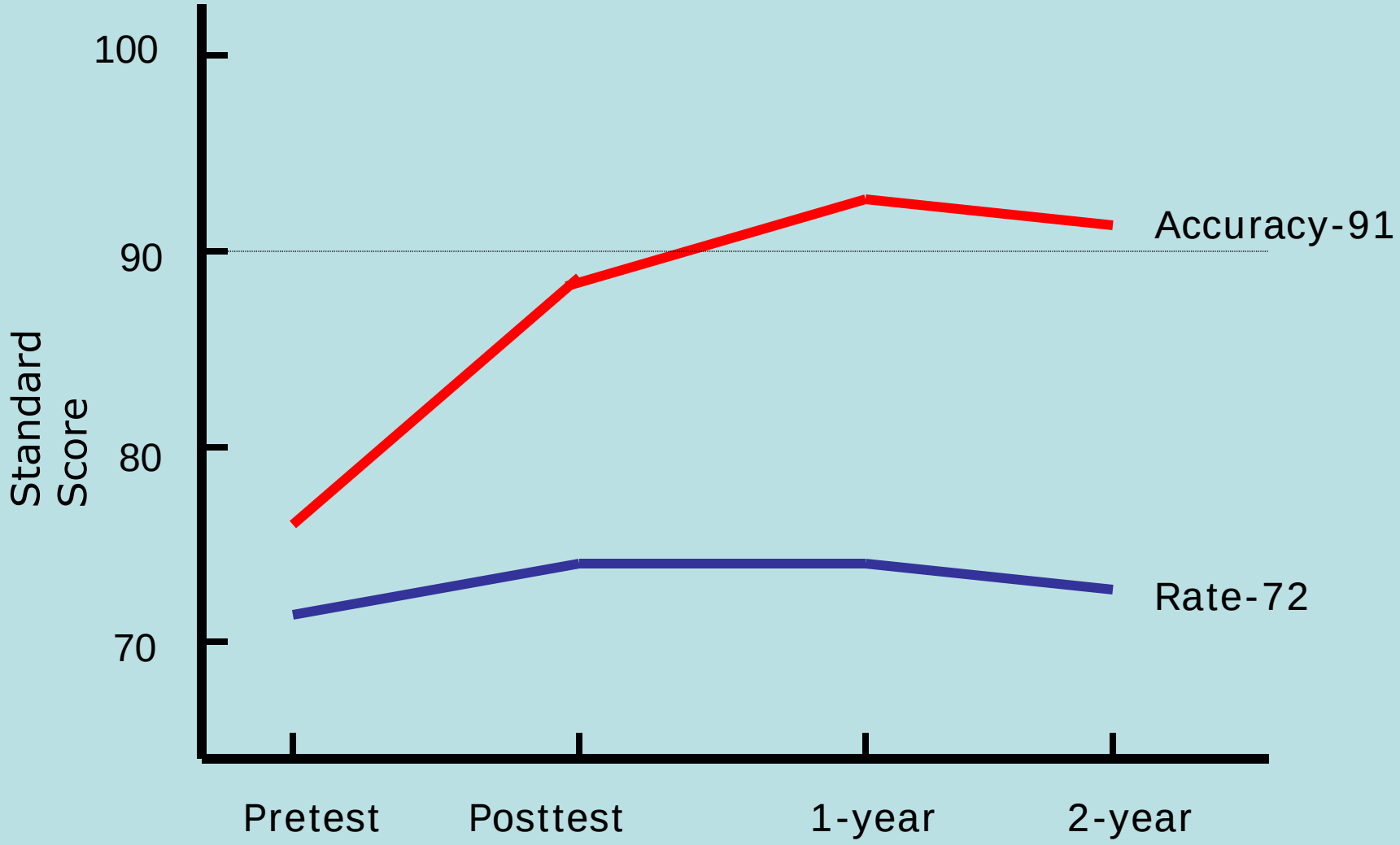


Torgesen et al., 2001

Time x Activity Analyses for the Two Intervention Approaches

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

Reading rate remained quite impaired



Remediation is not a solution!

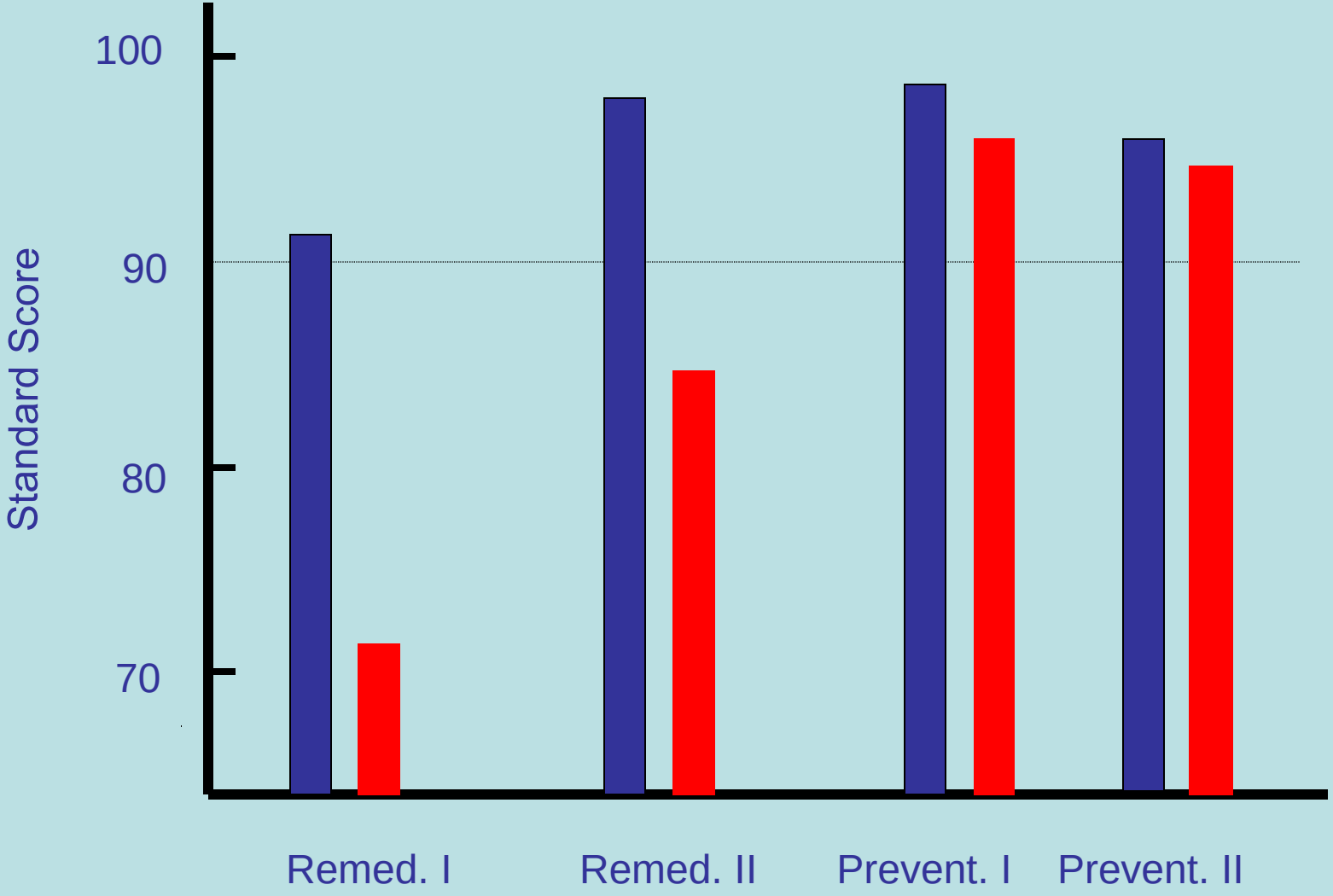
Reading rate is limited because the proportion of words in grade level passages that children can read “by sight” is less than for average readers.

How do you close the gap when the student is already 3- 5 years behind?

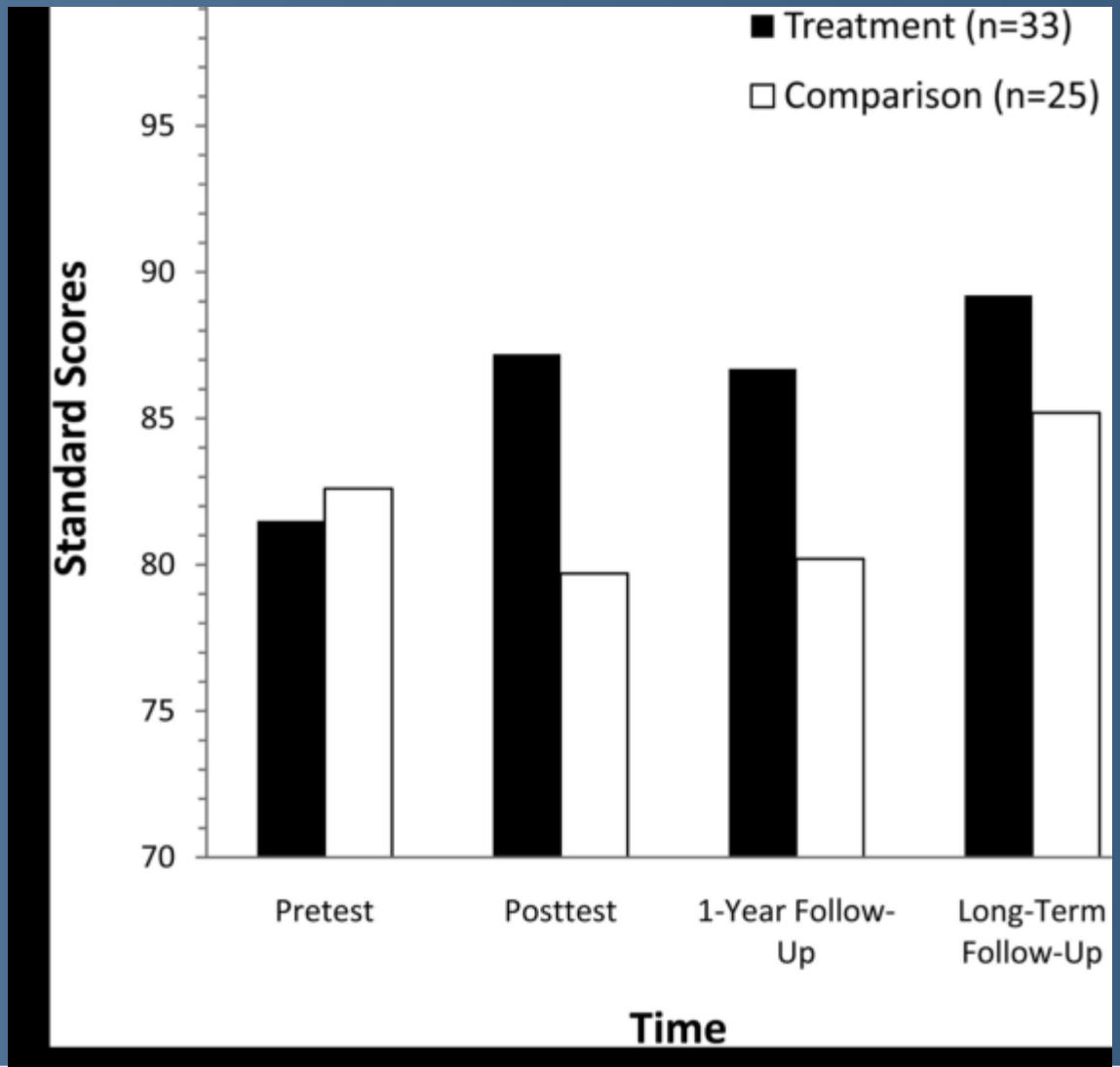
Early Intervention is Possible

- Risk characteristics present in Kindergarten and G1
- Letter sound knowledge, phonological awareness, oral language development
- Assess all children and INTERVENE- first in the classroom and then through supplemental instruction

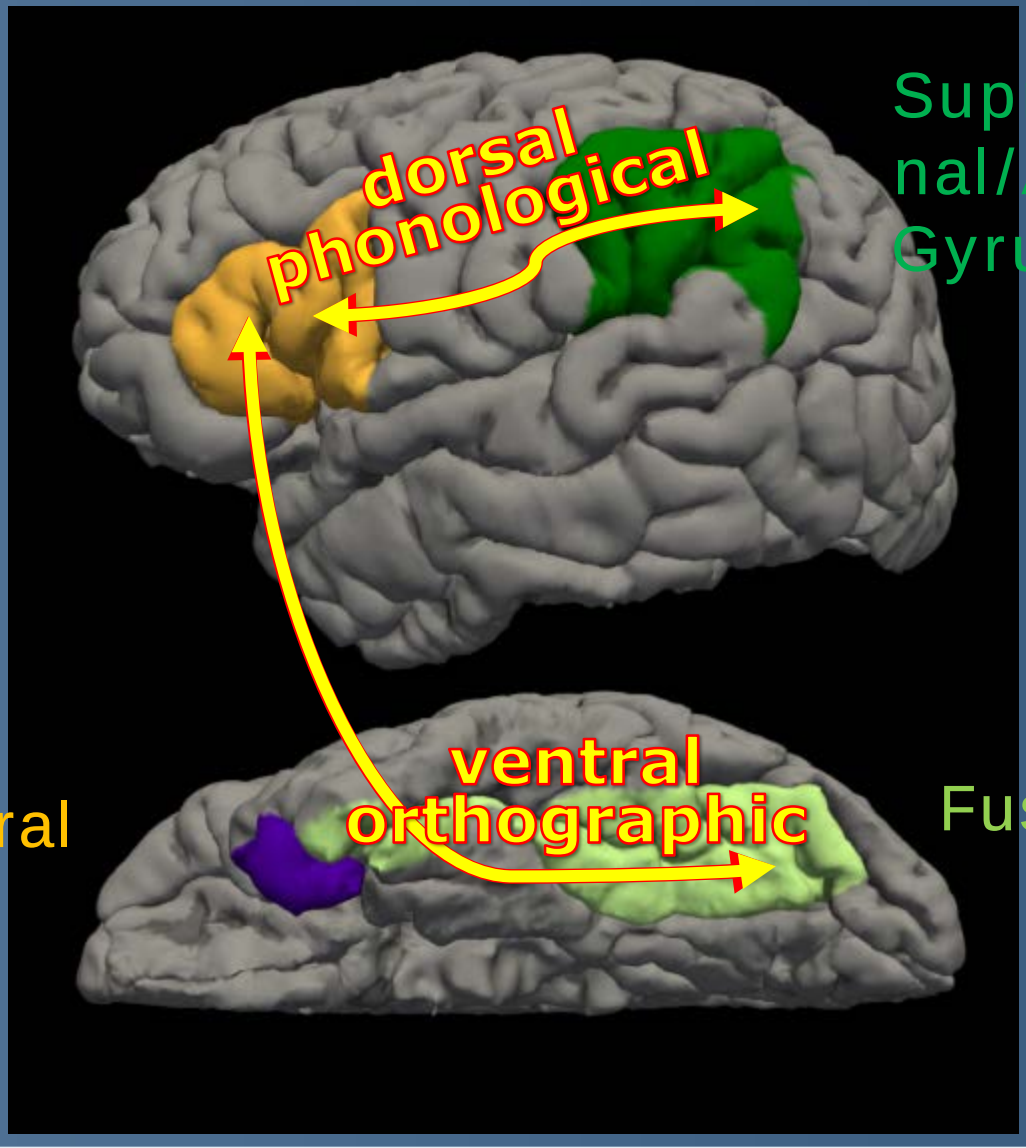
Differences in outcomes for Basic Reading Skills and Rate in Prevention vs. Remediation Studies



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



Dorsal vs ventral pathways in left hemisphere reading network



Inferior Frontal Gyrus

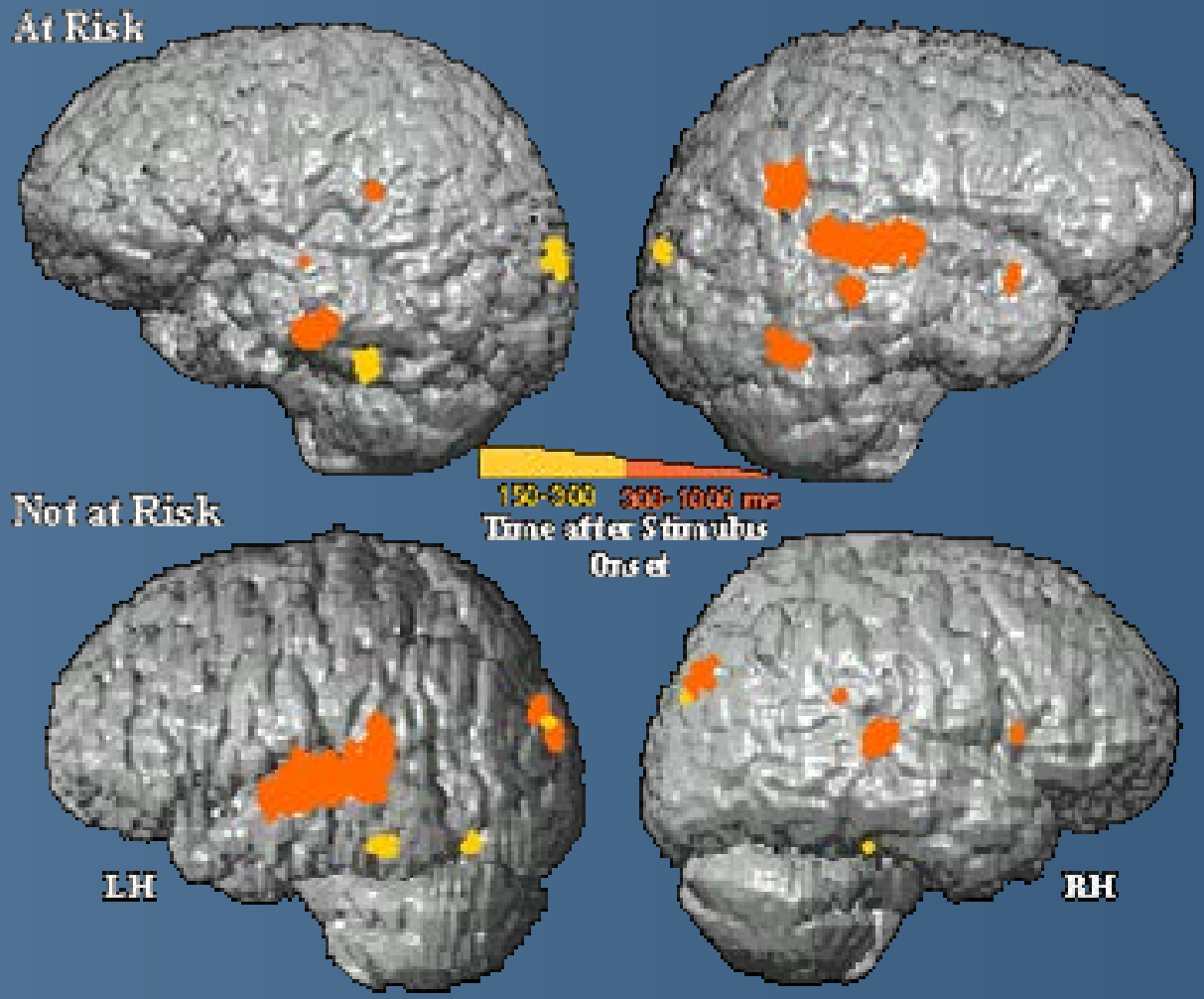
Supramarginal/Angular Gyrus

Temporal Pole

Fusiform Gyrus

TEXAS CENTER for LEARNING DISABILITIES

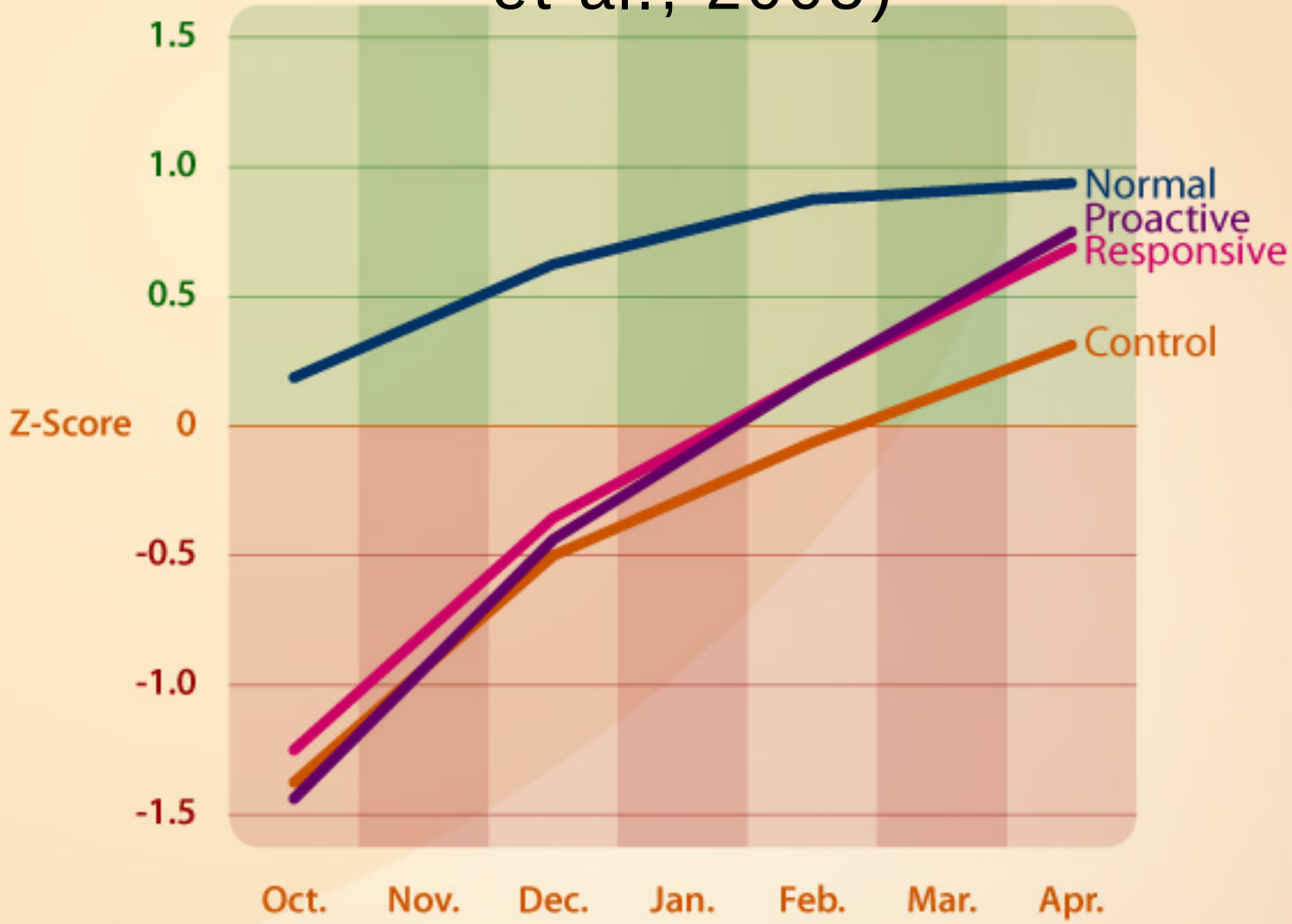
Brain Activation Profiles Before Intervention (end K) (letter sound task)



N= 45 children 6 yrs old

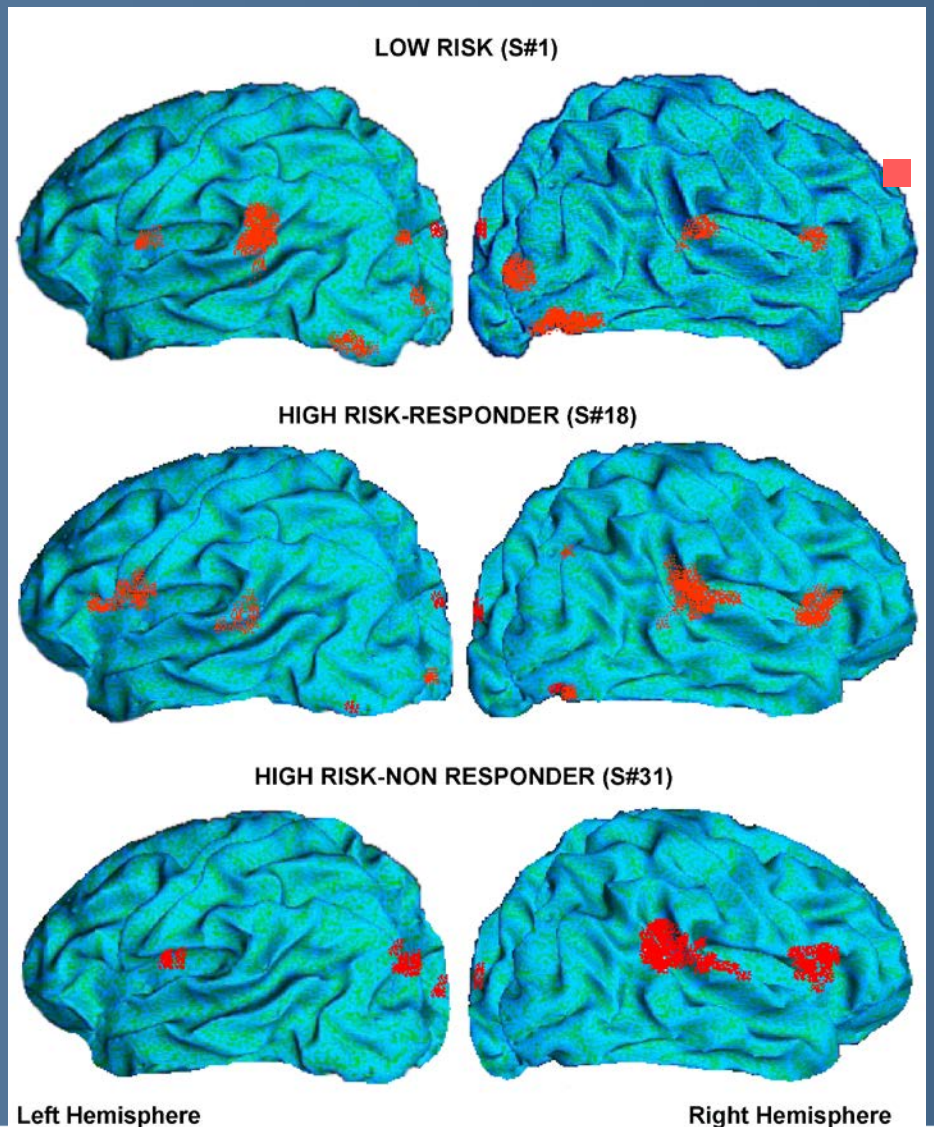
Simos et al., J Child Neural, 2002

Growth in Fluency by Intervention (Mathes et al., 2005)



ScaleUP

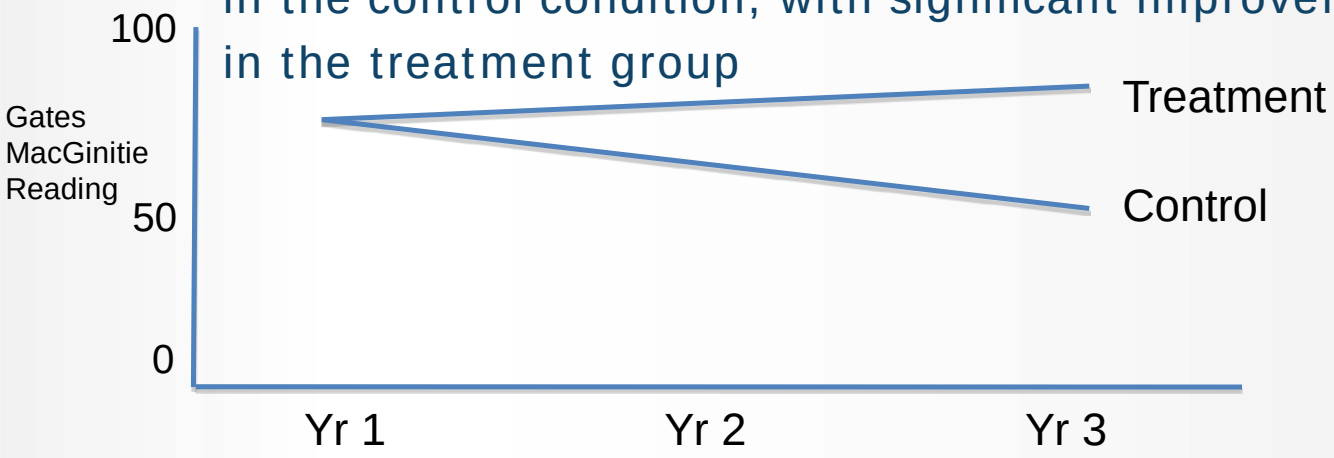
Grade 1 Intervention (pseudoword task)



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

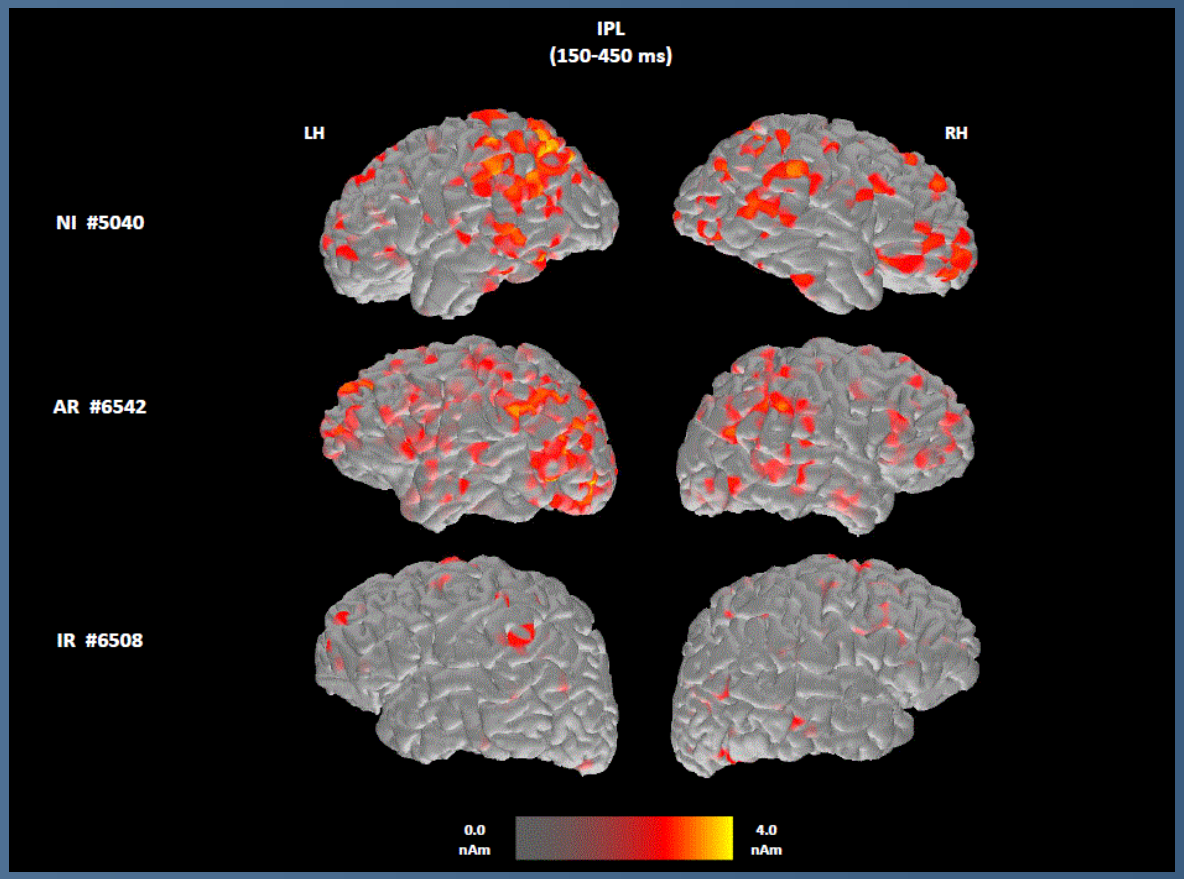
- NICHD middle school studies – intensive interventions for adolescents with severe reading difficulties

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



TEXAS CENTER for LEARNING DISABILITIES

Baseline MEG Patterns for Adolescent Adequate and Inadequate Responders



Who is Dyslexic/LD (Instructional Model)?

- 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
- Advances in science occur at the boundaries of disciplines (Wilson, 1998)

TEXAS CENTER for LEARNING DISABILITIES

Reading for SUCCESS
www.texasldcenter.org

Our Website

www.texasldcenter.org

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

Website Resources

- Our Research, research resources
- Education Research Matters
- Parent and Teacher Resources
- External Resources
- Contact Us With Feedback

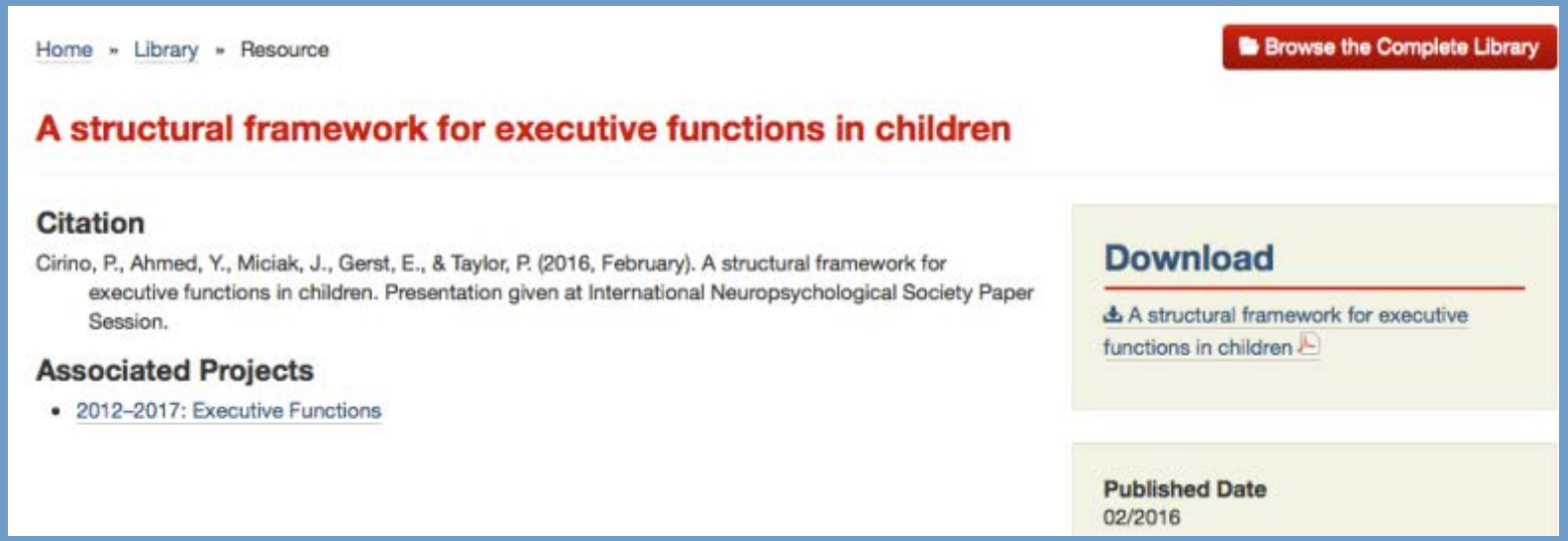
How Many People Visited The Website in 2016?

70,068 page views

17,535 downloads of resources

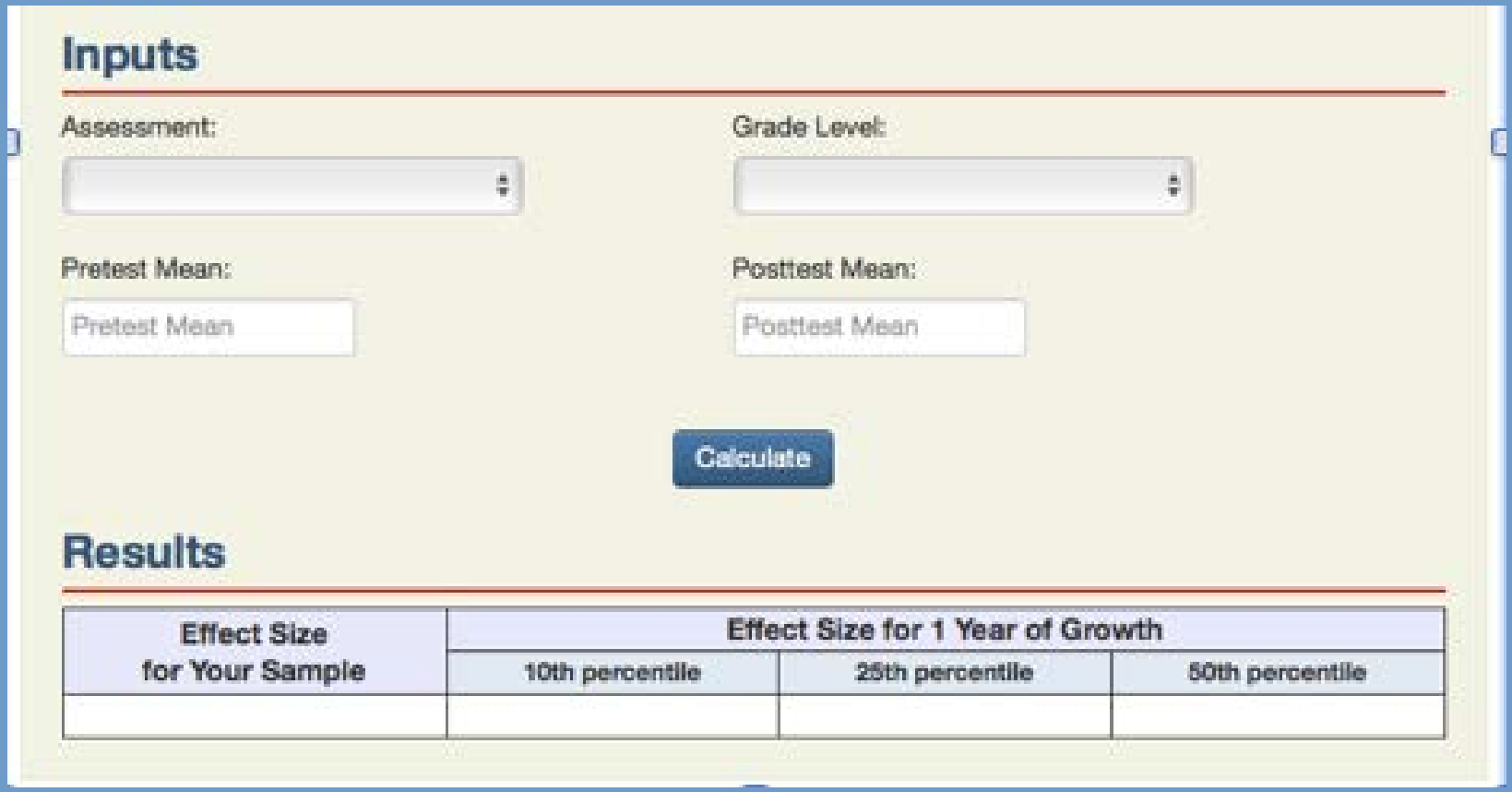
Research Library

- 159 Resources written by the Texas Center for Learning Disabilities research teams ranging from chapters, articles, and presentations available for downloading.

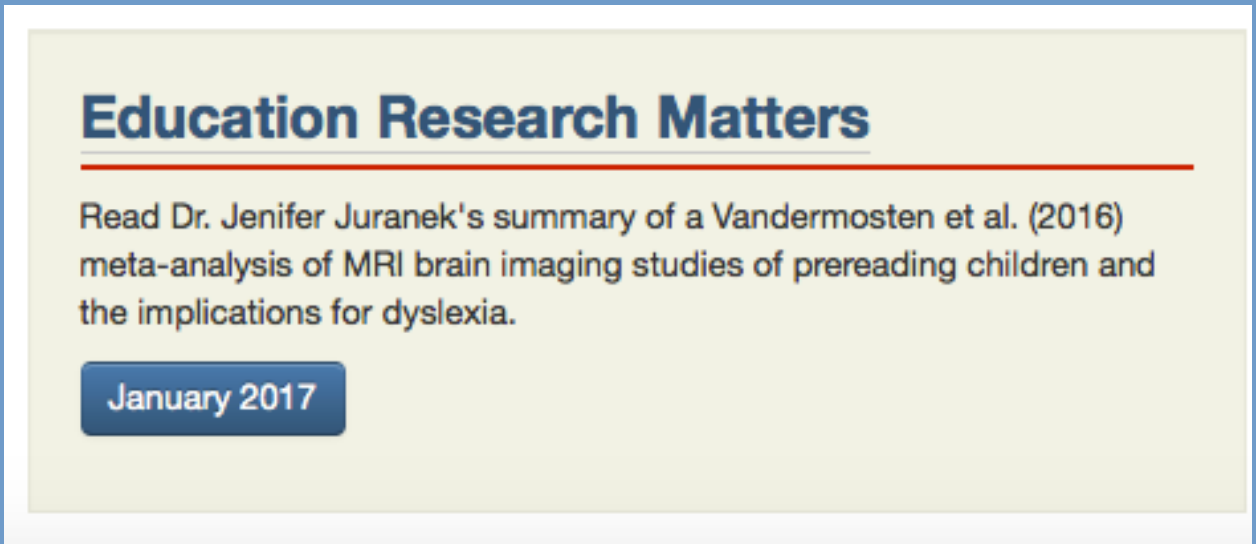


Online Benchmark Calculator

Helpful tool to help calculate a standardized mean difference scores for single-group studies of students in grades 1-12.



Education Research Matters



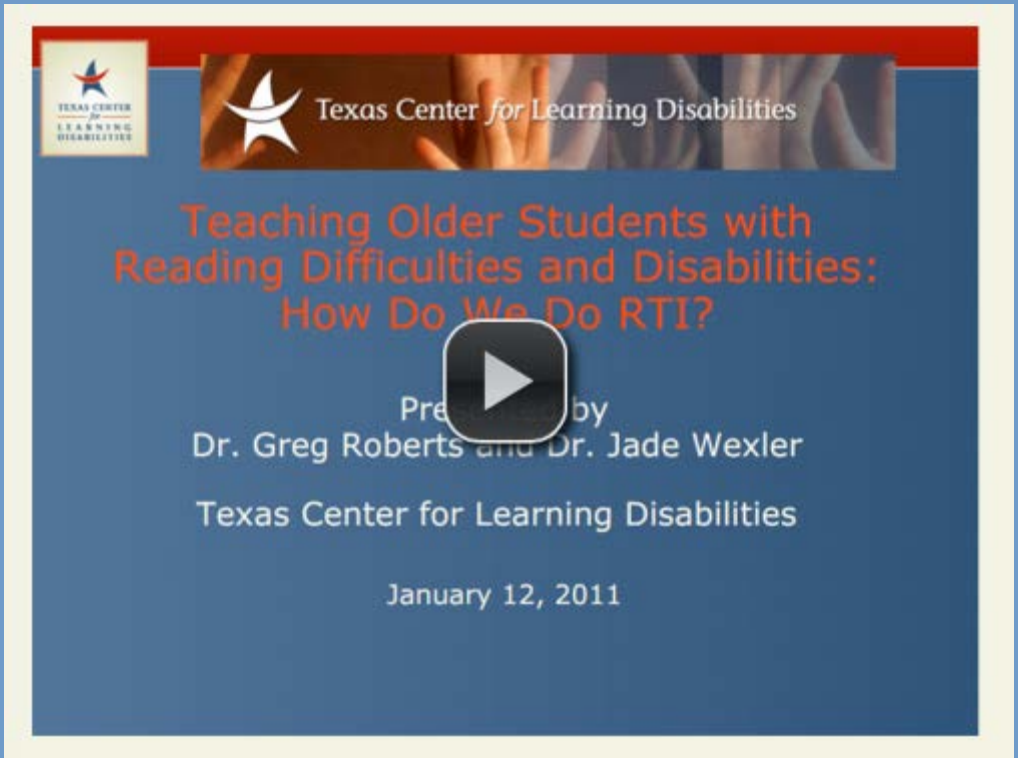
- Monthly researchers on Texas Center for Learning disabilities team pick a research article to review and summarize.
- Provides current research article: overviews, backgrounds, key findings, recommendations, summaries and references

Interviews, Podcast, Videos

Podcast for parents: What is RTI?

Interviews, Podcast, Videos

Watch Videos for Educators: Teaching Older Students with Reading Difficulties and Disabilities



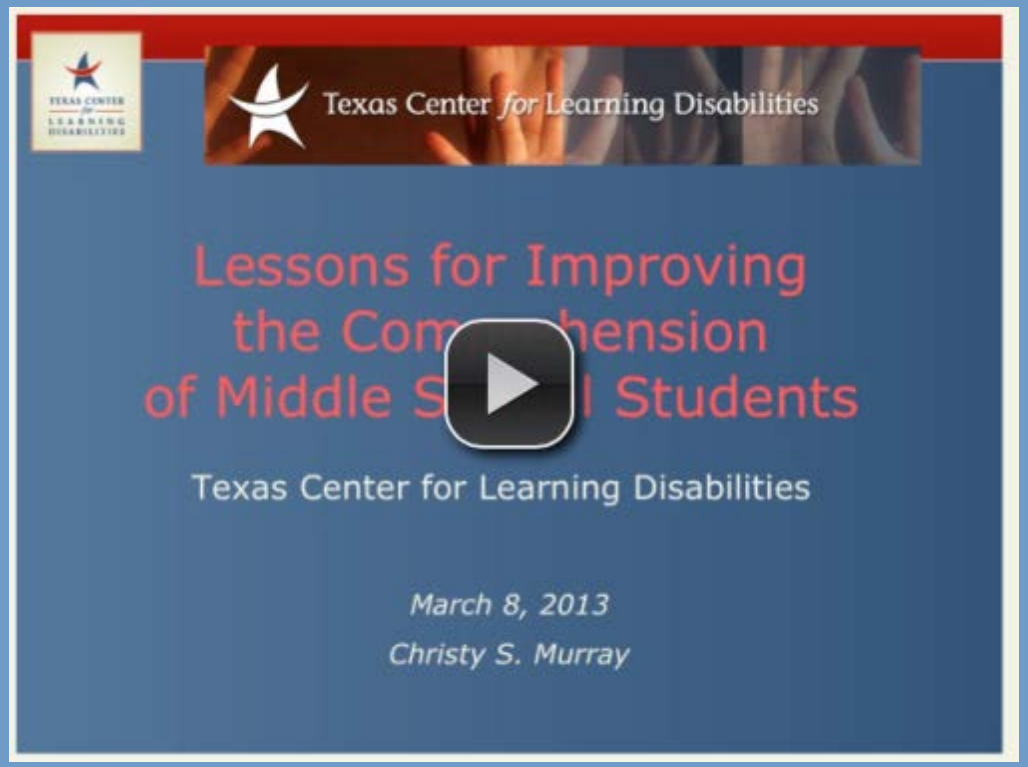
Teacher Lesson Plans for Downloading

Over 100 teacher lesson resources including:

- Reading instruction grades 1-5 and middle school
- Developing lessons for Improving Comprehension
- Interventions for Upper-Elementary Students with Reading Difficulties
  - Word Recognition and Fluency
  - Vocabulary and Comprehension
- Instruction for Middle School Students With Reading Difficulties

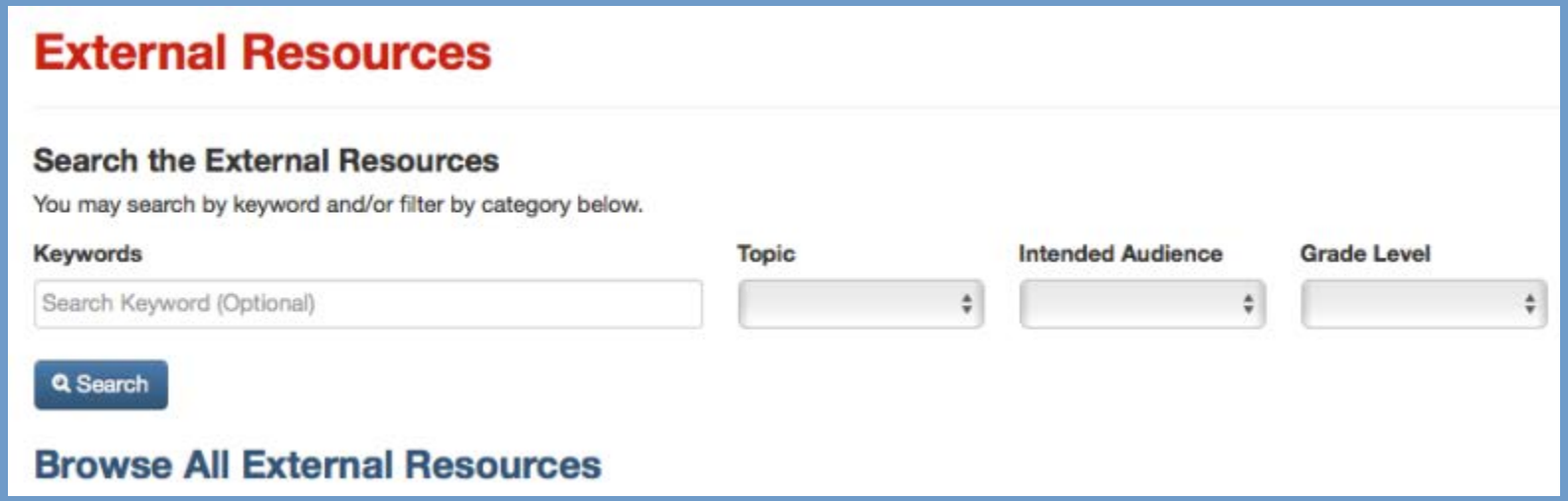
Professional Development

- Video and download presentation slides



External Resources

- 216 external internet resource direct links to TCLD relevant topics of the scope their work.
- Links to websites, articles, modules, practice guides, webinars, reports, presentations



Contact Us

- For questions regarding TCLD activities, or to request TCLD bookmarks or brochures people can contact us by filling out online form.
- Certain request by parents, teachers or students who contact the site about questions are referred to Jack Fletcher with immediate feedback.
  - I am a parent with a student with..
  - I am a doctoral student, what articles or research would your recommend….