

SLD Identification Methods: Cognitive Tests versus Instructional Response

Connecticut School Psychology Association

Jack M. Fletcher, Ph.D.
Texas Center for Learning Disabilities
University of Houston
www.texasldcenter.com
@texasldcenter
www.facebook.com/texasldcenter

Objectives

1. What is a Learning Disability?
2. Understand the Strengths and Weaknesses of Identification Methods and Comprehensive Assessments for Special Education Eligibility

There is little consensus about identification methods and little relation of comprehensive evaluation and instruction in practice

UNDERSTANDING LEARNING DISABILITIES

3

Definitional Criteria

- Low Achievement
- “Unexpected”
- Not due to another, contraindicative condition

4

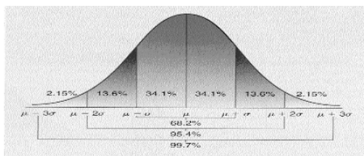
Intrinsic Attributes of LDs

- No “gold standard” for LD
- LDs are a dimensional disorder, not categorical
- Attributes of LDs are latent constructs
- All psychometric approaches to LD identification are unreliable at the individual level

5

SLD

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



← Ease of Learning to Read, Write, Numerate →

CONCEPTUAL FRAMEWORKS FOR LD

7

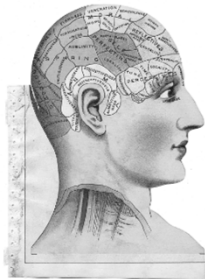
Neurological

Disorder of
"constitutional
origin"

Goal was to identify defective area of the brain

Minimal brain dysfunction

Generally not
accepted in present
practice



Is Charlie Brown LD? 1968

FROM "PEANUTS"



What are the signs of LD? Identify a static, neurobiological disorder in order to intervene

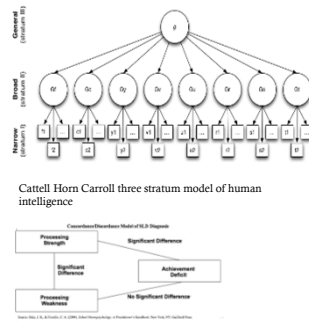
Cognitive Discrepancy

Low achievement is unexpected because of normal intelligence or the presence of cognitive strengths

- IQ Achievement Discrepancy
- Processing strengths and weaknesses (PSW Methods)

Long history in the field of LD

No longer required as of IDEA 2004

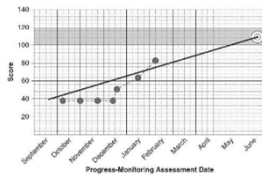


Instructional Framework

Low achievement is unexpected because deficits exist despite generally effective instruction

LD identification is based on direct measurement of basic academic processes

Low achievement and Instructional response criteria



Special Education: IDEA 2004: RTI or Discrepancy?

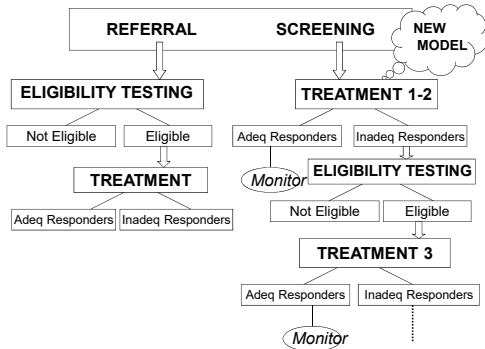
- (2)(i) The child does not make sufficient progress to meet age or State-approved grade-level standards in one or more of the [8 domains of achievement] when using a process based on the child's response to scientific, research-based intervention; or
- (ii) The child exhibits a pattern of strengths and weaknesses in performance, achievement, or both, relative to age, State-approved grade-level standards, or intellectual development, that is determined by the group to be relevant to the identification of a specific learning disability, using appropriate assessments, consistent with §§300.304 and 300.305;

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



**COGNITIVE DISCREPANCY
FRAMEWORKS**

**WARNING: I DON'T BELIEVE THESE
ARE EVIDENCE-BASED METHODS**

IQ-Achievement Discrepancy



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)

Federal Regulatory Definition of LD (1977) Was Not Aligned with Research

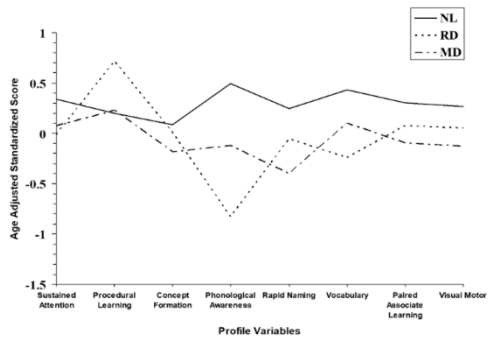
A severe discrepancy between achievement and intellectual ability in one or more of the areas: (1) oral expression; (2) listening comprehension; (3) written expression; (4) basic reading skill; (5) reading comprehension; (6) mathematics calculation; or (7) mathematic reasoning. The child may not be identified as having a specific learning disability if the discrepancy between ability and achievement is primarily the result of: (1) a visual, hearing, or motor handicap; (2) mental retardation; (3) emotional disturbance; or (4) environmental, cultural, or economic disadvantage (USOE, 1977).

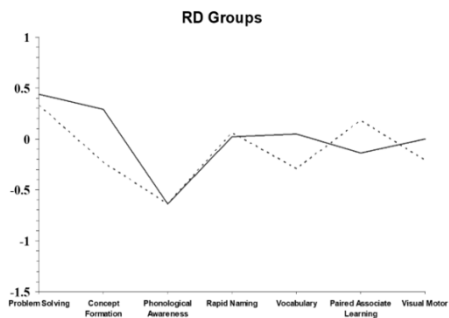
LD is a Valid Classification

*Learning disabilities are real! Stands up across definitional variation
(doesn't help identify individuals)*

Children and adults with different forms of LD can be reliably and validly differentiated from each other, typical achievers, and other disabilities on cognitive correlates, response to intervention, and neural correlates

What happens when we apply these criteria to different classifications?





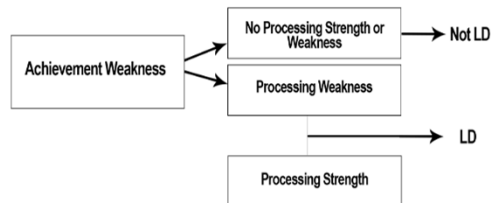
Is it all just low achievement? (does not address unexpectedness)

- Designate a cut point on the achievement dimension
- Strengths: Strong validity, linked to intervention, easy to implement
- Weaknesses: Cut point, does not measure the underlying construct (can't differentiate subgroups of poor readers when the cause is known to be related to emotional difficulty, economic disadvantage, and inadequate instruction)
- Necessary but not sufficient: *Status models based on cutpoints for dimensional disorders may never be reliable for individuals*

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)
- Hanson et al. (2008): "Research-based methods" recommended for Oregon schools
- Hale et al. (2010) survey of LD professionals: PSW methods needed not just for diagnosis, but also for treatment; mandated by statute

PSW Methods



Perceived 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 to make more informed decisions (Schneider & Kaufman, 2018)

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 recovered 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., 2018
- 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., 2018

- 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.”*

TCLD 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
 - Predict response to intensive reading interventions

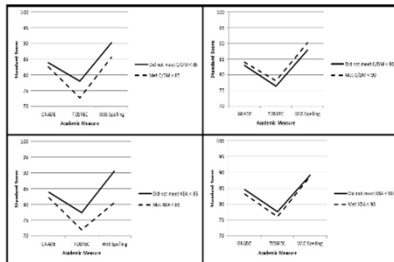
Study 1: Miciak, Fletcher, et al., 2014

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

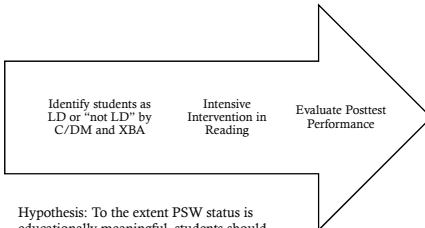
Two Batteries Varying in Achievement tests

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	Gates MacGinzie Passage WJ3 Passage Comp	Gates MacGinzie Passage Comp	KBIT-2 Verbal Knowledge

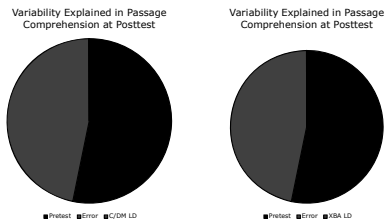
Results (cut point < 90): Poor Agreement (Chance corrected agreement (Kappa) > .40

- *Kappa* = .28
- Little overlap in the achievement domain identified as most impaired

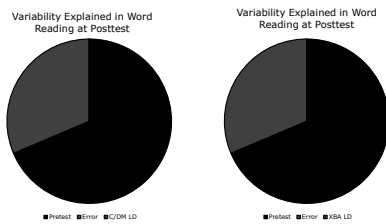
Study 3: Miciak et al., 2016



Reading 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 $t \leq -.66$		
	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 $t \leq -.66$		
	Pass	Fail
Pass	672	73
Fail	74	181
Total number of misclassifications = 147		

PSW Research Summary

- Different PSW Methods identify different kids as LD and not LD and are not reliable in identifying PSW profiles
- Generally, PSW Methods identify few students. Lots of testing for every 1 student. Independent of referral rate.
- PSW status does not predict differential treatment response
- PSW status does not correlate with meaningful outcomes
- Little evidence for differentiation of intervention
- Where is the evidence that cognitive assessments are necessary for the identification of LD? (Schneider & Kaufman, 2017)

Direct Treatment of Cognitive Processes

- Little evidence of aptitude by treatment interactions outside achievement domain (including CogMed)
- Melby-Lervag and Hulme (2016): meta-analysis of over 100 working memory training studies: little transfer to academic domains
- Parkinson and Jacobsen (2015): meta-analysis of executive function training programs: little transfer to academic domains
- Neuroimaging: activation of cognitive control regions only when reading (Cutting et al., 2018; Roe et al., 2019)

44

A “HYBRID” METHOD FOR LD IDENTIFICATION (RTI)

WARNING: THIS METHOD IS THE APPROACH I SUPPORT. ITS NOT HARD TO IMPLEMENT

45

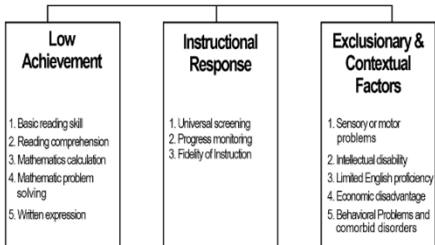
LD Summit: Hybrid Method (Triangle Approach) to Identification (Bradley et al., 2002)

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

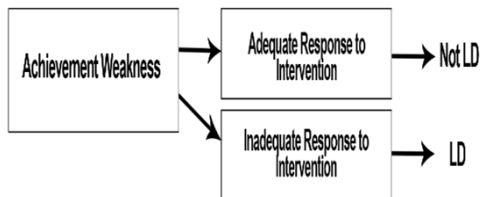
What is the validity of this hypothetical classification? (Low achievement is necessary, but not sufficient).

- www.air.org/ldsummit

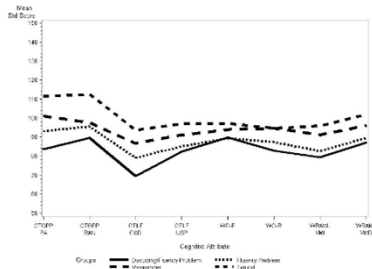
Hybrid Approach to Evaluating Learning Disabilities



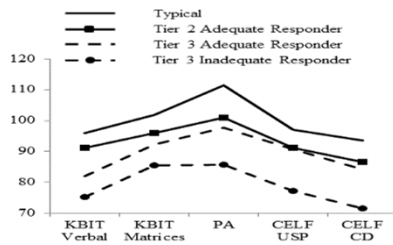
Methods based on RTI



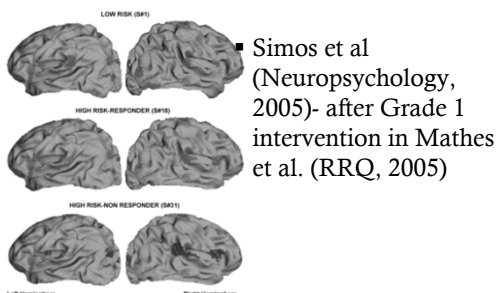
Validity of the hybrid method(Fletcher et al., SPR, 2011)



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



Grade 1 Intervention (pseudoword task)



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

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 formulae? IDEA says the team decides...

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-a range of scores, not a cut point
- Multiple criteria; comprehensive data gathering process in the context of the triangle model
- It's a team decision! Not dependent just on test scores

Why isn't the child responding to instruction?

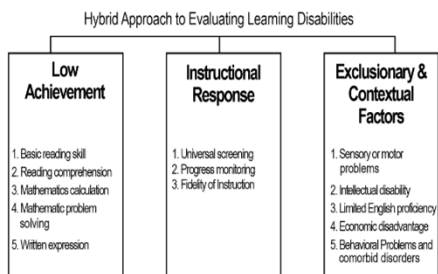
- SLD that is severe with major language-based problems (not necessarily SLI): vocabulary, background knowledge
- Unidentified disorder: ADHD, ODD, anxiety, depression, motivation
- Contextual factors: attendance, family, family history, history of failure, multiple school changes, peer issues
- English language and oral language proficiency
- Can be evaluated anytime in the RTI process

55

Comprehensive evaluation is required no matter what method is employed

- Comprehensive data gathering process that includes child observation and may or may not use standardized tests
- Can occur anytime in RTI process
- In the context of RTI, goal not only special education eligibility, but to understand why the child has not responded to instruction
- In the context of RTI, instructional response data is routinely obtained (must be added to other identification methods in IDEA)
- Exclusionary criteria require consideration of other factors and may involve additional evaluation for other disabilities and language proficiency
- No matter what method, the triangle approach applies

Comprehensive Evaluations in the Context of MTSS



1. Establish Low Achievement: IDEA 2004 Domains of SLD

- 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

Woodcock Johnson (WJ) and the Wechsler Individual Achievement Test (WIAT) subtests and component academic deficits.

Construct	WJ subtest	WIAT subtest
Word Recognition	Word Identification	Word Reading
.	Word Attack	Pseudoword Decod
Reading Fluency	Reading Fluency	ORF
Reading Comp	Passage Comp	Reading Comp*
Math Computation	Calculation	Numerical Op
Written Expression	Spelling	Spelling

Other achievement tests as needed, esp. reading comp and written expression (Gray, TOWL)

2. Assessing Response to Instruction

- Universal screening of all students for reading (and behavior) problems
- Monitor progress of at-risk students: establish a surveillance system
- Introduce multi- tiered intervention programs that begin in the classroom
- Evaluate the fidelity (and quality) of different instructional programs (fidelity- done in any significant research study; should be at least 80%)
- Increase intensity for those who show inadequate response

Criteria for Inadequate Response

- Can be norm- referenced or criterion-referenced benchmark; all repeatable
- Benchmarks can be "national" or local
- End point, slope, or both? *Evidence supports end point for identification, slope for intervention*
- Key for intervention is to account for change (slope)- treatment response gets confused with identification;
- May be resource driven
- Operates to move students through tiers and as a data source for identification
- Watch out for rigid cut points

3. Evaluate Contextual Factors and Related Disorders

- General principle: assess in the same way that the factors and conditions would be assessed in the absence of concerns about LDs
- Assessments depend on the question
- Routine use of behavior rating scales (home and school): BASC, CBCL (broadband), Connors, SNAP-IV (narrowband for ADHD: www.adhd.net)
- Consider oral language and limited English proficiency (Bateria-3 is best instrument)

Who is LD?

- 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

Thank you

- jackfletcher@uh.edu
- www.texasldcenter.org

Support: NICHD grant P50 HD052117

- <https://www.texasldcenter.org/library/resource/the-identification-of-specific-learning-disabilities-a-summary-of-research>
- <https://www.scientificamerican.com/article/too-many-schools-are-misdiagnosing-dyslexia/>

64
