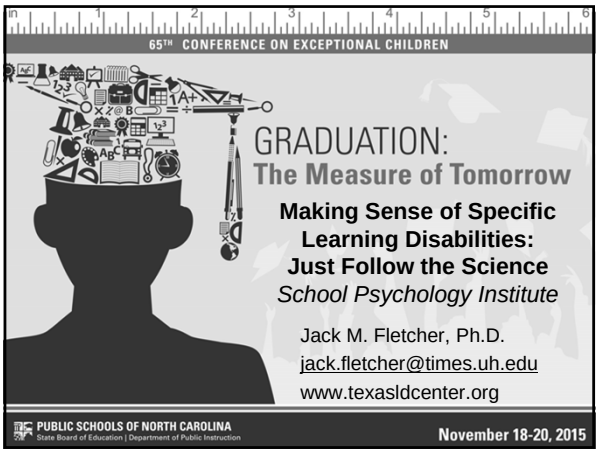



## Disclosures (Dr. Fletcher)

- 1. Author of *Texas Primary Reading Inventory* (Paul F. Brookes)
- 2. Author of *Learning Disabilities: From Identification to Intervention* (Guilford Press,2007)
- 3. Research supported by NICHD grant, P50 HD052117, Texas Center for Learning Disabilities (www.texasldcenter.org)
- 4. Presentation not intentionally aligned with any standards. I am a neuropsychologist and scientist
- 5. Father of two grown (?) children. Professional tester.



## Objectives

1. Understand research underlying different methods for LD identification
2. Enhance capacity for conducting comprehensive evaluations of LD
3. Link identification and intervention

## What are Learning Disabilities ? (how do I know one when I see one?)

- All disabilities have biological and social realities that vary with "disorder" and "person"
- Learning disabilities are dimensional- variation on normal development
- Model is obesity or hypertension, not measles and mumps
- "Disability" is a two pronged determination

## Learning Disabilities is a Hypothetical Construct

- Essential aspect of construct is "unexpected underachievement"
- Constructs do not exist independently of how they are measured; all measures are imperfect indicators of constructs (latent variables)
- Measurement depends on definition
- Definitions and identification criteria derive from classifications
- Classifications are validated by comparisons against variables not used to form the group
- Classifications reflect conceptual models

## How LD is Identified and Treated Depends on the Conceptual Model

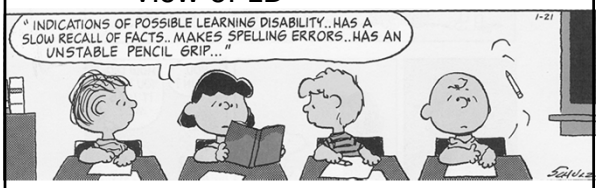
- Neurological: *"Disorder of constitutional origin"': special signs*
- Cognitive Discrepancy:
  - IQ-achievement discrepancy: cognitive discrepancy
  - Processing strengths and weaknesses: cognitive discrepancy
- Instructional Discrepancy
  - Low achievement: age-based discrepancy
  - Instructional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

## Federal Definition of LD (1968)

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.* The term includes such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. The term does not include children who have learning disabilities which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, or emotional disturbance, or of environmental, cultural, or economic disadvantage (USOE, 1968).

## Is Charlie Brown LD? 1968 View of LD

FROM "PEANUTS"



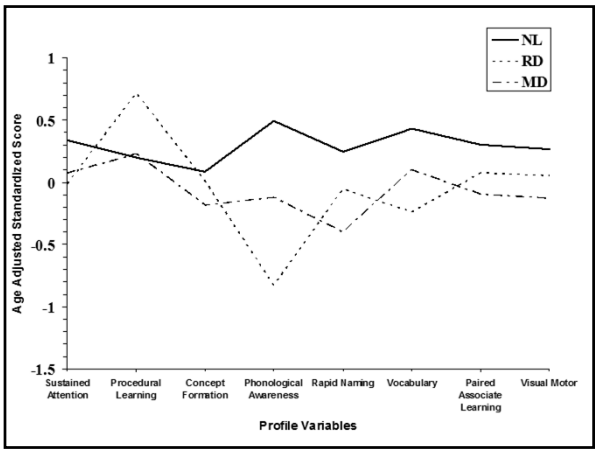

What are the signs of LD? Identify a static, neurobiological disorder in order to intervene

## 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?*

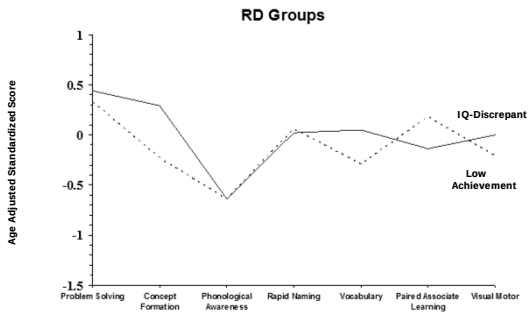



## Federal Regulatory Definition of LD (1977) Was Not Aligned with Research

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).

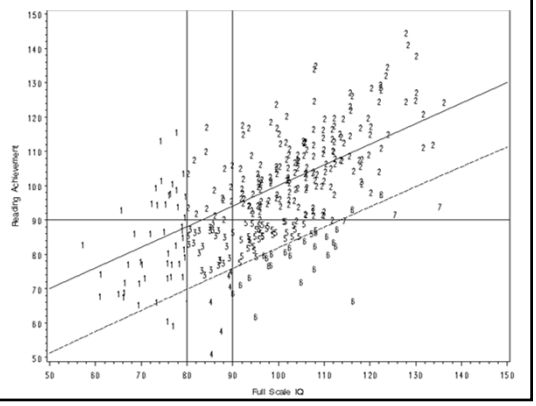
## What's Wrong With IQ- Discrepancy?

- 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)




## Low Achievement method 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

## Problems with PSW Approaches

- Statute does not mandate that cognitive skills be assessed- just their manifestations
- Little research on how PSW methods actually work and are related to instruction
- 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.

## 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 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)
  - Academic characteristics
  - How they respond to intensive reading interventions

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

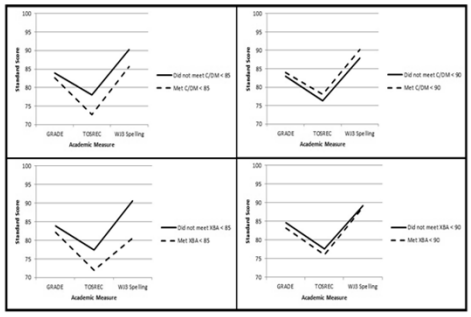
- The C/DM (Hale Model) and XBA Method (Flanagan Model) are frequently presented as equivalent PSW models (e.g. Hale et al., 2010)
- Do they identify the same students as LD or not LD?
- Is LD status (based on C/DM and XBA) associated with qualitative differences in academic functioning?

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

- *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., 2015

Identify students as LD or "not LD" by C/DM and XBA → Intensive Intervention in Reading → Evaluate Posttest Performance

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?

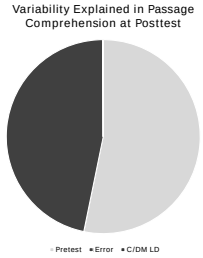
**Table 3**

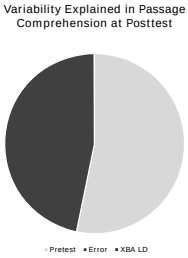
**Agreement for LD identification decisions for the XBA and C/DM methods for LD Identification**

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

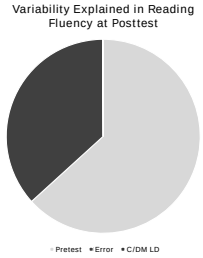
**Kappa = -.10; XBA = Cross Battery Assessment Method (Flanagan et al. 2007); C/DM = Concordance Discordance Model (Hale & Fiorello, 2004);**

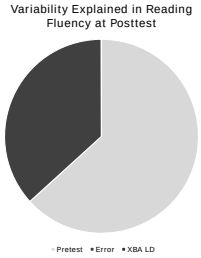
## Reading Comprehension at Posttest



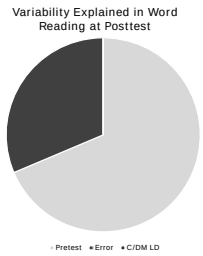



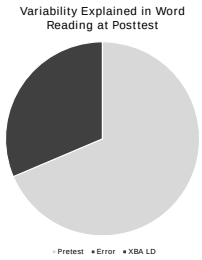

## Reading Fluency at Posttest



## 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 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
- 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

- 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

- Goal of RTI is to identify students as LD (RTI 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…

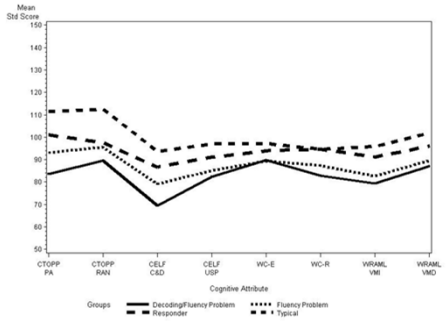
LD Summit: Hybrid Method (Triangle Approach) to Identification (Bradley et al., 2002)

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

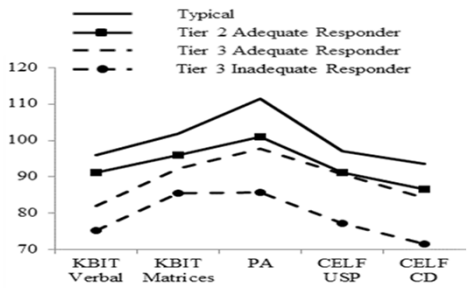
*What is the validity of this hypothetical classification?* (Low achievement is necessary, but not sufficient).

- www.air.org/ldsummit

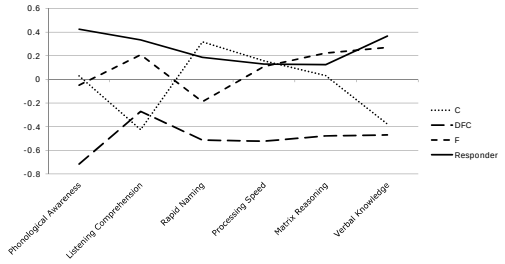
Validity of the hybrid method(Fletcher et al., SPR, 2011)



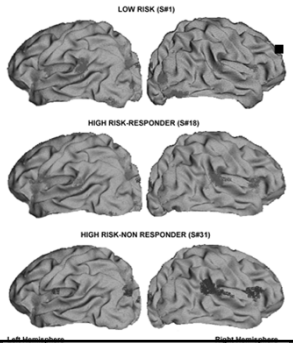

Inadequate Responders: Tier 3 (baseline cog characteristics) Denton et al., 2012



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

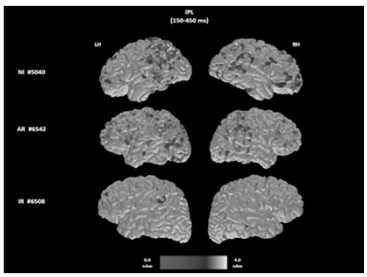



## Grade 1 Intervention (pseudoword task)




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

## 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

## 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?

## RTI is not a panacea for identification issues, but:

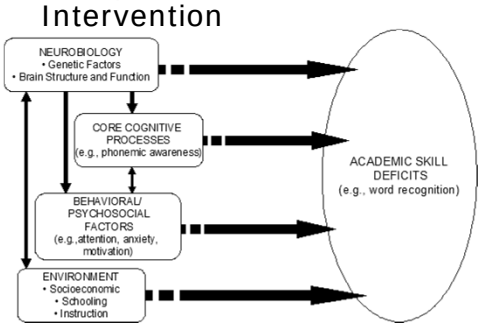
- RTI provides an alternative to cognitive (or even older neurological) conceptualizations of LD
- Directly linked to instruction and enhanced outcomes
- Cognition is related to LD and there are prominent neurological and genetic factors, but this knowledge does not yet facilitate identification or intervention
- RTI makes LD a real construct. We can argue about how to measure LD, but underlying constructs are real and survive definitional variability

## 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)

## A Model of LD (Fletcher et al., 2007); Identification to Intervention



Triangle Approach to Identification: Instructional Model of LD (Bradley et al., 2002)

- 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

## Why focus on achievement?

- *The most important markers of learning disabilities are achievement related*
- Classification hypotheses are validated only at the level of achievement
- Cognition and brain function are intrinsically linked to LD, but the path is through academic deficits
- If components of reading, math, and written expression are assessed, what else is needed for identification and intervention?

Achievement, adaptive behavior, and behavior differentiate children with high incidence disabilities

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.

## Core Cognitive Processes

- Vary with academic domain
- Supports validity of the hypothetical classification
- may not require assessment for identification, but do represent precursors
- May not add value to intervention (no aptitude X treatment interaction; Pashler et al., 2009)
- Do help understand neural mechanisms and essential for comprehensive understanding of LD

## Behavioral/Psychosocial Factors

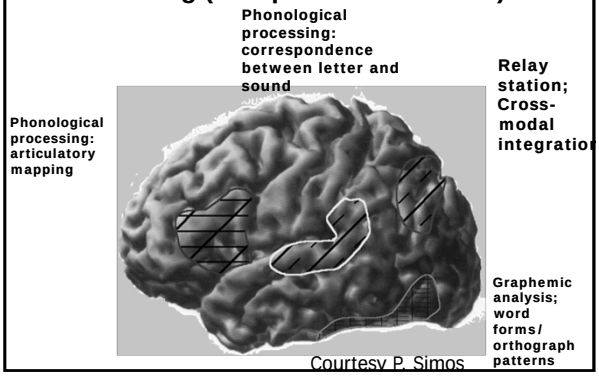
- Comorbid associations, especially ADHD
- Experience of failure
- Reaction of peers and family
- Motivation

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

## A Model for the Brain Circuit for Reading (Component Processes)




Courtesy P. Simos

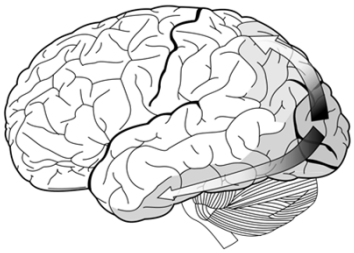
## Dual Route Theory

- Ventral (stipulated or addressed) route: lexical, directly from word form to pronunciation

-look up in a mental dictionary of sight words

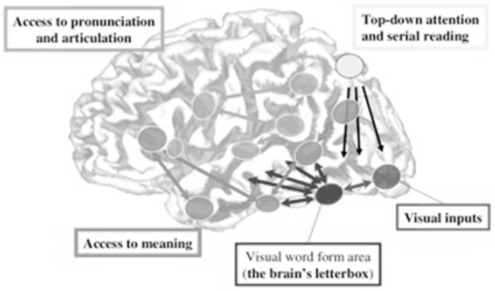
- Dorsal (assembled) route: sublexical, must access phonological representation and identify substituent parts (indirect)

## Dorsal vs. ventral pathways

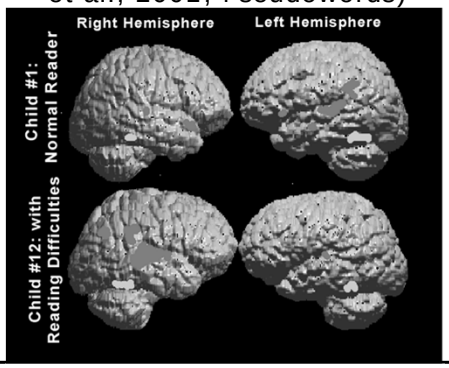


Dehaene – networks for reading

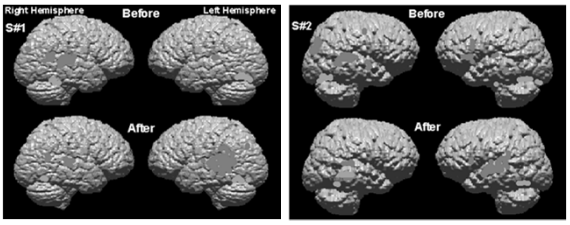
Learning to read consists in:
- creating an **invariant visual representation** of written words
- **connecting it** to brain areas coding for **sound** and **meaning**



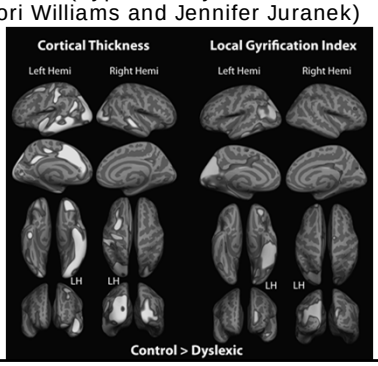

Brain Function in Dyslexia (Simos et al., 2001; Pseudowords)




Neural response to intervention; (Pseudoword Task; Simos et al., 2002)



Differences in Cortical Thickness at baseline (Typical > Dyslexic; Freesurfer; (Tori Williams and Jennifer Juranek)

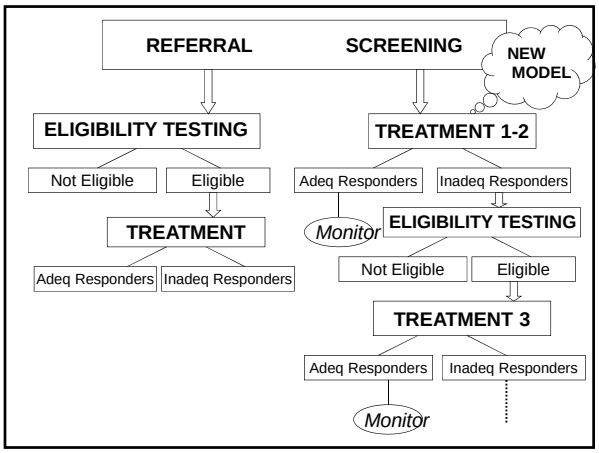



## Environmental Factors

- Home environment and quality of language
- Socioeconomic factors: parental education, economic disadvantage
- Instruction: Why RTI is really important

## 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;




## Comprehensive evaluation is required no matter what method is employed

- Data gathering process that includes child observation and may or may not use standardized tests
- 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
- I think norm referenced assessments of achievement and behavior rating scales for screening are very helpful

## RTI Adds:

- Documentation of parental notification and right to request an evaluation at any time
- Specification of learning strategies used to accelerate progress
- Some states add additional criteria for number of interventions, duration, and fidelity

## Comprehensive Evaluation (IDEA)

1. Use a variety of assessment tools and strategies to gather relevant functional, developmental, and academic information about the child, including information provided by the parent (comprehensive data gathering process)

2. May not use any single measure or assessment as the sole criterion

3. Must use technically sound instruments

## Comprehensive Evaluation (IDEA)

Selected instruments must be:

- racially and culturally fair, administered in native language
- used for purposes for which they are reliable and valid
- administered ***as designed*** by trained and knowledgeable personnel
- tailored to area of educational need, adapted to physical and sensory disabilities

## Comprehensive Evaluation (IDEA)

4. The child is assessed in all areas related to the ***suspected*** disability (i.e., it's a data gathering process)

5. Coordinated with assessments of other LEAs

6. Evaluation is sufficiently comprehensive to identify child's special education and related services needs, whether or not commonly linked to the identified disability category

7. Assessment data directly assists persons in determining the educational needs of the child (IQ scores are composites and not indicators of intervention goals)

## Comprehensive Evaluation

8. Additional requirements (review existing relevant data and determine what additional data is needed- formal testing may not be needed)

9. Additional requirements for LD:

- Lack of adequate achievement in 8 areas of eligibility based on RTI process or alternative for which the state writes rules
- Not due to exclusionary criteria (Sensory or intellectual disability, behavioral problems, cultural/linguistic diversity, English proficiency
- 10. Adequate instruction is inclusionary

## IDEA 2004: Inadequate instruction is inclusionary

To ensure that underachievement…is not due to lack of appropriate instruction in reading or math, the group must consider…

(1) Data that demonstrate that prior to, or as a part of, the referral process, the child was provided appropriate instruction in regular education settings, delivered by qualified personnel; and

(2) Data-based documentation of repeated assessments of achievement at reasonable intervals, reflecting formal assessment of student progress during instruction, which was provided to the child's parents.

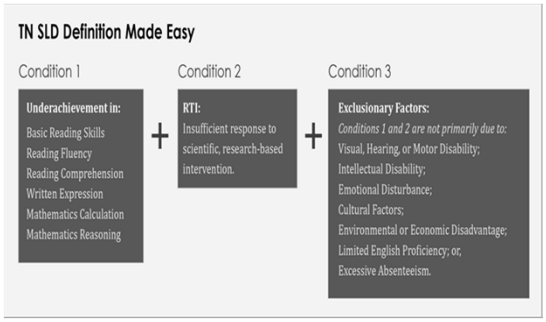
## Comprehensive Evaluation

10. Additional requirements for RTI:

- Documentation of parental notification and right to request an evaluation at any time
- Specification of learning strategies used to accelerate progress
- Parent may request an evaluation at any time
- Consent may be obtained while the child is in RTI process (starts data gathering process), but not possible to evaluate instructional response/LD without adequate opportunity and no reason to evaluate if growth is adequate

## Is cognitive assessment required by law?

- "The Department does not believe that an assessment of psychological or cognitive processing should be required in determining whether a child has an SLD" (p. 46651). - OSEP




## 1. 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-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)

## 2. 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-III (WJ) and the Wechsler Individual Achievement Test-II (WIAT) subtests in relation to component academic deficits.

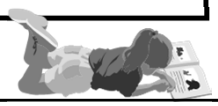
| Construct | WJ subtest | WIAT subtest |
|---|---|---|
| Word Recognition | Word Identification | Word Reading |
| | Word Attack | Pseudoword Decod |
| Reading Fluency | Reading Fluency | -- |
| Reading Comp | Passage Comp | Reading Comp* |
| Math Computation | Calculation | Numerical Op |
| Written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

Other achievement tests as needed, esp. reading comp and written expression

## Word Level Reading Difficulties

Most common and best understood form of LD (Dyslexia)

- A common problem: 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



## Achievement markers

- Reading real words, pseudoword reading, spelling dictation
- IDA definition in State handbook well-validated and most appropriate

## Intervention: Word Recognition

- Teach phonics in the context of an approach that includes comprehension and fluency components
- 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

## Myths

1. NRP is outdated
2. Reading First did not work
3. Reading Recovery is superior to all other forms of intervention
4. Guided Reading is more effective than explicit instruction

## Content: 1998 NRC Report 2000 NRP Report

- **Consensus documents**
- **Instruction can prevent reading difficulties**
- **Emphasized integration of:**
  - Explicit alphabetic instruction: ***word recognition***
  - Reading for meaning: ***comprehension***
  - Active engagement: ***fluency***

**In an integrated, comprehensive approach to reading instruction**

## Reading Instruction Must be Integrated from KG- G12

- If a critical component is missing, students who at risk will not develop the component
- Success and failure in reading are opposite sides of the same coin- it's the same theory, not two theories, one for success and another for failure
- Instruction is the key
- It must be explicit, differentiated, and adequately intensive
- Therefore, reduce costs of assessment and shift resources into intervention

## 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

## Why is Remediation of Word Recognition 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)

## Achievement markers

- Simple norm referenced and/or criterion-referenced assessments of word reading and text fluency
- Processing correlates: Rapid naming, Speeded processing
- www.studentprogress.org

## Intervention: Fluency

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

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

## 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)

## 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

## 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

## Assessment Guidelines

- A single assessment is not adequate
- Make sure the child reads text: WJ and WIAT not adequately complex (GORT-4, not 5; GATES)
- Allow silent reading
- Don't discount group- based assessments
- Ask the teacher and parent

## 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)

## 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

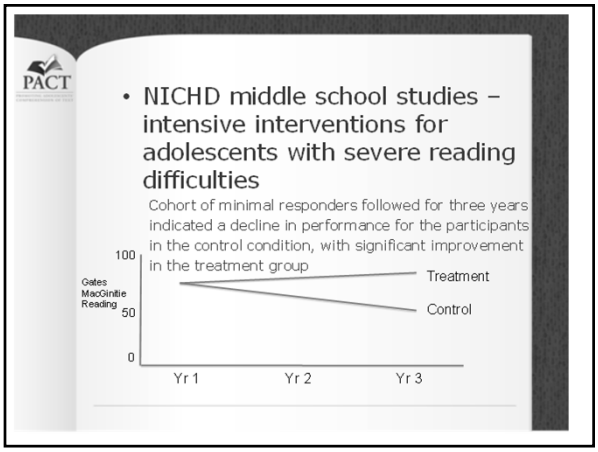
- Strategy instruction: .54
- Word study .40
- Fluency practices (mostly SSR): -.07
- Multicomponent: .59

## Adolescent Studies (Vaughn et al., 2010; 2011; Wanzek, 2011)

- Sample selected on the basis of reading comprehension performance in grades 6-8 and randomized to typical practice or different reading interventions over 3 years
- **Typical Readers** (pass state test), n=974:
- **Struggling Readers** (don't pass or don't take state test), n=1032:
  - 81% decoding/fluency problems; 19% primarily comprehension

## Results

- Year 1: Small effects generally not statistically significant; no effect of group size
- Year 2: Moderate effects on decoding, fluency, and comprehension; no difference in standardized vs. individualized instruction exception for children identified with special needs (better with standardized intervention)
- Year 3: Moderate to large effects on decoding, fluency and comprehension




## 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

## Achievement Markers

- Transcription: Spelling, handwriting
- Generation: Text level writing (TOWL)

## Intervention

- For transcription difficulties, teach handwriting and spelling; 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 older students who have not responded to instruction

## 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. (2012) 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

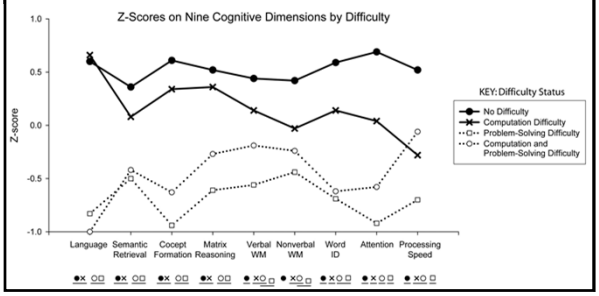
## Graham et al. meta-analysis

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

## Computations vs. Problem Solving (Fuchs et al., 2007)




## Achievement Markers

- Computational Arithmetic: WJ III Calculations, WRAT- III Arithmetic
- Problem solving: WJIII Applied Problems (many state accountability tests)

## Intervention

- For computations, make math as verbal and concrete as possible; teach algorithms as rules; rehearse; practice
- For PS, work on problem solving strategies in content, esp. word problems; teach as a strategic process
- Teach math facts to automaticity (better if in the context of problem solving; Fuchs et al. 2012)
- Permit adjuncts (calculators, graph paper) for older students
- Teach different components explicitly- fact retrieval, procedures, problem solving, estimation
- Promote self- regulation and independence; control attention

## Fuchs et al. (2011)

- No evidence of differential responsiveness to intervention as a function of difficulty status on any outcome.
- Across tutoring conditions and sites, students with MD outperformed students with MDRD at pre- and posttest (severity).
- MF tutoring enhanced fluency with MFs with transfer to procedural calculations but without transfer to algebra or WPs.
- For 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 (2001)

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

Melby- Lervag & Hulme (DP, 2012) 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

## Some General Remedial Principles

- Remedial interventions must increase intensity and differentiation, so the first step is to increase time on task and reduce the size of the instructional group
- Whenever possible, interventions should supplement, not supplant
- No intervention is effective if it does not involve the academic skill itself (must read, do math, and write)
- The longer intervention is delayed, the slower the response (on average) and the greater the need for intensity
- Intervention always begins in the general education classroom
- Effective interventions include a self- regulation component
- Progress must be assessed at all levels

## 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

## All professionals must…

- Focus on assessment of academic skills and move students to intervention as soon as possible- look at progress and ***academic*** strengths and weaknesses
- Address comorbid disorders and other factors
- Become experts on intervention
- Evaluate progress
- Reserve comprehensive evaluations for clearly inadequate responders
- Don't get hung up on process- focus on results

## 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

## 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, 1996

Jack.fletcher@times.uh.edu

www.texasldcenter.org

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