The Role of the SLP Assessing and Differentiating Reading Disorders

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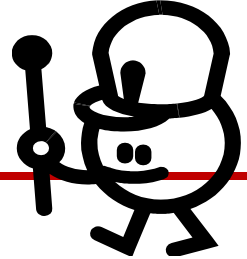
ASHA recommendations: Role of the SLP in Reading Disabilities

- Serve as KEY professionals in identifying children at risk for RD
- Assess spoken language in all children who have reading deficits
- Develop a specialization in assessing
  - Children with language learning disabilities (LLD)
  - Children with dyslexia (SRD)



Leadership Issues

PROBLEM:

- Until recently -- SLPs have not been systematically educated to prevent, assess, or treat reading disabilities

CONSEQUENCE:

- SLP is poorly represented in the education and service delivery for children with RD

RECOMMENDATIONS: SLPS SHOULD

- Serve as KEY professionals in identifying children at risk for RD
  - Assess spoken language in all children who have reading deficits
  - Develop a specialization in treating
    - ***children with language learning disabilities***
    - ***children with specific reading disability - dyslexia***

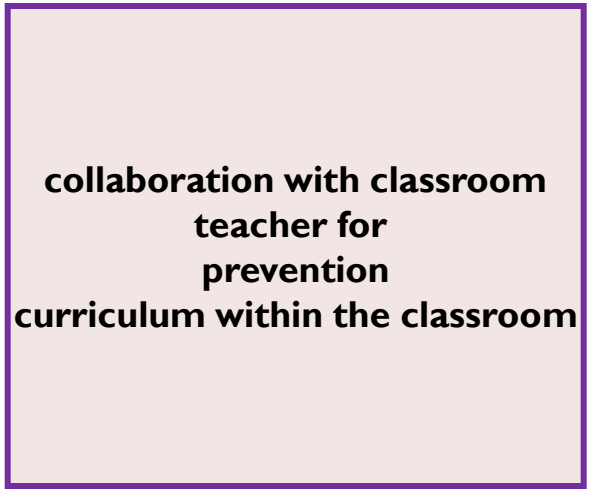
Argument: Critical Role of the SLP

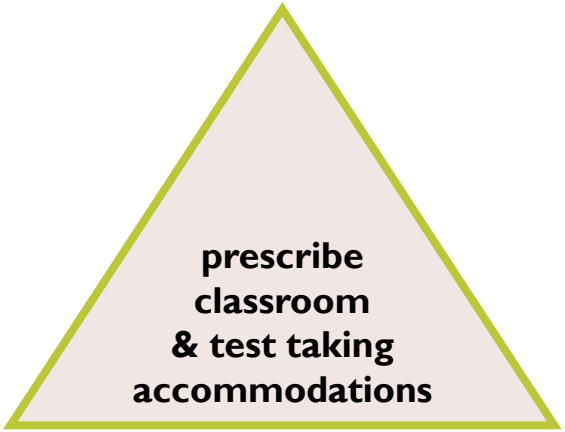
- ***The unique skills of SLPs and reading specialists and the shared knowledge between other professional*** can serve to create an optimal learning context for children who have dyslexia or other types of reading disabilities

Interdisciplinary Relationships

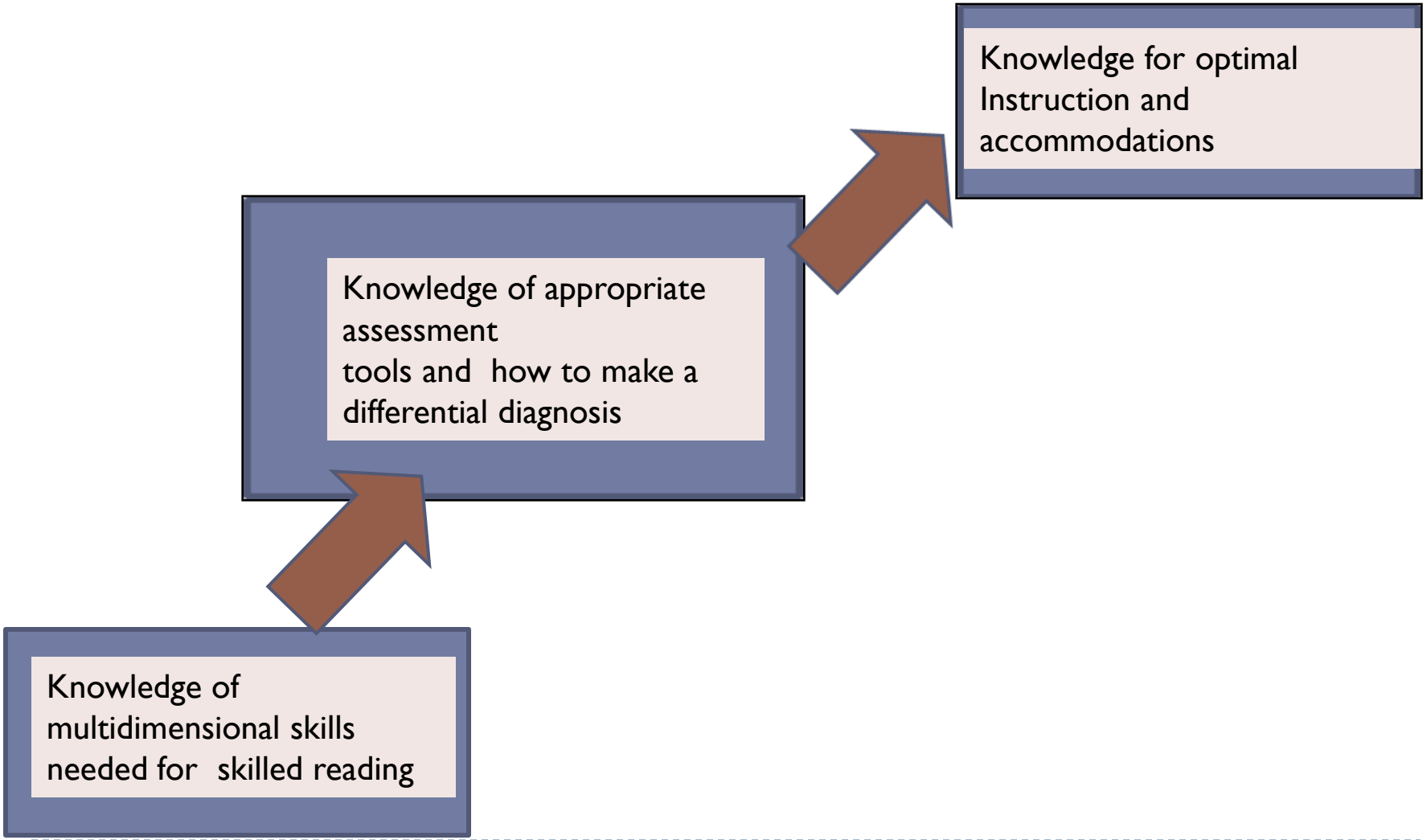
Front and center with other learning disabilities specialists

Range of roles for SLPs





Summary of Roles for SLP



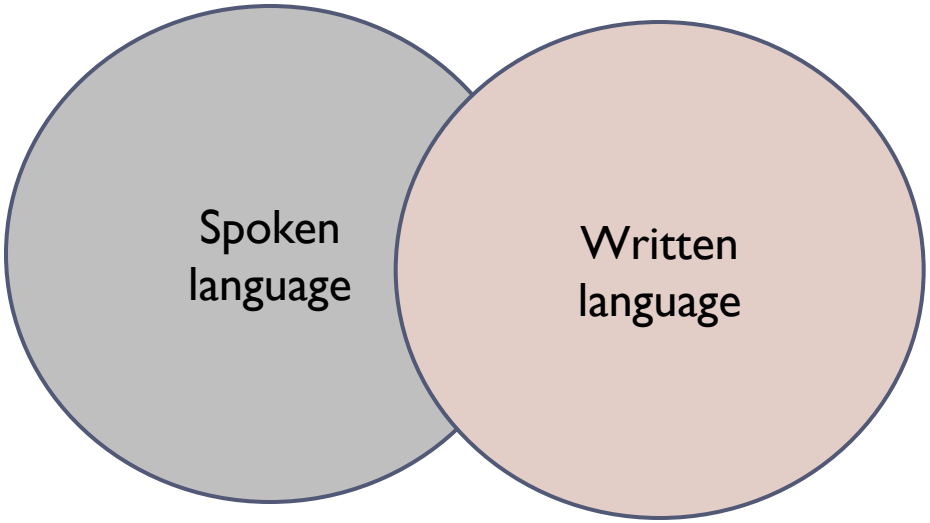
SLP Role in Predicting & Preventing

- collaborative partnership with teachers, administrators
- direct role in preventative instruction
  - letter knowledge
  - letter-sound knowledge
  - concepts of print
  - sense of story grammar
  - relationship between reading & spelling

Prevention – Most Critical Role

- Identify Preschool Screening of Children who are at risk for Reading Delays or Disabilities. Risk factors include:
  - Low SES
  - Family history of language and/or reading delays
  - Developmental of speech or language delays
- Employ screening instruments to assess pre-reading phonological awareness and print concepts from ages 3-5
- Provide intervention in all areas of weakness (don't wait and see!)
- Continue intervention until child is functioning at expected levels for age and grade
- Re-evaluate child's performance annually until it is clear that s/he is working at age/grade expected levels

Classification Model



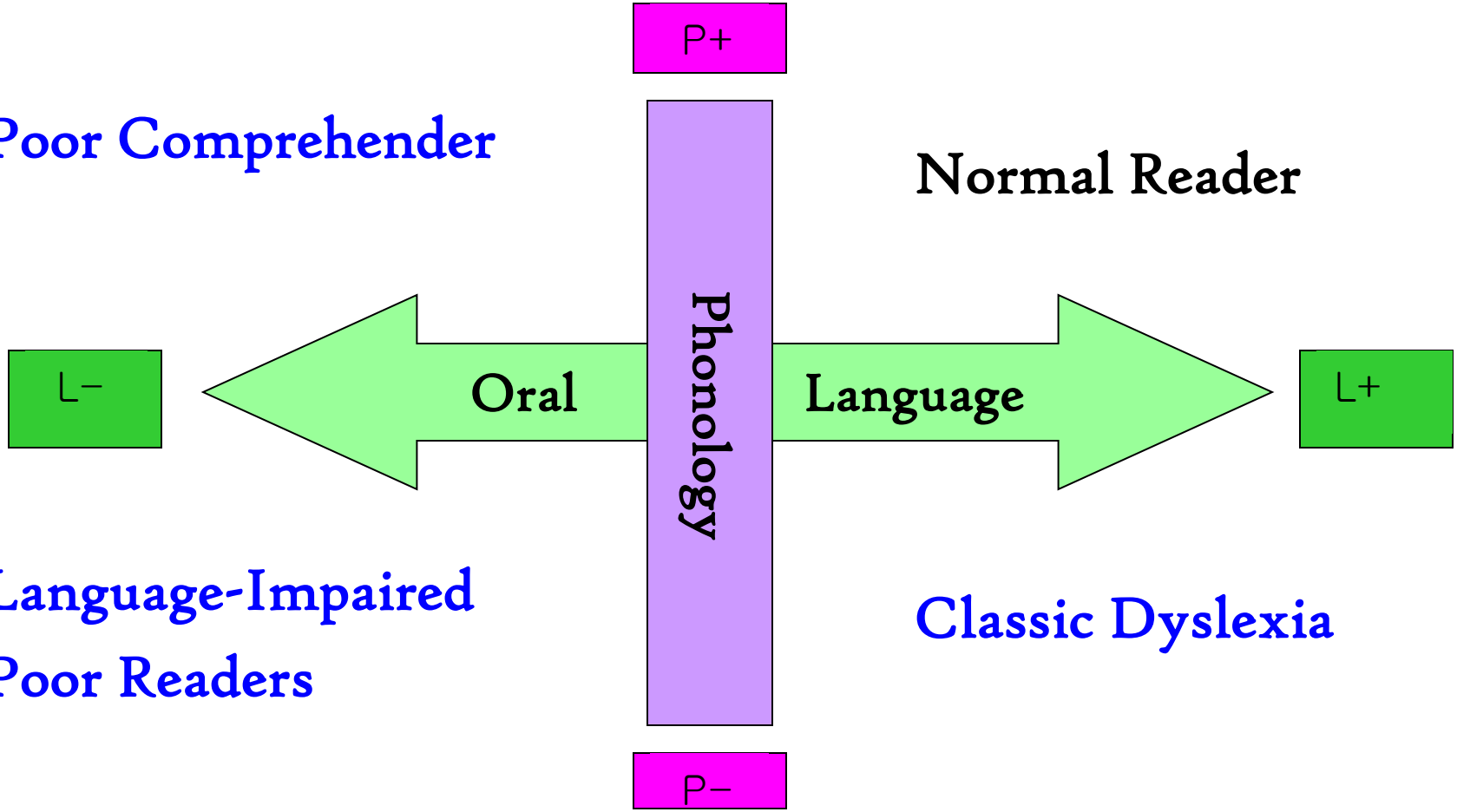
Rationale for Classifications

- Reading disabilities have different roots causes -- not all reading difficulties are alike

Therefore…

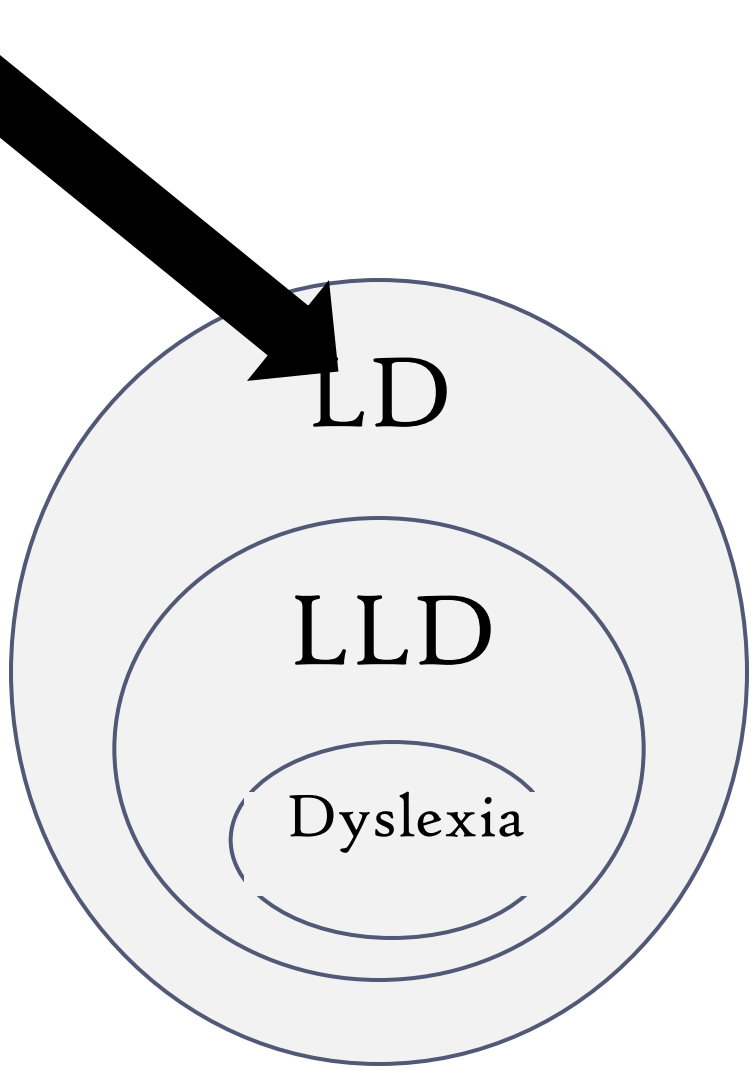
- Professionals from different disciplines need to be involved in the identification, diagnosis, and treatment of struggling readers

Classification Model - Bishop & Snowing (2004)



Learning Disability (LD)

- Generic term
- Refers to a heterogeneous group of disorders
- Significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities, or of social skills…
- Conditions include what are called: perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia and developmental language disorders…



Taken from Rhea Paul , 2001, figure 11-1, pg 388

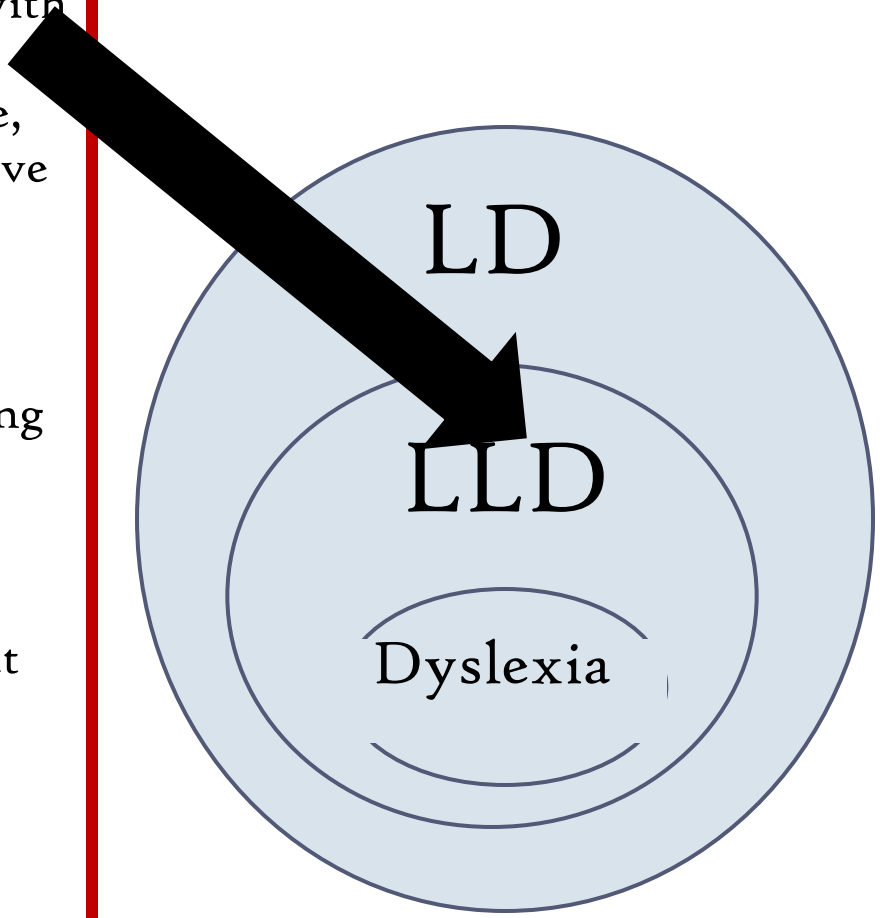
Language-Learning Disability (LLD)

- Learning disability resulting in difficulty with **various aspects of communication** (understanding and/or generating language, listening comprehension, discourse, narrative production)

- **Oral Language weakness :** vocabulary knowledge, use of correct grammar, listening comprehension, discourse, narrative production

May have knowledge of basic vocabulary, but not **higher levels of language performance**

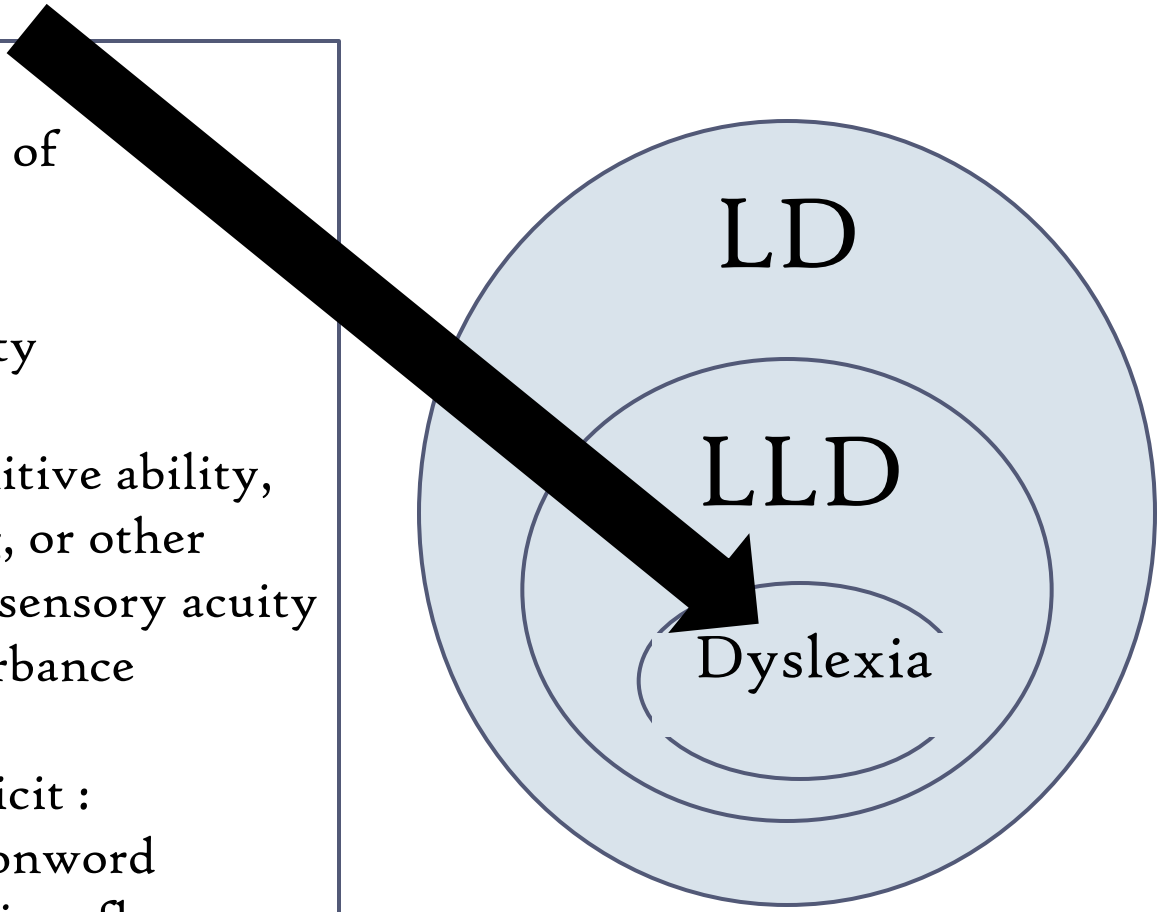
- **Written language weakness :** reading comprehension , written language composition



Taken from Rhea Paul , 2001, figure 11-1, pg 388

Developmental Dyslexia (DD)

- Specific reading disability of neurological origin
- A high rate of inheritability
- Not related to overall cognitive ability, lack of exposure to reading, or other extraneous factors such as sensory acuity deficits or emotional disturbance
- The identified areas of deficit : phonological awareness, nonword decoding, single word reading, fluency in text reading, spelling, and short-term verbal memory skills



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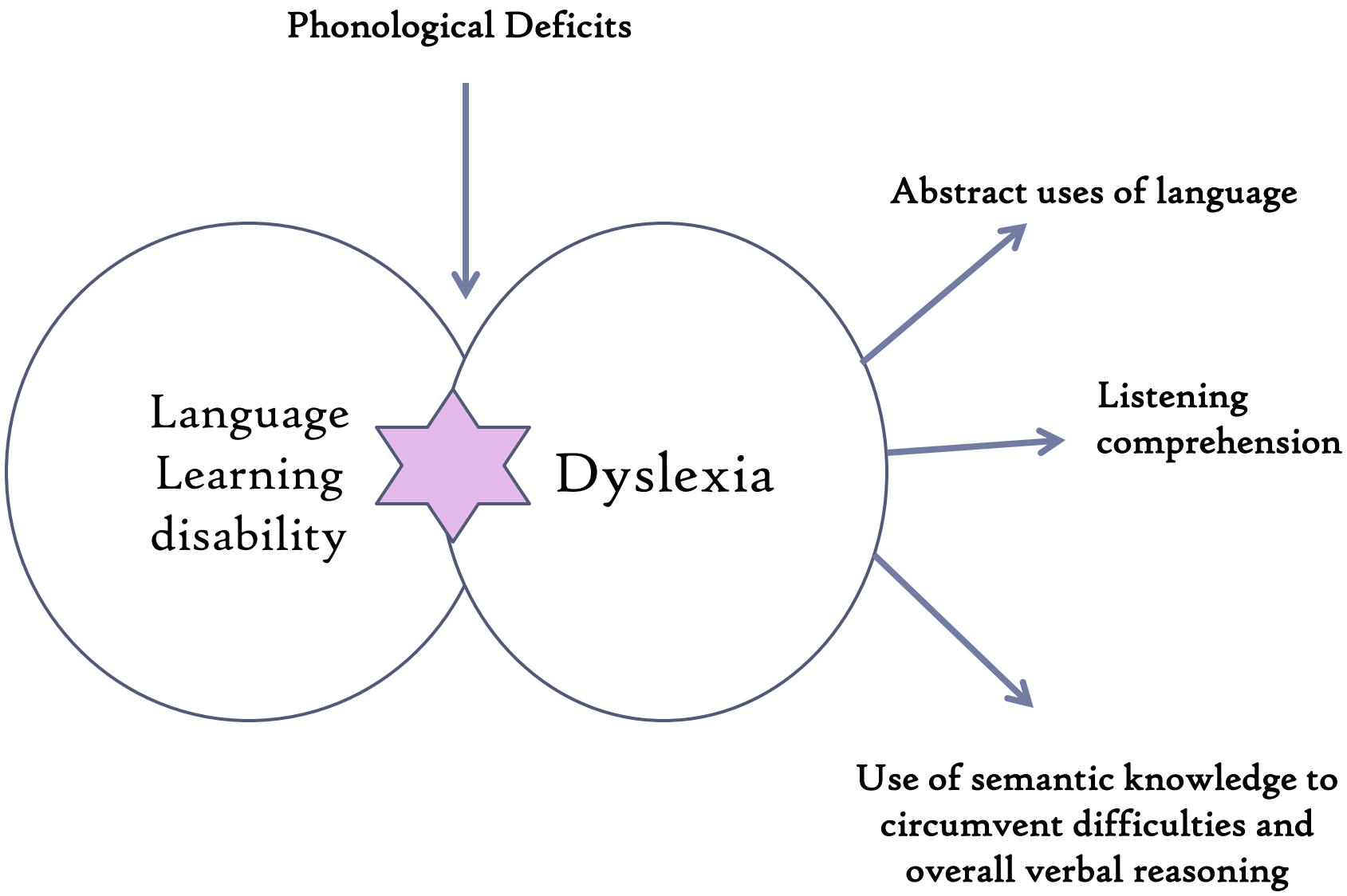
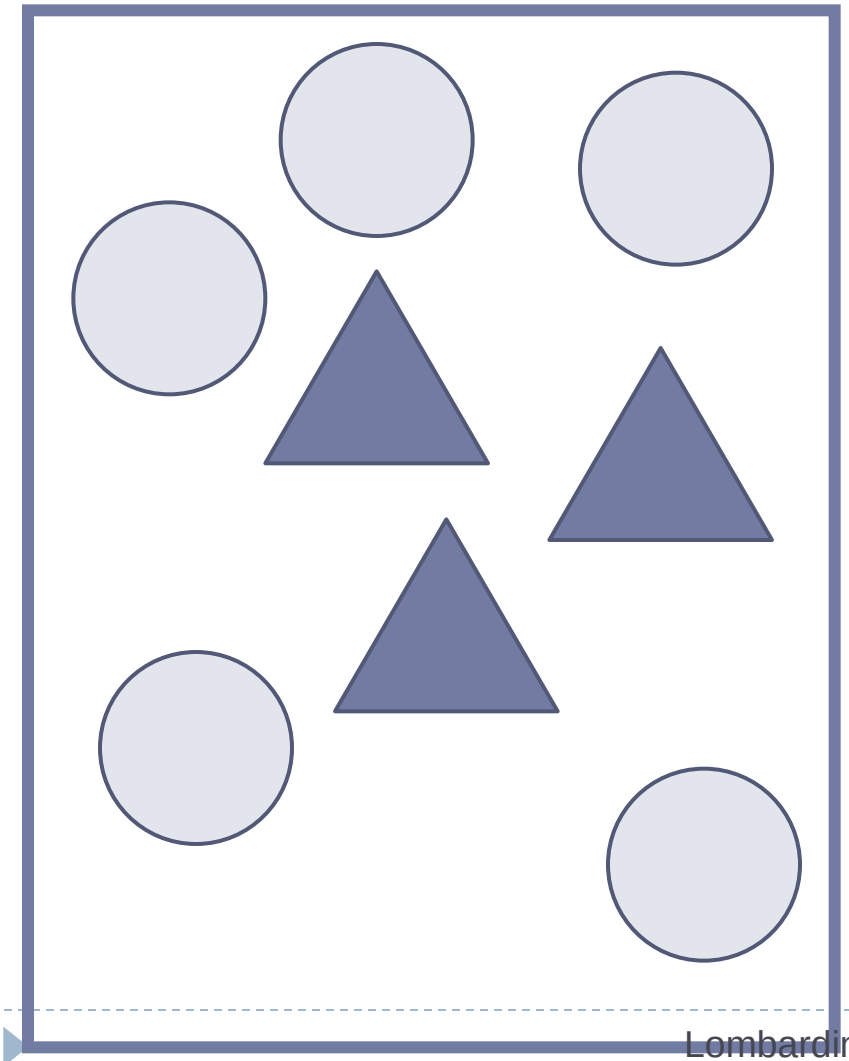
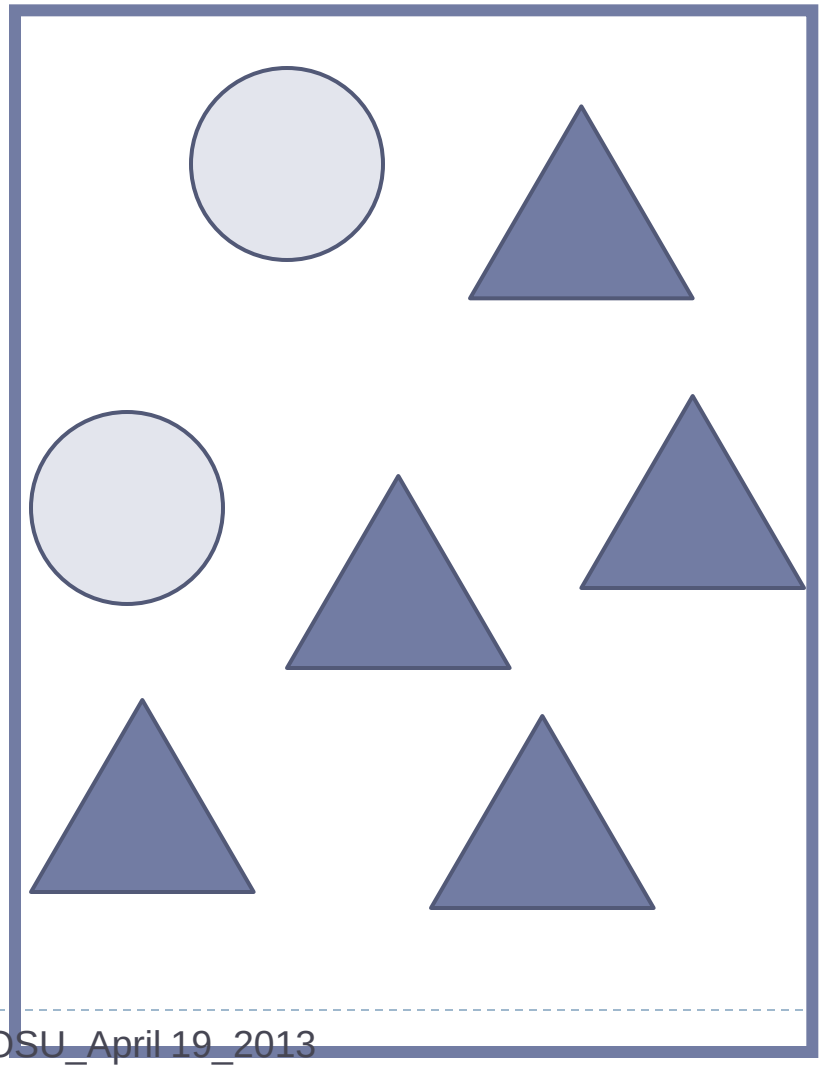
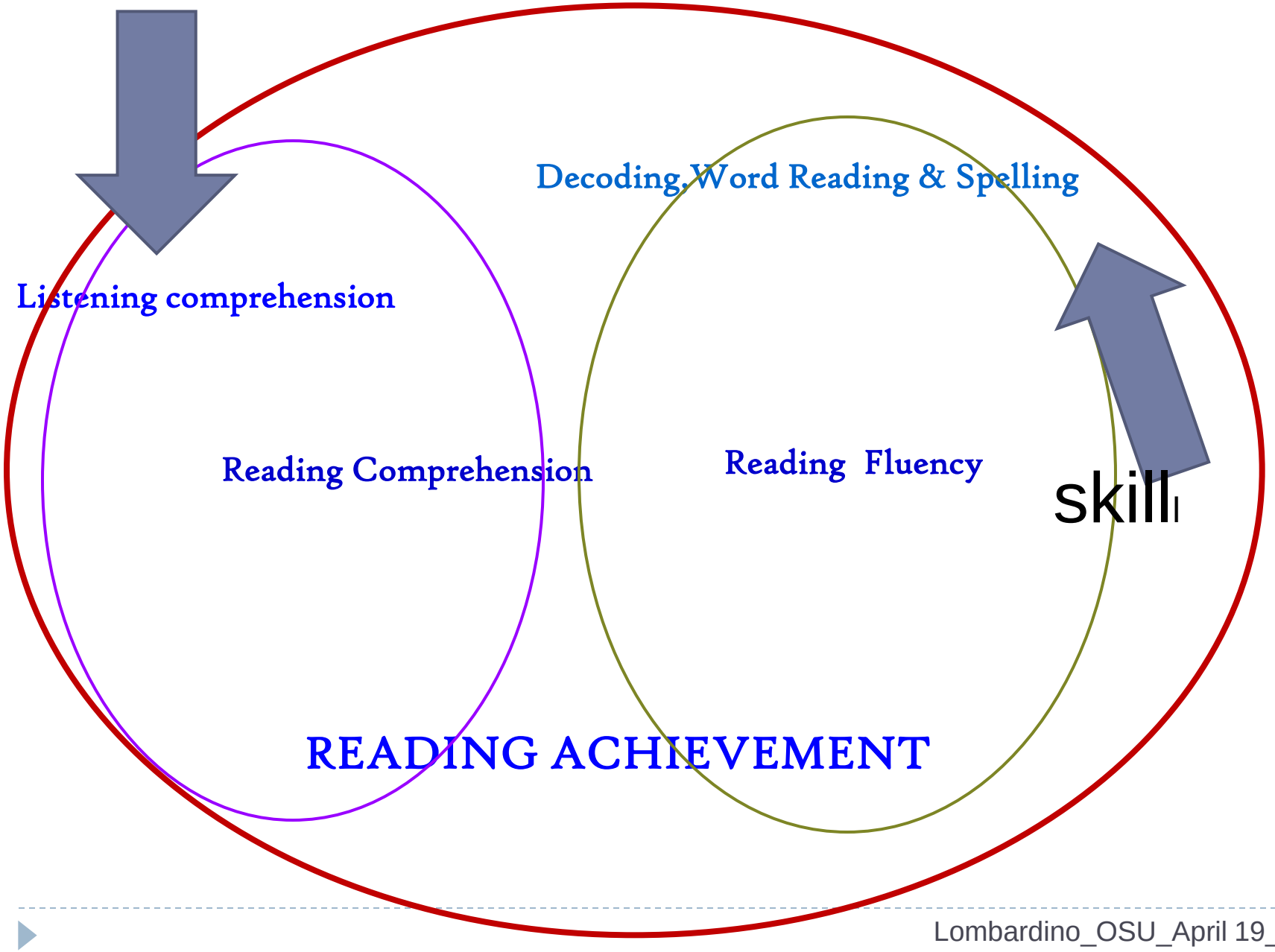

Phonological Deficits
Language Learning disability
Dyslexia
Abstract uses of language
Listening comprehension
Use of semantic knowledge to circumvent difficulties and overall verbal reasoning

Fundamental Question

Strengths vs. Weaknesses






Decoding,Word Reading & Spelling
Listening comprehension
Reading Comprehension
Reading Fluency
skill
READING ACHIEVEMENT

Other Cognitive Processes

- Phonological processing
- Processing speed
- Verbal memory

About Dyslexia

Facts

- Heritability rate between 40-60%
- Most widely studied learning disability
- Core deficits----phonological processing (language)
- Occurs in 5-15% of the school age population

Characteristics

- Average or above average intelligence
- Slow word recognition
- Poor oral fluency (reading aloud)
- Poor spelling
- Omission and substitution of function words and suffixes in reading and in writing
- Good listening comprehension

Core Deficits in Dyslexia

RD children have difficulty with:

- the development of complete alphabetic knowledge (sound-letter associations) for reading and spelling

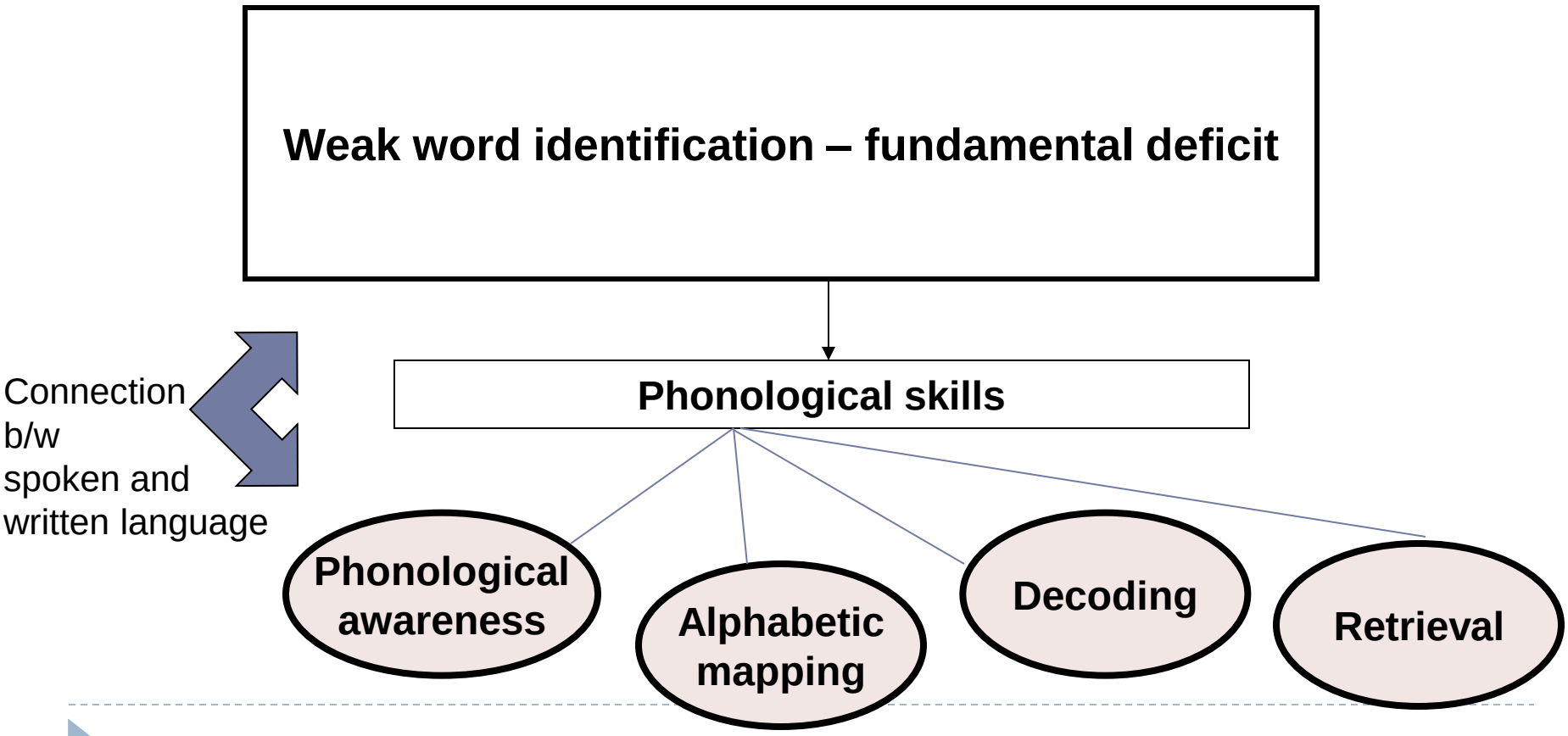
- the development of complete orthographic knowledge for reading and spelling (sound-letter patterns)
  - dress – spelled with DOUBLE s

Phonological Processing Problems: Signature of Dyslexia

- Remembering associations between letters or letter sequences in reading
- Remembering associations between sounds and letters or letter sequences in spelling
- Retrieving pronunciation patterns from memory especially in multisyllabic words

Expression of Phonological Deficits in Dyslexia

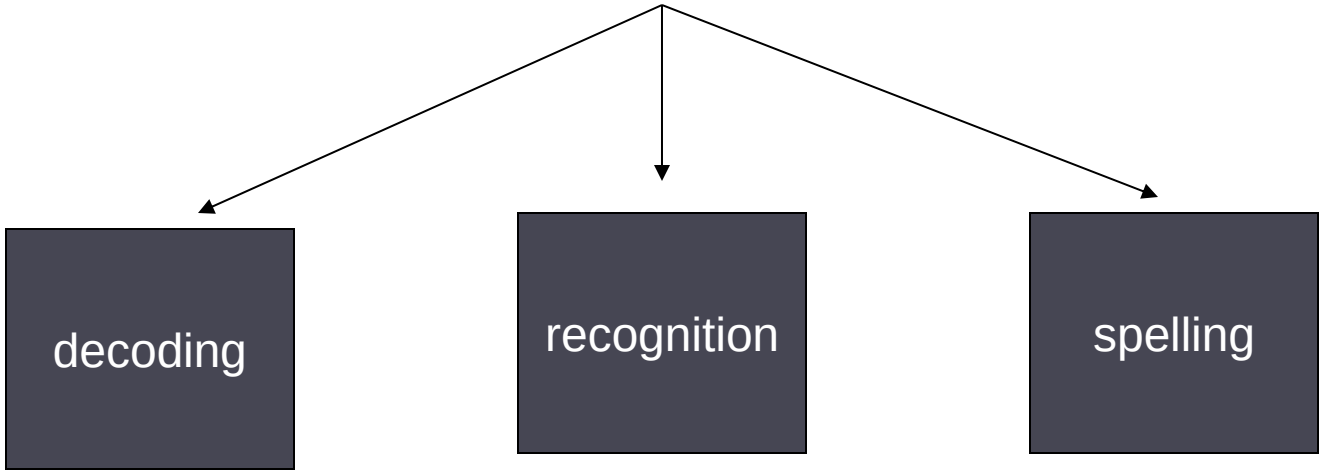
(Vellutino & Fletcher, 2005)



How deficits manifest

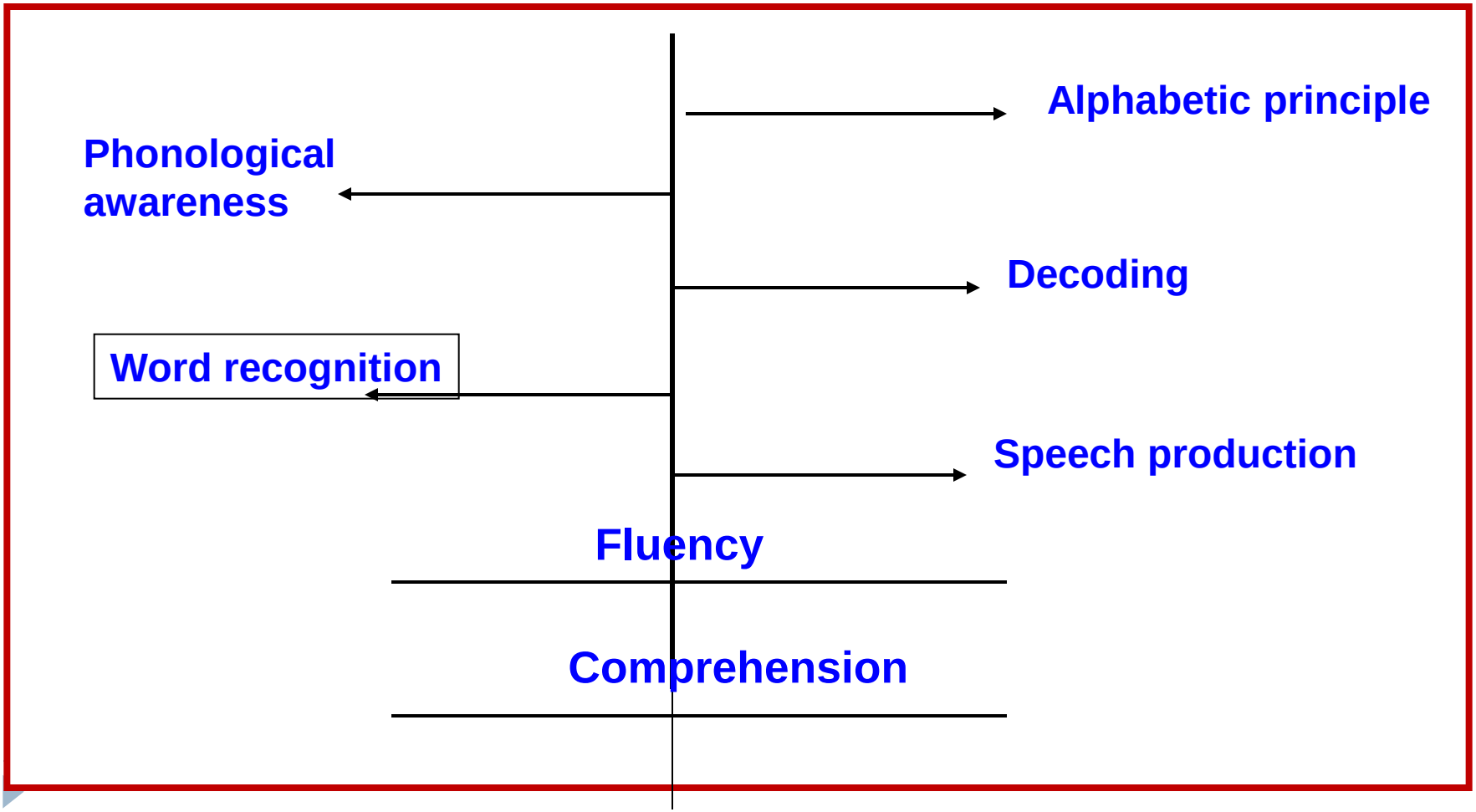
Best identified at the word level

XXXX XXX XXXX XXXX



Weak Phonological Representations Affect All Aspects of Reading

(Vellutino & Fletcher, 2005)



Dyslexia is NOT just a reading disability

- Profound effect on reading skill
- See effects on oral language tasks that require phoneme manipulation
- See effects on visual tasks that require fast visual-motor processing
- See effects on tasks of memory that require holding symbols such as numbers in a sequence
- See effects on speech production when complex sound combinations are required

Examples of Clinical Cases of LLD and Dyslexia

Spoken language

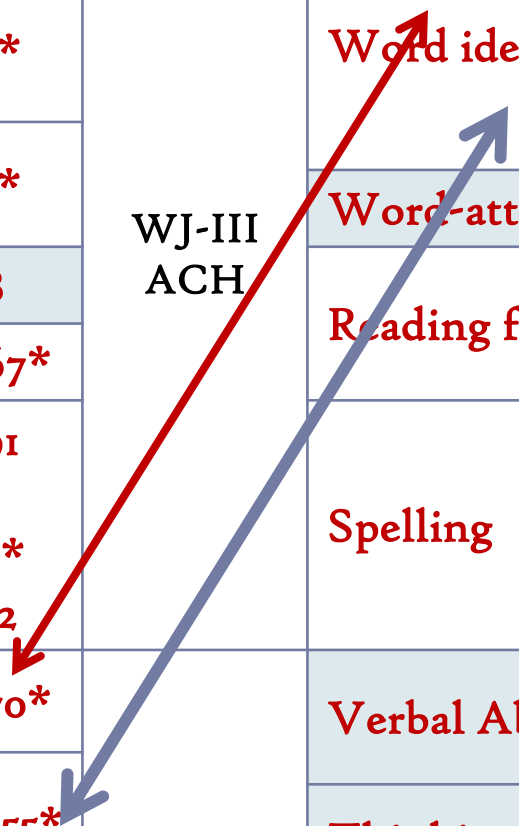
Written language

Case 1: Dyslexia

- No Preschool history
- Positive family history
- Strength in spoken language
- Strength in reasoning
- Weakness in reading
- Weakness in phonological processing

Dyslexia Profile (D. R. 10;2)

	Subtest	SS	Test	Subtest	SS
GORT-4th	Rate	2*	WJ-III ACH	Oral comprehension	98
	Accuracy	1*		Word identification	64*
	Fluency	1*		Word-attack	84
	Comprehension	8		Reading fluency	61*
	Oral Reading Quotient	67*			
CTOPP	Phonological awareness Elision Blending	91 5* 12		Spelling	61*
	Rapid naming	70*	WJ-III-COG	Verbal Ability Com	96
TOWRE	Sight word	<55*		Thinking Ability Com	95
	Phonemic decoding	72*		Cognitive Efficiency Com	77*
	Total word reading	56*		General Intellectual	91



Case 2: LLD

- Preschool history
- Positive family history
- Nature of school difficulty
- Strength in cognitive skills
- Weakness in spoken language
- Weakness in written language

LLD Profile (A. J. 8;5)

Test	Subtest	SS	Test	Subtest	SS
GORT	Rate	6*	ITPA-3	Spoken analogies	6*
	Accuracy	6*		Spoken vocabulary	6*
	Fluency	6*		Morphological closure	9
	Comprehension	5*		Syntactic sentences	7*
CTOPP	Phonological awareness	112		Semantic Composite Quotient	76*
	Phonological memory	91		Grammar Composite Quotient	88
	Rapid naming	106	WJ-III Cog	Verbal ability	80*
				Thinking ability	115
WJ-III Ach	Letter-word identification	96		Cognitive efficiency	91
	Spelling	83		General Intellectual Ability	96

Written story retelling

Puranik, Lombardino, & Altmann (2007).
Reading and Writing (2007) 20:251–272

- Differences (DD> LLD)
  - (a) number of T-units
  - (b) number of ideas
  - (c) total number of words
  - (d) number of different words
- Similarities
  - (a) percentage of spelling
  - (b) production of grammatically correct sentences

Relative strengths in the DD group:

- Formulation of ideas, diversity of vocabulary, complexity of sentences

Hayes & Flowers (1987) Model of Writing Composition

Planning

- Generation of ideas
- Setting Goals
- Organizing a text scheme

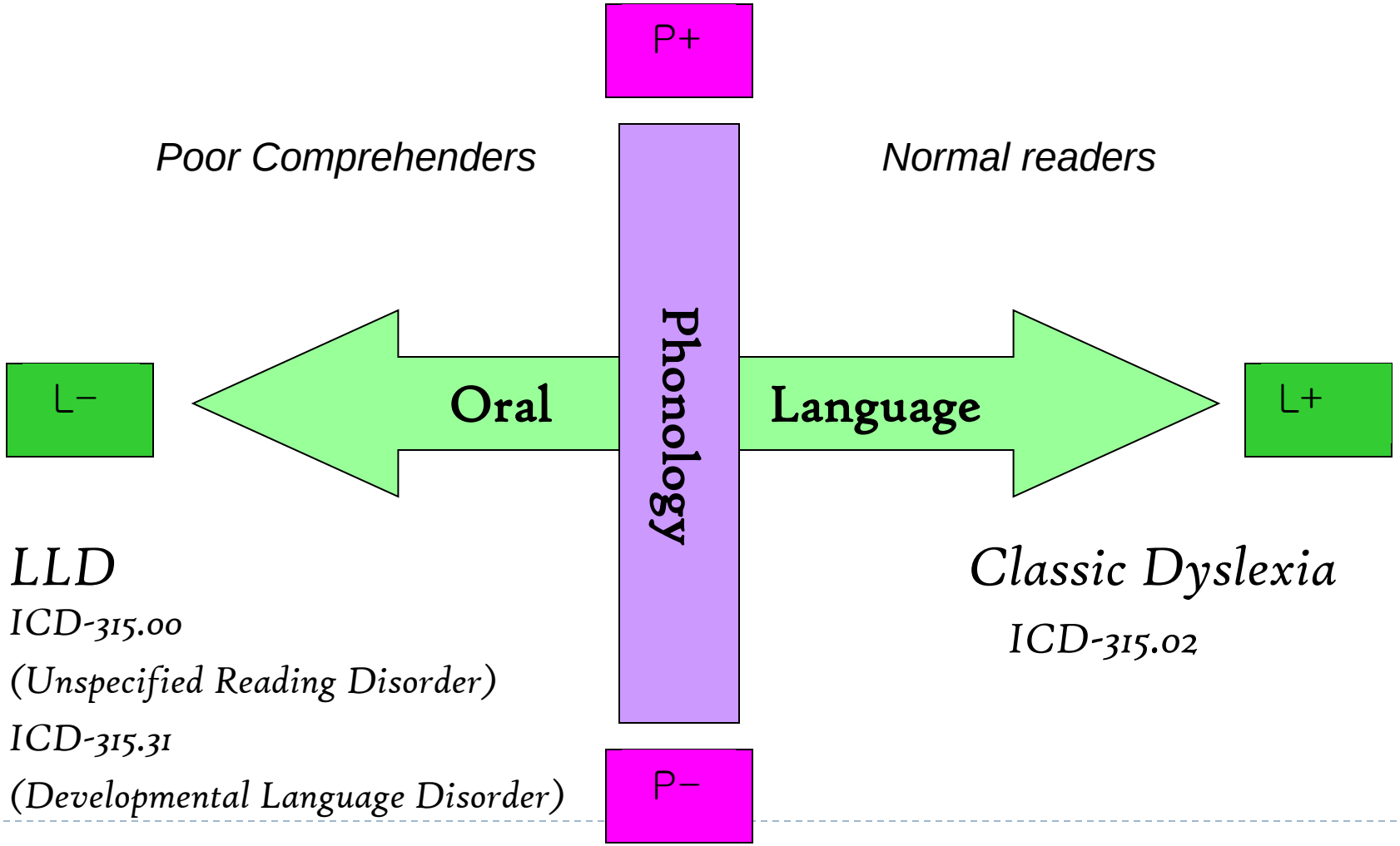
Translating

- *Text transcription:* translating language into print through spelling, handwriting, and punctuation
- *Text generation:* Translating ideas into language at the word, sentence, or discourse level

Reviewing

- Detecting Problems
- Repairing problems

Classification Model - Bishop & Snowing (2004)



LLD

ICD-315.00

(Unspecified Reading Disorder)

ICD-315.31

(Developmental Language Disorder)

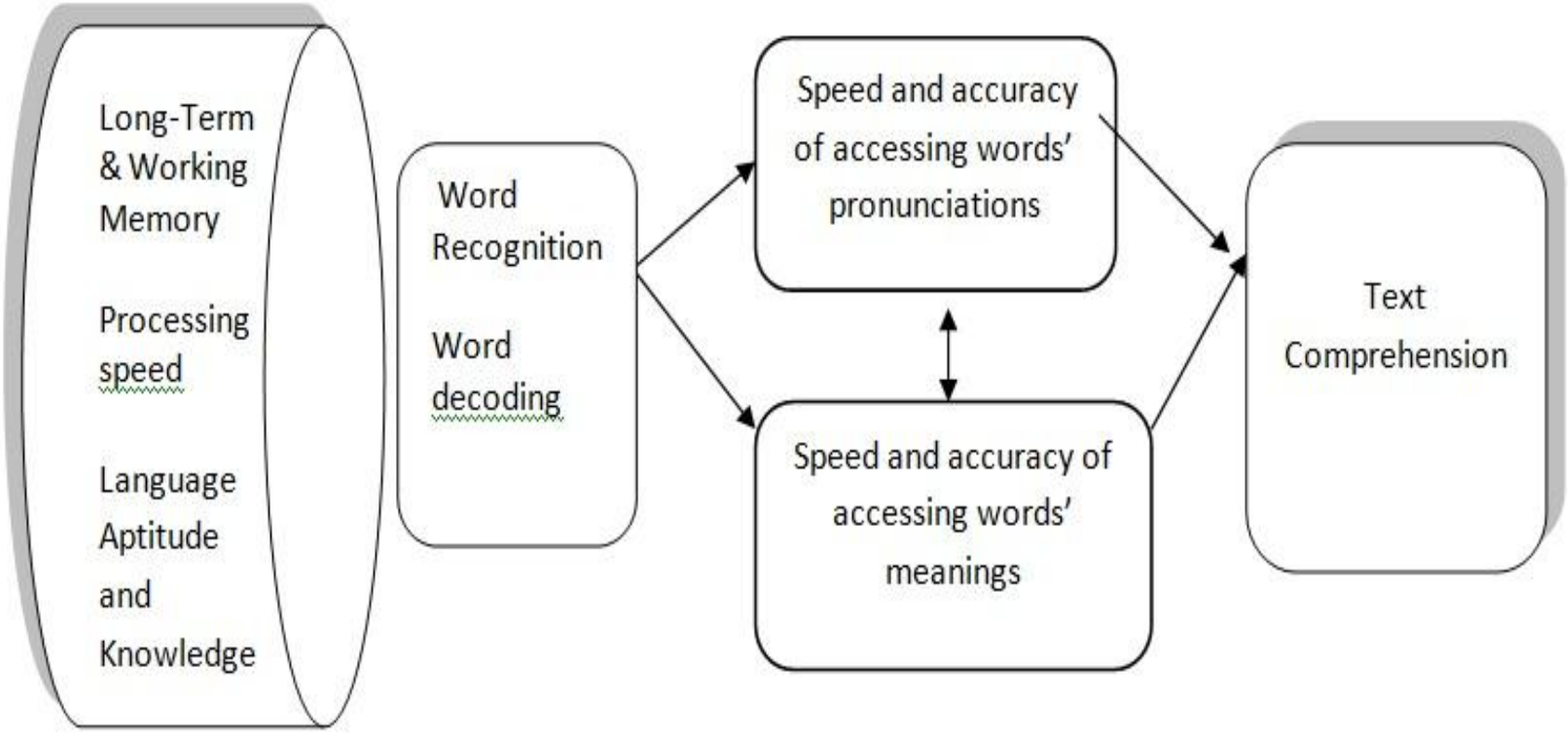
Classic Dyslexia

ICD-315.02

Assessing and Differentiating Reading Disorders

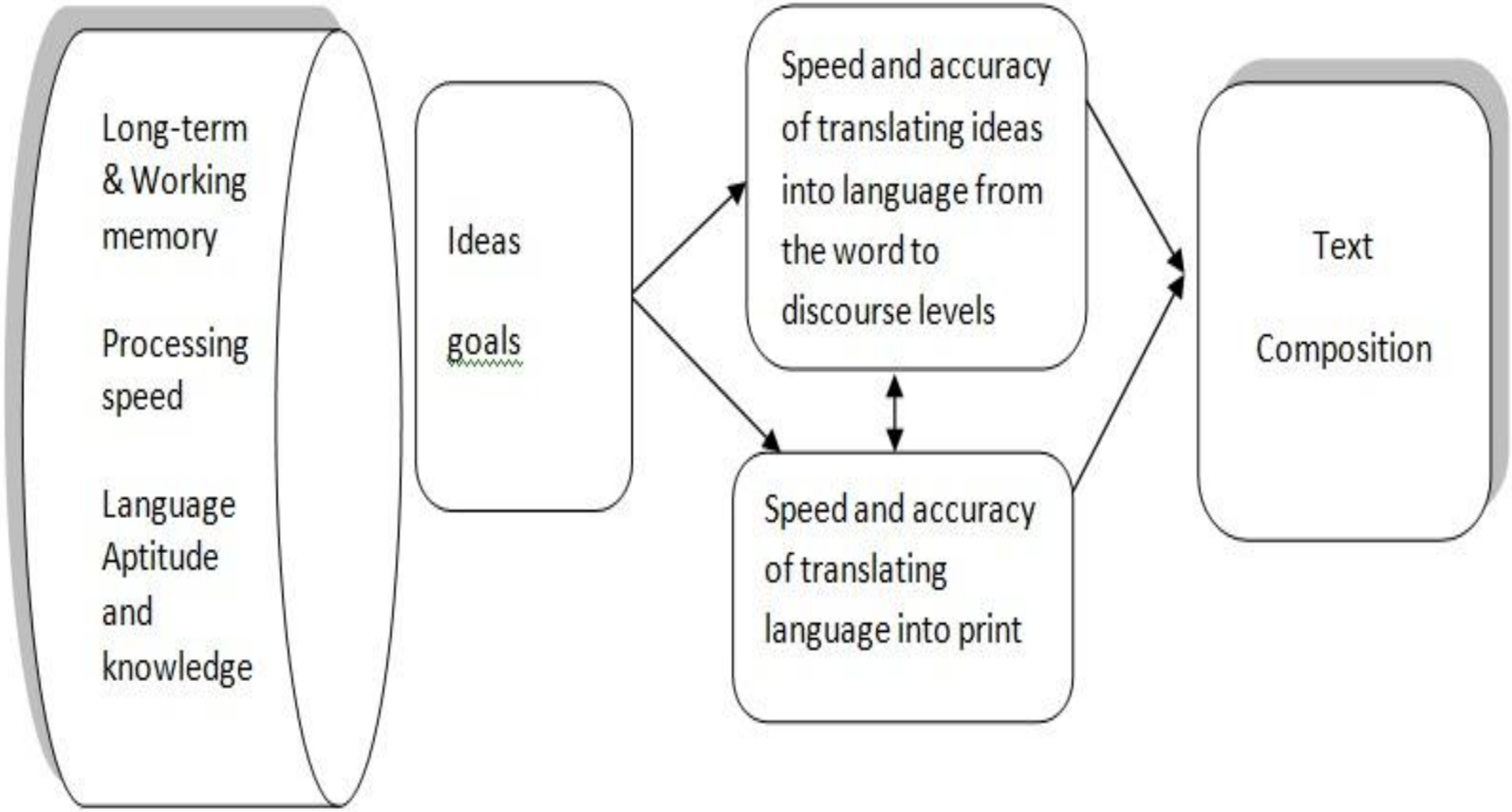
Component Skill Assessment for Differential Diagnosis

Processes involved in reading comprehension



Taken from: Lombardino, L (2012). *Assessing and Differentiating Reading & Writing Disorders*. Cengage Learning

Processes involved in generating text



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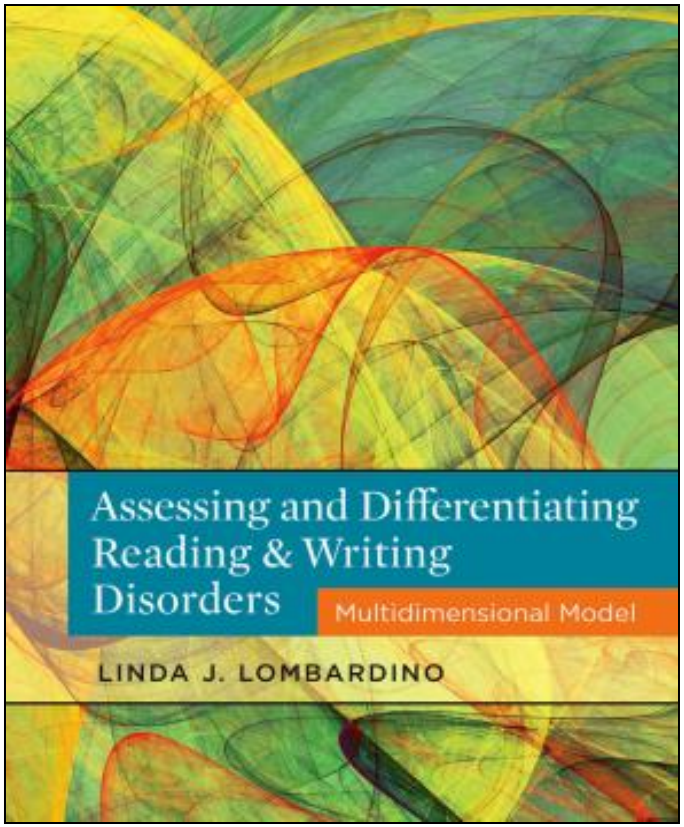
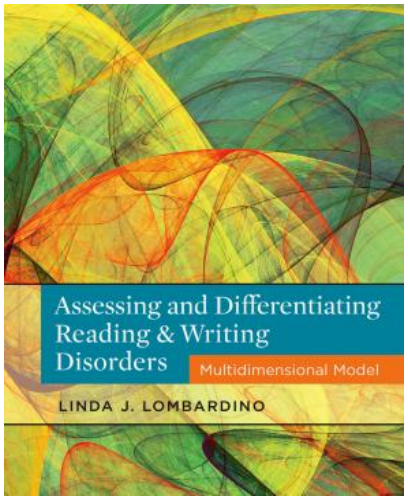
Protocol of Component Strength and Weaknesses

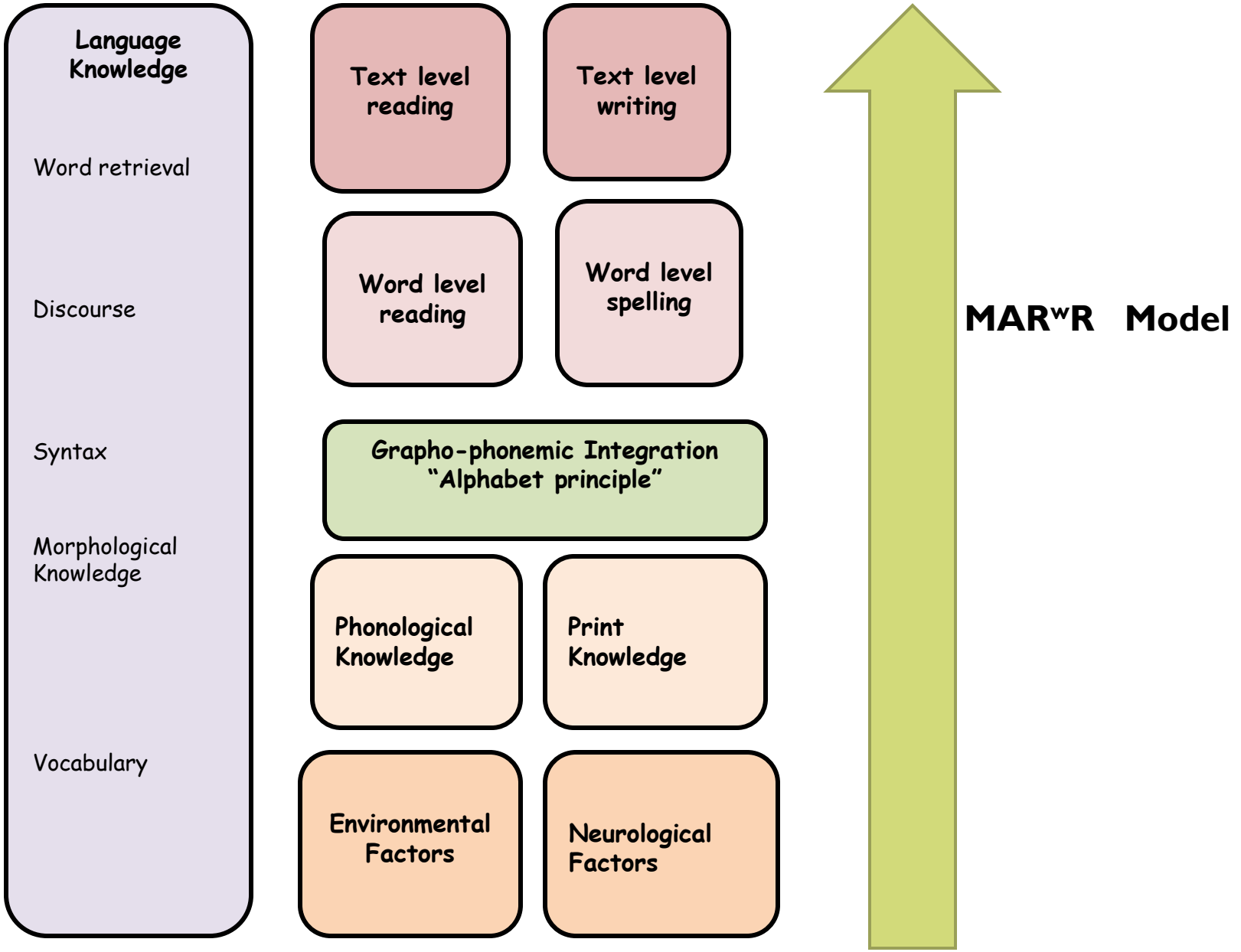
Clinical Framework for Differential Diagnosis of Reading Disabilities



Aims of Assessing and Differentiating Reading & Writing Disorders: Multidimensional Model

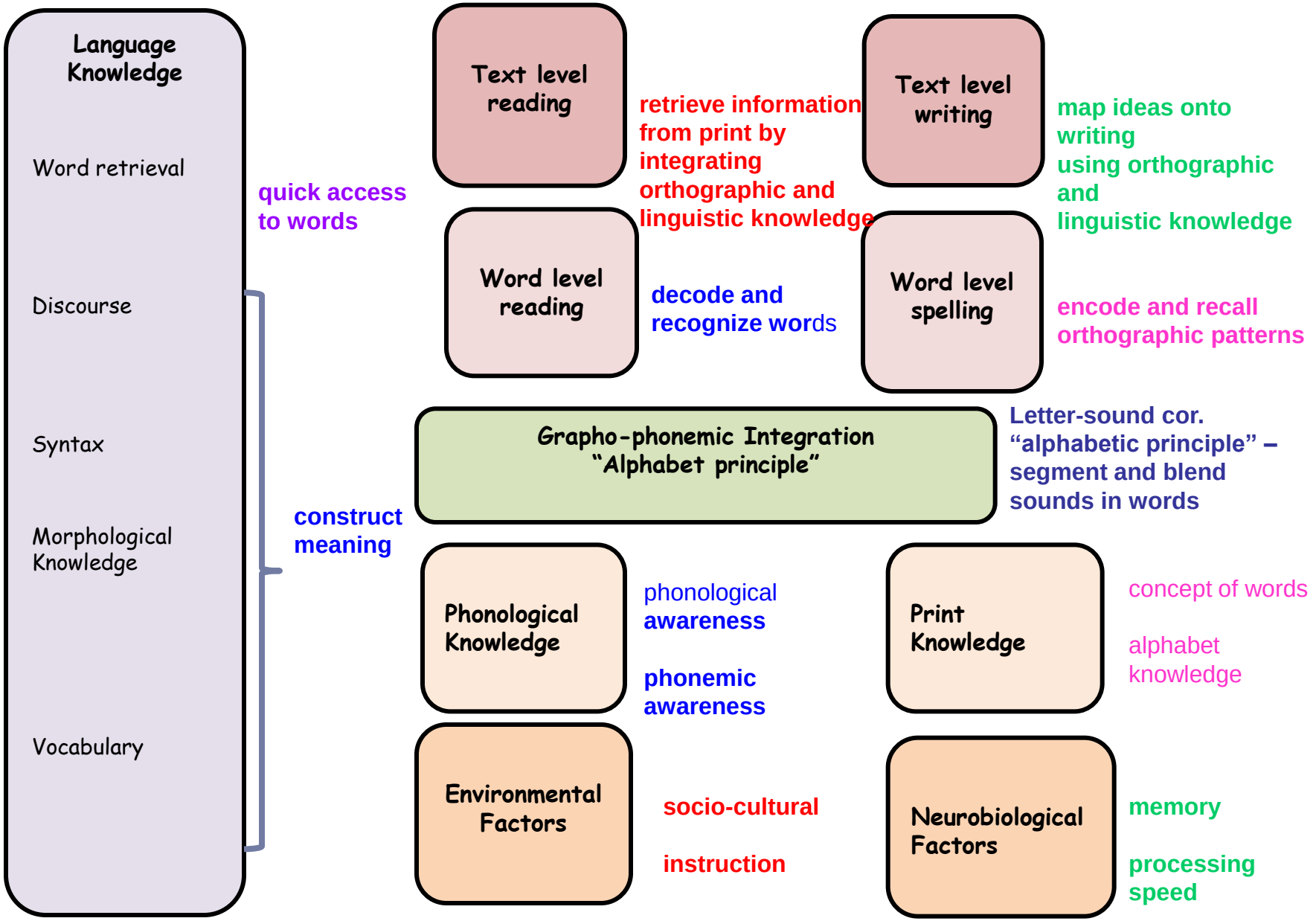
- Synthesizing the literature
- Presenting developmental schemes for core components
- Identifying core weaknesses that underlie the struggling readers' difficulties
- Showing diagnostic profiles that have scientific support
- Recommending specific treatments for case studies
- Providing guidelines for counseling parents





Multidimensional Model for Assessing Reading and Writing (MARwR)

READING ACHIEVEMENT



Skills Targeted in MAR^{w}R

Spoken Language	
Vocabulary	Understanding of words and word meanings in both spoken and written language
Word retrieval	Accessing pronunciations of words or sound patterns stored in memory
Morphological awareness	Understanding that morphemic units exist in words and contribute to the meaning of the word
Syntactic knowledge	Understanding how to use grammatical rules and to adhere to word order, morphological markers, and other syntactic constraints of one's language
Discourse skills	Understanding causal connections and inferences in texts
Print Knowledge	
Print awareness	Knowledge of book conventions, concept of word in print, and print mechanics
Letter knowledge	Knowledge of letter names and ability to write letters that represent letter names
Word awareness	Knowledge that words can be segmented into separate units that represent individual spoken words
Phonological Knowledge	
Phonological awareness	Awareness that the stream of speech can be broken down into smaller units
Grapho-phonemic Integration	
Phonics knowledge	Mapping phonemes (sounds) onto graphemes (letters)
Invented spelling	Knowledge that sounds are represented by letters in some consistent way and use of this knowledge to create spellings prior to conventional instruction

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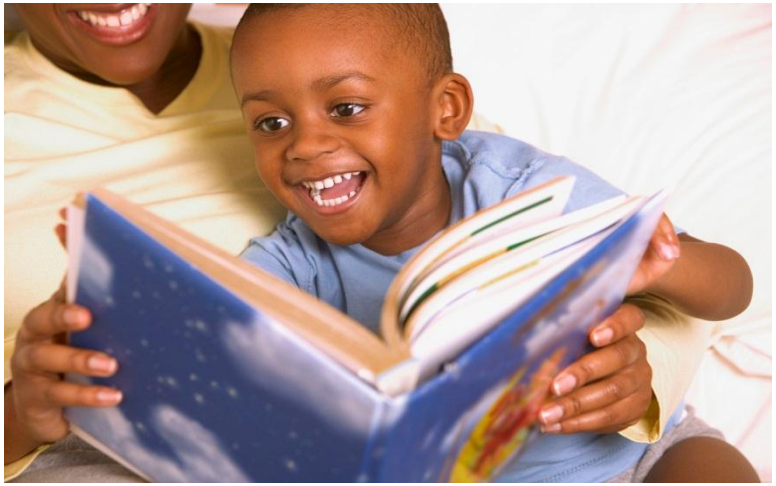


Profiles/Classifications

Preschool through first grade

Classifications

At Risk Classifications for PK – First Grade Children	
Profile 1: Mixed Language and Emergent Literacy Deficit	• Mild to severely depressed language production and/or comprehension • Difficulty in one or more phonological processes • Low normal to above average nonverbal intelligence • Absence of primary visual, auditory or motor disabilities
Profile 2: Emergent Literacy Deficit	• Normal language with or without a history of articulation difficulties • Difficulty with emergent literacy skills especially letter knowledge and sound-letter associations • Low normal to above average nonverbal intelligence • Absence of primary visual, auditory or motor disabilities
Profile 3: Environmental Disadvantage Deficit	• Overall depressed pre-academic skills with or without previous identification of a language delay or disorder • History of diminished opportunities for exposure to language and to literacy concepts at home and/or in school • Low normal to above average nonverbal intelligence • Absence of primary visual, auditory or motor disabilities

Early Literacy Classifications (4-7 years)

	Profile 1 Mild to moderate mixed spoken language & emergent literacy deficit	Profile 2 Emergent literacy deficit	Profile 3 * Environmental disadvantage deficit
Spoken language knowledge	–	+	-/+
Phonological knowledge	-/+	-/+	-/+
Grapheme-Phoneme knowledge	-/+	–	-/+

Profile 1

At-risk with spoken language weakness

Preschool – First Grade

Assessment of Literacy and Language

ASSESSMENT OF LITERACY AND LANGUAGE

PK- first grade

Emergent Literacy

Pre-K	Kindergarten (fall)	Kindergarten (spring)	First Grade
Basic Concepts Rhyme Knowledge	Basic Concepts Letter Knowledge	Basic Concepts Letter Knowledge	Basic Concepts Phonics Knowledge

Language

Pre-K	Kindergarten (fall)	Kindergarten (spring)	First Grade
Basic Concepts Receptive Vocabulary Parallel Sentence Production Listening Comprehension	Basic Concepts Receptive Vocabulary Parallel Sentence Production Word Relationships Listening Comprehension	Basic Concepts Receptive Vocabulary Parallel Sentence Production Word Relationships Listening Comprehension	Basic Concepts Receptive Vocabulary Parallel Sentence Production Word Relationships Listening Comprehension

Brittany: Severe spoken language & emergent literacy deficit

TABLE 4-4 Summary of Brittany's Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Assessment of Literacy and Language (ALL)				
	Word relationships	2*	0.4	Very depressed
	Basic concepts	1*	0.1	Very depressed
	Receptive vocabulary	1*	0.1	Very depressed
	Listening comprehension	1*	0.1	Very depressed
	Parallel sentence production	6*	9	Below average
	Spoken Language Composite	47*	<0.1	Very depressed
	Rime knowledge	3*	1	Very depressed
	Elision	6*	9	Below average
	Phonics knowledge	5*	5	Depressed
	Sound categorization	4*	2	Depressed
	Sight-word recognition	1*	0.1	Very depressed
	Emergent Literacy Composite	61*	0.5	Very depressed
	• Phonological composite	66*	1	Very depressed
	• Phonological-orthographic composite	60	0.4	Very depressed
	• Invented spelling	CR		Did not meet criterion score
Comprehensive Test of Phonological Processing (CTOPP)				
	Elision	6*	9	Below average
	Blending words	11	63	Average
	Sound matching	6*	9	Below average
	Phonological Awareness Composite	85*	16	Low average
	Memory for digits	3*	1	Very depressed
	Nonword repetition	9	37	Average
	Phonological Memory Composite	85*	16	Low average
	Rapid color-naming	4*	2	Depressed
	Rapid object-naming	8	25	Average
	Rapid-Naming Composite	76*	5	Depressed
Test of Early Written Language–2nd Edition (TEWL-2)				
	Basic writing	80	10	Below average
	Contextual writing			Unable to obtain basal level

*Score is at least one standard deviation below mean.

Amanda : moderate mixed language and literacy

TABLE 4-3 Summary of Amanda's Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Assessment of Literacy and Language (ALL)				
	Word relationships	5*	37	Depressed
	Listening comprehension	5*	5	Depressed
	Basic concepts	7*	16	Below average
	Receptive vocabulary	7*	16	Below average
	Parallel sentence production	12	75	High average
	Spoken Language Composite	87	19	Low average
	Letter knowledge	9	37	Average
	Rime knowledge	9	37	Average
	Elision	8	25	Average
	Phonics knowledge	11	63	Average
	Sound categorization	7*	16	Below average
	Sight-word recognition	10	50	Average
	Emergent Literacy Composite	91	27	Average
	• Phonological composite	87	19	Low average
	• Phonological-orthographic composite	99	47	Average
ALL Supplemental Tests				
	Book handling	CR	—	Met criterion
	Matching symbols	CR	—	Met criterion
	Word retrieval	CR	—	Met criterion
	Rapid automatic naming	CR	—	Met criterion
Dynamic Indicators of Basic Early Literacy Skills (DIBELS)				
	Letter-naming fluency	CR	—	Low risk
	Phoneme segmentation fluency	CR	—	Emerging skill
	Nonsense-word fluency	CR	—	Low risk
The Illinois Test of Psycholinguistic Abilities (ITPA-3)				
	Spoken analogies	10	50	Average
	Spoken vocabulary	6*	9	Depressed
	Morphological closure	9	37	Average
Test of Narrative Language (TNL)				
	Narrative comprehension	8	25	Average
	Oral narration	4*	2	Depressed
	Narrative Language Ability Index	76*	5	Depressed

*Score is at least one standard deviation below mean.

Profile 2

At-risk with spoken language strengths

Carlos : Only emergent literacy deficit

TABLE 4-5 Summary of Carlos' Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Assessment of Literacy and Language (ALL)				
	Listening comprehension	10	50	Average
	Word relationships	12	75	Above average
	Basic concepts	11	63	Average
	Receptive vocabulary	13	84	Above average
	Parallel sentence production	14	91	Superior
	Spoken Language Composite	112	79	Average
	Letter knowledge	4*	2	Depressed
	Rime knowledge	9	37	Average
	Elision	8	25	Average
	Phonics knowledge	4*	2	Depressed
	Sound categorization	9	37	Average
	Sight-word recognition	7*	29	Below average
	Emergent Literacy Composite	76*	5	Depressed
	• Phonological composite	91	27	Average
	• Phonological-orthographic composite	68*	2	Depressed
	Concept of word	CR	—	Did not meet criterion
	Invented spelling	CR	—	Did not meet criterion
	Matching symbols	CR	—	Met criterion
	Word retrieval	CR	—	Met criterion
	Rapid automatic naming	CR	—	Met criterion

CR = criterion-referenced score
*Score is at least one standard deviation below mean.

Go to practice report # 1 kindergarten child

Go to practice report #2 kindergarten child

Profiles/Classifications School-Age Children

Late first grade and beyond

Mixed Spoken and Written Language Disorder

Sp Language characteristics	R and W Characteristics
• Exhibits depressed oral language abilities in one or more domains of language (e.g., semantic, syntax, pragmatics), however, deficits in phonological processing (awareness, memory, rapid) are often mild and sometimes do not occur • Typically has a history of early language impairment • Often shows deficits in production of oral language narratives and other forms of oral discourse • Often shows deficits in use of morphological and syntactic forms	• Can exhibit relatively good word recognition and reading fluency, and spelling • Exhibits depressed reading comprehension • Exhibits depressed writing composition in terms of story grammar and other structural elements of discourse • Morpho-syntactic and semantic errors are often observed in written composition

Gail (9 years), Mixed language and literacy

TABLE 5-9 Gail's Test Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Clinical Evaluation of Language Fundamentals—4 (CELF-4)				
	Formulating sentences	6	9	depressed
	Understanding spoken paragraphs	6	9	depressed
	Recalling sentences	8	25	Lower end of average
Test of Word-Reading Efficiency (TOWRE)				
	Sight-word efficiency	85	16	below average
	Phonemic decoding efficiency	90	25	lower end of average
	Total Word-Reading Efficiency	85	16	below average
Comprehensive Test of Phonological Processes (CTOPP)				
	Elision	10	50	average
	Blending words	14	91	above average
	Phonological Awareness Composite	112	79	higher end of average
	Memory for digits	9	37	average
	Nonword repetition	6*	9	depressed
	Phonological Memory Composite	85	16	below average
	Rapid letter-naming	6*	9	depressed
	Rapid digit-naming	3*	<1	very depressed
	Rapid-Naming Composite	56*	<1	very depressed
GRAY ORAL READING TEST—4TH EDITION (GORT-4)				
	Rate	3*	1	very depressed
	Accuracy	7*	16	below average
	Fluency (rate + accuracy)	5*	5	depressed
	Passage comprehension	9	36	average
	Oral Reading Quotient	82*	12	below average
Woodcock Johnson Tests of Achievement—3rd Edition (WJ III ACH)				
	Letter-word identification	97	43	average
	Reading fluency	86	18	low average
	Spelling	101	52	average
	Writing fluency	94	35	average
	Writing samples	90	26	lower end of average
	Word attack	115	83	above average
	Passage comprehension	96	39	average
Woodcock-Johnson Tests of Cognitive Abilities—3rd EDITION (WJ III COG)				
	Verbal comprehension	77*	7	below average
	Concept formation	87	20	lower end of average
	Visual matching	79*	8	below average
	Brief Intellectual Ability	78*	7	below average

*score is at or below one standard deviation below the mean.

Gail (9 years) - continued

TABLE 5-9 Gail's Test Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Clinical Evaluation of Language Fundamentals—4 (CELF-4)				
	Formulating sentences	6	9	depressed
	Understanding spoken paragraphs	6	9	depressed
	Recalling sentences	8	25	Lower end of average
Test of Word-Reading Efficiency (TOWRE)				
	Sight-word efficiency	85	16	below average
	Phonemic decoding efficiency	90	25	lower end of average
	Total Word-Reading Efficiency	85	16	below average
Comprehensive Test of Phonological Processes (CTOPP)				
	Elision	10	50	average
	Blending words	14	91	above average
	Phonological Awareness Composite	112	79	higher end of average
	Memory for digits	9	37	average
	Nonword repetition	6*	9	depressed
	Phonological Memory Composite	85	16	below average
	Rapid letter-naming	6*	9	depressed
	Rapid digit-naming	3*	<1	very depressed
	Rapid-Naming Composite	56*	<1	very depressed
GRAY ORAL READING TEST—4TH EDITION (GORT-4)				
	Rate	3*	1	very depressed
	Accuracy	7*	16	below average
	Fluency (rate + accuracy)	5*	5	depressed
	Passage comprehension	9	36	average
	Oral Reading Quotient	82*	12	below average
Woodcock Johnson Tests of Achievement—3rd Edition (WJ III ACH)				
	Letter-word identification	97	43	average
	Reading fluency	86	18	low average
	Spelling	101	52	average
	Writing fluency	94	35	average
	Writing samples	90	26	lower end of average
	Word attack	115	83	above average
	Passage comprehension	96	39	average
Woodcock-Johnson Tests of Cognitive Abilities—3rd EDITION (WJ III COG)				
	Verbal comprehension	77*	7	below average
	Concept formation	87	20	lower end of average
	Visual matching	79*	8	below average
	Brief Intellectual Ability	78*	7	below average

*score is at or below one standard deviation below the mean.

Specific Reading Disability (Dyslexia)

Sp language characteristics

- Depressed ability to remember the precise oral pronunciations of words learned, particularly when they consist of multisyllabic and complex constructions.
- Relatively frequent history of articulation therapy
- Low average or above language production and comprehension skills depending on the severity of the word reading deficit
- Listening comprehension exceeds reading comprehension although sometimes holding lengthy oral directions in memory is difficult
- Handwriting varies from good to very poor
- Writing conventions, such as punctuation and capitalization are often ignored or misused.

W language characteristics

- Depressed phonological decoding of nonwords, word reading, spelling, and reading fluency
- Listening comprehension exceeds word reading and reading fluency
- Spelling is always impaired and retention of word spelling is very difficult
- Writing mechanics including punctuation conventions are typically poor.
- Morph-syntactic deficits may be apparent in written language
- Handwriting can range from good to illegible but is typically of poor quality

Evan (10 years), Dyslexia

TABLE 5-4 Evan's Test Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Test of Word-Reading Efficiency (TOWRE)				
	Sight-word efficiency	<55	<1	very depressed
	Phonemic decoding efficiency	72	3	depressed
	Total Word-Reading Efficiency	56	<1	very depressed
Comprehensive Test of Phonological Processings (CTOPP)				
	Elision	5*	5	depressed
	Blending words	12	75	high average
	Phonological Awareness Composite	91	27	average
	Memory for digits	9	37	average
	Nonword repetition	11	63	average
	Phonological Memory Composite	100	50	average
	Rapid letter-naming	5*	5	depressed
	Rapid digit-naming	5*	5	depressed
	Rapid-Naming Composite	70*	2	very depressed
Gray Oral Reading Test–4th Edition (GORT-4)				
	Rate	2*	<1	very depressed
	Accuracy	1*	<1	very depressed
	Fluency (Rate + Accuracy)	1*	<1	very depressed
	Passage comprehension	8	25	low average
	Oral Reading Quotient	67*	1	very depressed
Woodcock Johnson Tests of Achievement–3rd Edition (WJ ACH III)				
	Letter-word identification	64*	1	very depressed
	Reading fluency	61*	0.5	very depressed
	Calculation	85	16	below average
	Math fluency	62*	1	very depressed
	Spelling	61*	0.5	very depressed
	Writing fluency	62*	1	very depressed
	Writing samples	89	22	low average
	Word attack	84*	14	below averaged
	Oral comprehension	98	45	average
Woodcock Johnson Tests of Cognitive Abilities–3rd Edition (WJ III COG)				
	Verbal comprehension	96	39	average
	Visual-auditory learning	90	25	lower end of average
	Spatial relations	92	30	average
	Sound bending	112	80	higher end of average
	Concept formation	107	68	average
	Visual matching	60*	0.4	very depressed
	Numbers reversed	97	43	average
	Verbal-Ability Composite	96	39	average
	Thinking-Ability Composite	95	41	average
	Cognitive Efficiency Composite	77*	6	depressed
	General Intellectual Ability	91	28	lower end of average

*Score is at or below one standard deviation below the mean.

Evan (10 years), Dyslexia

TABLE 5-5 Summary of Evan's Primary Areas of Strength and Weakness

	Processing Speed	Verbal Abilities	Word Recognition	Fluency	Rapid Naming	Reading Comprehension
Weakness	✓		✓	✓	✓	
Strength		✓				✓

Samples of spelling and writing composition in children with dyslexia

Writing Sample from a 7 year old girl with dyslexia

Wrote

- I Im a gaon
- I go m dog
- Goa is aon a a don

Tried to write

- I have a dog
- I'm going to be a clown

Writing sample from a 12 year old boy with dyslexia

- "Today in LAD (lab) we played with suchtion (suction) cups. It took 50 pru to pull them apart. first w (we) tride (tried) to pull them aprrt with 14 peple. The inveter (inventor) of sushin cups and put them together and 2 horss (horses) culd (could) not pull them a part".

(verbal analogies on the WJ-COG = 129)

Spontaneous written language sample from an 11 yr old with dyslexia

- *What does online shopping cost us?*
- **Buying on the Enter net has gotten cheper than in the store like 1.00 for a pake of cards on the enter 2.00 for the same pack in the store. The enter net is also much faster, you can by things n seconds. One bad thing about the enternet is it takes awile for delivry. Another bad thing about the net is you only pass address and creid card number, but in stores they can make you feel good and laugh you cant do that on a computer.**

note phonic spellings and poor orthographic pattern recognition

- listening comp=138
- verbal analogies=132

- phono. aware.=85
- word attack=95
- word id=94
- spelling=95

Reading Comprehension Disorder

Sp Language characteristics	W language characteristics
• Typically unidentified with learning difficulties until 4th grade and beyond. • Average to strong phonological decoding and word recognition • Relatively weak language comprehension skills at the word and discourse levels • Weaknesses in telling well structured and integrated stories orally and in writing • Variable performance on tasks of working memory	• Word level reading, decoding and spelling are all superior to reading comprehension • Depressed reading comprehension skills, particularly beyond a 3rd-4th grade reading level

Harry (14 years), Reading Comprehension Deficit

TABLE 5-11 Harry's Test Scores

Test	Subtest	Standard Score	Percentile Rank	Descriptive Rating
Comprehensive Test of Phonological Processes (CTOPP)				
	Elision	10	50	average
	Blending words	9	37	average
	Memory for digits	7*	16	below average
	Nonword repetition	10	50	average
	Rapid digit-naming	11	63	average
	Rapid letter-naming	13	84	higher end of average
	Phonological Awareness Composite	97	42	average
	Phonological Memory Composite	91	27	lower end of average
	Rapid-Naming Composite	112	79	high average
Woodcock Reading Mastery Tests-Revised (WRMT-R)				
	Word identification	139	99.6	superior
	Word attack	114	82	high average
	Word comprehension	98	45	average
	Passage comprehension	96	40	average
	Basic Skills Cluster	127	96	well above average
	Reading Comprehension Cluster	97	41	average
	Total Reading Cluster	112	79	higher end of average
Gray Oral Reading Test–4th Edition (GORT-4)				
	Rate	10	50	average
	Accuracy	13	84	above average
	Fluency (rate + accuracy)	12	75	higher end of average
	Passage comprehension	6*	9	depressed
	Oral Reading Quotient	94	34	average
Wide Range Achievement Test–3rd Edition (WRAT-3)				
	Reading	122	92	well above average
	Spelling	113	81	higher end of average
Test of Word-Reading Efficiency (TOWRE)				
	Sight-word efficiency	99	48	average
	Phonemic decoding efficiency	111	77	higher end of average
	Total Word-Reading Efficiency	106	66	average
Clinical Evaluation of Language Fundamentals–4th Edition (CELF-4)				
	Recalling sentences	11	63	average
	Formulating sentences	9	37	average
	Word class-receptive	11	63	average
	Word class-expressive	11	63	average
	Word classes-total	10	50	average
	Word definitions	9	37	average
	Core language score	100	50	average

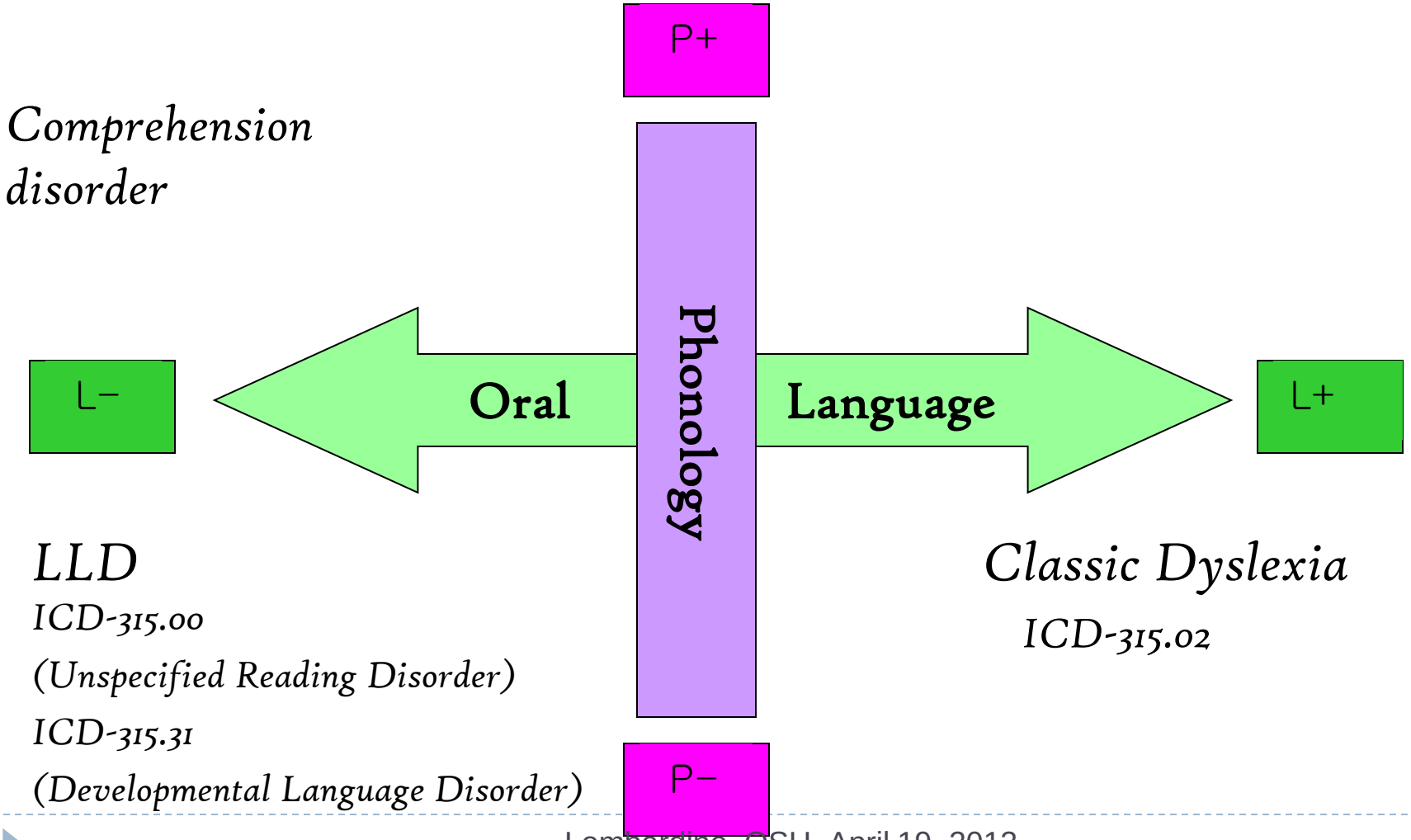
*Score is at least one standard deviation below the mean.

Harry (14 years), Reading Comprehension

TABLE 5-12 Summary of Harry's Primary Areas of Strength and Weakness

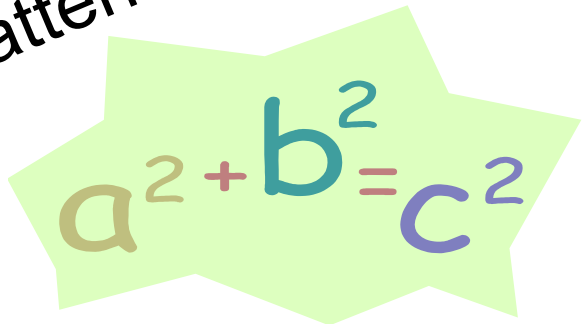
	Rapid Naming	Short-Term Memory	Word Decoding	Word Recognition	Spelling	Fluency	Word-Level Reading Comprehension	Text-Level Reading Comprehension	Written Composition
Weakness		✓					✓	✓	✓
Strength	✓		✓	✓	✓	✓			

Classification Model - Bishop & Snowing (2004)



Focus on Dyslexia

No one formula or pattern



Synthesis and convergence of data

Problems Surrounding the Diagnosis of Dyslexia

- Lack of recognition of "dyslexia" as a specific learning disability
  - Overwhelming neuro-psychological and neuro-biological evidence
- Use of a single standard to make the diagnosis
  - Discrepancy requirements
  - Scores must be below a specific metric (e.g., 1 or 1.5 standard deviations below mean)
- Use of a single deficit theory
  - Requiring that a specific skill be deficient such as phonological decoding, reading fluency etc.

Problems continued

- No one pattern of deficits can be used to diagnosis dyslexia

- Patterns of strengths and weaknesses vary with
  - ✓ Number of areas of strength to facilitate compensation
    - Socio-cultural opportunities
    - Educational opportunities
    - Degree of appropriate and intensive intervention
    - Motivation/determination
    - Reasoning abilities
    - Memory abilities

Most Widely Recognized Deficit Skills in the Classification of Dyslexia

- ✓ Difficulties with the phonological processing sounds
  - manipulation
  - memory
  - retrieval
- ✓ Difficulty mapping sounds of speech onto letters/print symbols
  - reading
  - spelling

Language Characteristics of Dyslexia

weaknesses

- Automatic mapping of arbitrary language and print information
  - Memories for complex phonological patterns while speaking
  - Spelling – transcription
- Word finding
- Organization/fluency of oral language

strengths

- Spoken language
- Listening comprehension
- Drawing inferences in reading comprehension
- Writing content

Cognitive Characteristics of Dyslexia

Weaknesses

- Universal deficits in phonological processing
- Universal deficits in rapid naming
- Short-term working memory especially for symbols holding little semantic information

Strengths

- Fluid reasoning
- Recalling information/retelling stories

Medical Diagnosis of Dyslexia

DSM-IV criterion

Proposed DSM -V changes

Key diagnostic patterns found on widely used standardized test for the diagnosis of dyslexia

Discrepancies between spoken language and written language

spoken language > written language

Discrepancies between performance on difference components of reading

e.g. reading comprehension > word-level decoding and recognition

Discrepancies between performance on difference components of writing

e.g. content of text > spelling and punctuation

Discrepancies in one or more cognitive processes

e.g. fluid reasoning > processing speed

Deficits in Speed of Processing across Domains

Timed word reading

Color, letter, number naming

A C B C B A D A

Visual matching

1 3 5 1 7 4

Mathematical calculations

$a^2 + b^2 = c^2$

Discrepancies between phonetic patterns heard and spelling of irregular words

Cheper for cheaper

Nashun for nation

Discrepancies between transcriptional skills in writing and generation of ideas

e.g. content knowledge > spelling and punctuation

Common Patterns on WJ-III-ACH

Common Discrepancy Patterns on WJ-III-ACH tests

Oral comprehension > word-level reading & decoding

Reading fluency > word-level reading

Passage comprehension > word-level reading

Writing samples > writing fluency

Common Patterns on WJ-III-COG and WISC-IV

Common Discrepancies **between** Composite Scores on WJ-III-COG and indices on WISC-IV

WJ-III-COG (between composites)

Thinking Ability > Cognitive Efficiency

WISC-IV (between indices)

Perceptual Reasoning > Processing Speed

Verbal Comprehension > Processing Speed

Verbal Comprehension and Perceptual Reasoning > Processing Speed and Working Memory

Common Discrepancies **within** Composite Scores on WJ-III-COG and indices on WISC-IV

WJ-III-COG (within composites)

Thinking Ability Composite

- Sound blending is often elevated in comparison with other measures of phonological awareness
- High sound blending scores in persons with dyslexia often inflate reasoning score and obscure phonological coding deficit

Verbal Ability Composite

- typically average range – one test

Cognitive Efficiency Composite

- Visual matching test is typically lowest score

WISC-IV (within indices)

Verbal Comprehension Index

?

Perceptual Reasoning Index

?

Working Memory Index

- Likely to have most difficulty with letter-number sequencing & backward digit span

Processing Speed Index

- Likely to have most difficulty with coding and symbol search

Diagnosis by Convergence of Evidence

Qualitative observations of a range of academic tasks

Family and developm history

Severe deficits in spelling and other conventions need to map words into text

Rate of learning on tasks of reading and writing and nature of errors

Test scores and discrepancies across skill and on timed vs. untimed tests of word-reading and performance on tasks of phonological processes and rapid naming

How to Avoid Incorrect Conclusions When Diagnosing Dyslexia

- Lack of deficit in one specific area such as decoding or word-reading
- Adequate scores in reading comprehension
- Adequate scores in all areas, especially in the early grades
- Include timed measures of word and text-level reading
- Listen to parents experiences from working with child at home

- Insert Peter's data with conclusions

Final Look

More Clinical Cases

Case 1: 5 years, 7 months

5 year, 7 month
February, kindergarten
public school

Developmental & Familial Hx

- Some difficulties at birth but quickly resolved
- Age appropriate communication and motor milestones
- Average health and good coordination
- Both father and brother having reading disabilities

Presenting Problems

Struggles with:

- Learning letters
- Writing
- Organization
- Following multi-step commands

5 year 7 month kindergartener

ALL Tests of Spoken Language		
Subtests	**Ss**	%tile
Basic Concepts	11	63
Receptive Vocabulary	13	84
Parallel Sentence Production	14*	91
Word Relationships	12	75
Listening Comprehension	10	50
Language Composite	**112**	**79**

ALL Criterion Test for Emergent Literacy		
Subtest	**Raw Score**	**Criterion**
Matching Symbols	9	Meets criterion
Word Retrieval	7	Meets criterion
Rapid Automatic Naming	109 seconds	Meets criterion
Concept of Word	4	Does not meet criterion
Invented Spelling	8	Does not meet criterion

ALL Emergent Literacy Tests		
Subtests	**Ss**	**tile**
Rhyme Knowledge	9	37
Elision	8	25
Sound Categorization	9	37
Phonological Composite	**91**	**27**
Phonics Knowledge	4*	2
Sight Word Recognition	7	29
Phonological-Orthographic Composite	**68***	**2**
Emergent Literacy Composite	**76**	**5**

Woodcock-Johnson III Tests of Achievement		
Subtest	**Ss**	**%tile**
Picture Vocabulary	96	40
Spelling	100	49
Story Recall	116**	86
Oral Comprehension	109	73

spoken language > emergent literacy

Dx: Dyslexia ICD-10-CD Code 315.02.

Refer to Sample Report of a first grade child with dyslexia

Case 2: 7 year old male first grade, public school

Developmental & Familial Hx

- Unintelligible speech until ~ 2 years
- Positive family hx for reading difficulties for bio. father
- Sibling with autism
- Sibling in gifted program
- Signs in K such as writing numbers backwards, skipping words when reading, incomplete assignments

Presenting Problems

- Started school in 2nd grade math and reading
- Just moved back to 1st grade level reading
- Incomplete assignments
- Slow oral reading
- Difficulty with spelling and reversing letters when spelling
- Reversal of numbers in math assignments
- Verbal answers are correct but written answers are often incorrect

First grade student, public school

ASSESSMENT OF LITERACY AND LANGUAGE

ALL Tests of Spoken Language

Composite Score	Ss	%tile
Language Composite	135	99

ALL Emergent Literacy Tests

Composite Scores	Ss	%tile
Phonological Composite	111	77
Phonological-Orthographic Composite	104	61
Emergent Literacy Composite	109	73

Test of Word Reading Efficiency (TOWRE)

(timed 45 sec)

Subtests	Ss	%tile
Sight word efficiency	86	17
Phonemic decoding efficiency	91	27
Total Word Reading	86	17

Gray Oral Reading Test – 4 (GORT-4)

Subtests	Ss	%tile
Rate	5	5
Accuracy	5	5
Fluency	5	5
Comprehension	9	37
Oral Reading Quotient	82	12

Examples of reading errors

Target word	Child's production
new	now
with	wath
stars	stairs
goes	gets

spoken language > emergent literacy
spoken language> word and text-level reading
comprehension > fluency

Dx Dyslexia

ICD-10-CD Code 315.02

Case 3: 9 years, 10 months private school

Male: 9 years, 10 months
going into 4th grade
private school

Developmental & Familial Hx

- Unremarkable birth history
- Hx of ear infections, allergies, asthma
- Dx of ADHD – inattentive type in 3rd grade, treated with medication during school year only. Positive results
- No documented family hx but mother reports positive history for attention difficulties and reading difficulties, especially while in college

Presenting Problem

- 3rd grade teacher reported problems with reading fluency and started to have difficulty with math problems
- Difficulties at school are resulting in frustration, crying, twitching, and low self-esteem

Transitioning into 4th grade

Clinical Evaluation of Language Fundamentals- 4 (CELF-4)		
Subtest	**Ss**	%tile
Recalling sentences	9	37
Formulating sentences	16	98
Understanding spoken paragraphs	15	91
Concepts and following directions	7*	16
Word classes-receptive	13	84
Word classes-expressive	11	63
Word-classes - total	12	75
Receptive Lang. Index	99	47
Expressive Lang. Index	112	79
Core Lang. Index	106	66

Woodcock-Johnson Tests of Achievement-3rd Edition	
Subtest	**Ss**
Letter-Word Identification	99
Spelling	93
Word Attack	104
Reading Fluency	93
Passage comprehension	92
Broad Reading Skills	95

Gray Oral Reading Mastery Test-4th Edition		
Subtest	**Ss**	%tile
Rate	9	37
Accuracy	13	84
Fluency (Rate + Accuracy)	11	63
Passage Comprehension	12	75
Oral Reading Quotient	109	73

Test of Word Reading Efficiency (TOWRE)		
Subtest	**Ss**	%tile
Sight Word Efficiency	67	
Phonemic Decoding Efficiency	76	
Total Word Reading Efficiency	66	

Comprehensive Test of Phonological Processing		
Subtest	**Ss**	**%tile**
Elision	6*	
Blending Words	9	
Phonological Awareness Com	85*	
Memory for Digits	6*	
Nonword Repetition	8	
Phonological Memory Composite	82*	
Rapid Digit Naming	7*	
Rapid Letter Naming	7*	
Rapid Naming Composite	79*	

Case 4: 10 year old male home schooled

Ten year old male, home schooled

Woodcock-Johnson Tests of Cognitive Abilities-3rd edition

Subtest	Ss	%tile
Verbal Comprehension	96	39
Visual-Auditory Learning	90	25
Spatial Relations	92	30
Sound Blending	112	80
Concept Formation	107	68
Visual Matching	60*	0.4
Numbers Reversed	97	43
Verbal Ability Composite	**96**	**39**
Thinking Ability Composite	**95**	**41**
Cognitive Efficiency Composite	**77***	**6**
General Intellectual Abilities Com	**91**	**28**

Woodcock-Johnson Tests of Achievement-3rd Edition

Subtest	Ss	%til
Letter-Word Identification	64*	1
Reading Fluency	61*	0.5
Calculation	85	16
Math Fluency	62*	1
Spelling	61*	0.5
Writing Fluency	62*	1
Writing Samples	89	22
Word Attack	84*	14
Oral Comprehension	98	45
Broad Written Language	62*	1
Basic Reading Skills	72*	3
Math Calculation Skills	78*	8

Test of Word Reading Efficiency (TOWRE)

Subtest	Ss	%tile
Sight Word Efficiency	<55*	<1
Phonemic Decoding Efficiency	72*	3
Total Word Reading Efficiency	56*	<1

Gray Oral Reading Mastery Test-4th Edition

Subtest	Ss	%tile
Rate	2*	<1
Accuracy	1*	<1
Fluency (Rate + Accuracy)	1*	<1
Passage Comprehension	8	25
Oral Reading Quotient	67*	1

Comprehensive Test of Phonological Processing (CTOPP)

Subtest	Ss	%tile
Elision	5*	5
Blending Words	12	75
Phonological Awareness Com	91	27
Memory for Digits	9	37
Nonword Repetition	11	63
Phonological Memory Composite	100	50
Rapid Digit Naming	5*	5
Rapid Letter Naming	5*	5
Rapid Naming Composite	70*	2

Case 5: 15 year old female private high school

Female: 15 years, 9 months - **After Intensive Intervention**

10th grade
private high school

Developmental & Familial Hx

- Unremarkable birth hx
- Late talker for combining words
- No documented family hx but several family members on maternal and paternal side had reading difficulties
- Diagnosed with dyslexia in 2nd grade on psycho-educational assessment at school
- Received private therapy in LiPs
- Spent 3rd grade in charter school for children with learning difficulties
- Enrolled in intensive multisensory intervention in special center
- IOWA scores at end of middle school ranged from 88-94 percentiles in reading, math, social studies but * 21st percentile for spelling

Presenting Problem

- Note taking is difficulty
- Dragon Speech software is very helpful
- Although taking advanced placement in history, reading is extremely slow and spelling remains weak.

15 year old, 10th grader

Woodcock-Johnson Tests of Cognitive Abilities-3rd edition

Subtest	Ss	%tile
Verbal Comprehension	97	41
Visual-Auditory Learning	98	45
Spatial Relations	91	28
Sound Blending	137	99
Concept Formation	116	86
Visual Matching	70*	2
Numbers Reversed	69*	2
Decision speed	86	17
Verbal Ability Composite	97	41
Thinking Ability Composite	120	91
Cognitive Efficiency Composite	65*	1
Processing Speed Composite	75*	5
General Intellectual Abilities Com	96	39

Woodcock-Johnson Tests of Achievement-3rd Edition

Subtest	Ss	%tile
Letter-Word Identification	90	26
Spelling	77*	6
Word Attack	89	23
Passage Comprehension	115	84
Writing Samples	133	99

Test of Word Reading Efficiency (TOWRE)

Subtest	Ss	%tile
Sight Word Efficiency	76*	6
Phonemic Decoding Efficiency	74*	4
Total Word Reading Efficiency	70*	2

Gray Oral Reading Mastery Test-4th Edition

Subtest	Ss	%tile
Rate	6*	9
Accuracy	8	25
Fluency (Rate + Accuracy)	6*	9
Passage Comprehension	9	37
Oral Reading Quotient	85*	16

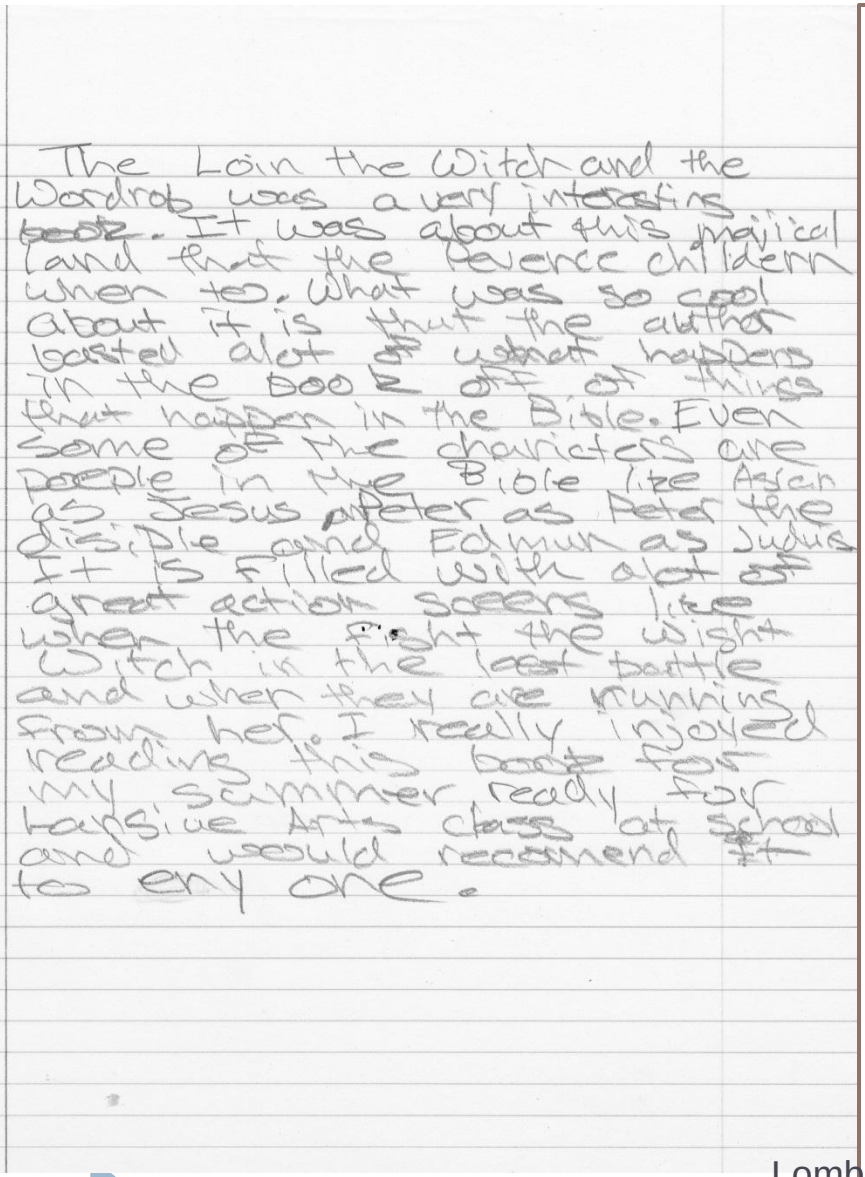
Comprehensive Test of Phonological Processing (CTOPP)

Subtest	Ss	%tile
Elision	4*	2
Blending Words	11	63
Phonological Awareness Com	85*	16
Memory for Digits	7*	16
Nonword Repetition	8	25
Phonological Memory Composite	85*	16
Rapid Digit Naming	2*	<1
Rapid Letter Naming	1*	<1
Rapid Naming Composite	49*	<1

Spoken Language (CELF-4)

Subtest	Ss	%tile
Recalling sentences	13	84
Formulating sentences	13	84
Understanding spoken paragraphs	10	50

15 years olds writing sample



The Loin (lion) the Witch and the Wardrob (wardrobe) was a very interesting book. It was about the majical (magical) land that the Pevence children (children) when (went) to. What was so cool about it is that the author basted (based) a lot of what happens in the book off of things that happen (happened) in the bible. Even some of the charicters (characters) are the poeple (people) in the Bible like Asich (Isaach) as Jesus, Peter as Peter the disciple (disciple) and Edmun as Judus. It is filled with a lot of great action sceens (scenes) like when the ____ the ____witch in the last battle and when they are running from her. I really injoyed (enjoyed) reading this book for my summer ready (reading) for Langive (language) Arts class at school and would recomend (recommend) it to eny one (anyone).

Case 6: College Student

UF College Student
male: 30 years old

Developmental and Familial Hx

- Difficulties with reading since middle school
- Problems acknowledge by teachers but not give a diagnosis of LD

Presenting Problem

- Desire to pursue an advanced degree - concerned that he may not be able to compensate for his reading difficulties due to rigorous academic demands
- Dx is required to quality for academic accommodations

UF College Student

Woodcock-Johnson Tests of Cognitive Abilities-3rd edition		
Subtest	**Ss**	%tile
Verbal Comprehension	113	81
Visual-Auditory Learning	106	65
Spatial Relations	119	90
Concept Formation	107	69
Visual Matching	85*	16
Decision speed	91	28
Verbal Ability Composite	113	81
Processing Speed Composite	87	19
BIA	98	44

Test of Word Reading Efficiency (TOWRE)		
Subtest	**Ss**	%tile
Sight Word Efficiency	86	17
Phonemic Decoding Efficiency	73*	4
Total Word Reading Efficiency	75*	5

Comprehensive Test of Phonological Processing		
Subtest	**Ss**	**%tile**
Elision	9	37
Blending Words	12	75
Phonological Awareness Com	103	58
Memory for Digits	11	63
Nonword Repetition	9	37
Phonological Memory Composite	100	50
Rapid Digit Naming	6*	9
Rapid Letter Naming	6*	9
Rapid Naming Composite	76*	5

Woodcock-Johnson Tests of Achievement-3rd Edition		
Subtest	**Ss**	%tile
Letter-Word Identification	118	89
Word Attack	113	81
Reading Fluency	82*	11
Passage comprehension	105	62
Broad Reading Skills Composite	94	35
Spelling	124	95
Writing fluency	89	23

Gifted Student with dyslexia

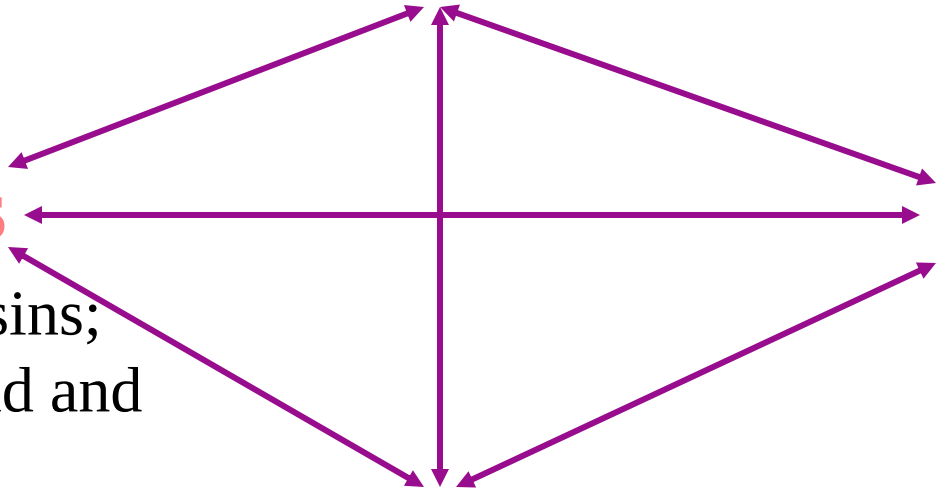
Over the years!

Case History on ZM

- First evaluated at 9 years of age (IQ=138)
- Last evaluated at 16 years of age
- Strong familial hx for dyslexia
- Gifted child
  - Science
  - Drama
  - Drawing
  - Conceptual and Figurative Language
- Attends public school in Florida

LiPS: A Multisensory Scheme

(What do I feel?)



Brothers and cousins;
Smile, open, round and sliders

[p] /p/
[c] /s, k/
[ee] /I:/

Lips
Tongue
Air

ORTON-GILLINGHAM APPROACH (AVK)

- **Sound-letter associations with real and nonsense words for reading and spelling**
- **Syllable types**
  - **Open syllable**
  - **Closed syllable**
- **Spelling rules**
- **Reading comprehension**
- **Reading fluency**

Mean score =100

ZM over eight years

	WRMT-R	Word id	Word attack	Passage comp
Below Average	1994 (9 yrs)	76	67	No testing
	1996 (11 yrs)	92	90	100
Normal range	1999 (14 yrs)	98	94	104
	2002 (16 yrs)	107	105	126

Multisensory Learning Materials

- Highgate House
  Creaton
  Nothamptonshire
  NN 6 8 NN

  email: www.msl-online.net

- Reid, G. (2011). *Dyslexia: a complete guide for parents and those who help them.* John Wiley and Sons

- **Appendix 4 (Reid, 2011): Information: Sources, Resources and Organizations**

- Published Online: 20 APR 2011
- DOI: 10.1002/9781119970897.app4

Conclusions

- Look for converging evidence across reading and cognitive skills
- Dyslexia is a multimodality learning disability
- Always use some timed reading measures and measures of processing speed
- Avoid set standards, theories, or specific patterns to limit interpretation of test findings