

Is Phonology Closing the Gap? A Longitudinal Analysis of the Progress of 100 Students with Dyslexia

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&
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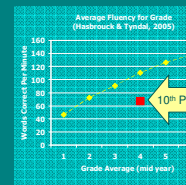
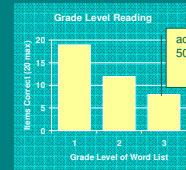
Tennessee Center for the Study
and Treatment of Dyslexia
www.mtsu.edu/~dyslexia



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www.mtsu.edu/~sbernst/IDA07TNCTR.pdf

Sample Case Aaron - Age 9 1/2, 4th Grade

- **Parents**
 - History of difficulty with sight words, phonics, new & nonsense word reading, spelling, fluency, & timed tests.
- **4th Grade Teacher**
 - Aaron “still needs support to decode grade level text.”
- **Reading Tutor**
 - “It seems we are forever reviewing CVC patterns. He can identify them by sight, but still misses them when reading.”



The Tennessee Center for the Study & Treatment of Dyslexia

Integrated Service Model

- **Provide a clear description** of the student's learning problem
- Work with schools to **design appropriate education intervention plans**
- **Support school instructional staff** by helping them understand the origin and nature of dyslexia
- Assist teachers in **effective use of specific instructional approaches**
- **Recommend appropriate accommodations** to assure that a student's general education does not suffer because of limitations in reading and spelling.



Established by the Tennessee General Assembly in 1999 to assist K-12 students with dyslexia, their teachers, and their families.

Center Services & Professional Development

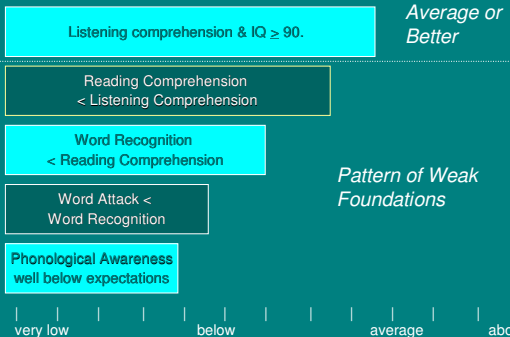
- **In-service Professional Development**
 - Professional development workshops presented across the state of TN (30+ per year, 500 professionals served)
- **Pre-service Graduate Education**
 - 10 graduate courses taught in dyslexic studies, part of our certificate program
 - Interdisciplinary Ph.D. in literacy studies, begins Fall, 2008.
www.mtsu.edu/~literacy
- **Direct Services to K-12 Students**
 - 50+ assessments each year, reading & spelling progress monitoring of 25+ students, consultations for 40+ children
 - Data is retained for archival study



Part I: Initial Diagnosis

Goal: identify children who meet the state of Tennessee's criteria for having a specific learning disability in reading and the Center's profile of dyslexia

Diagnosis: Based on the Specific Dyslexia Algorithm (Pennington, 1991)



Sample Case "Aaron"

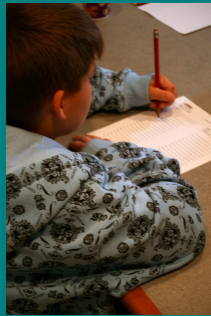
Name: Aaron		Date: 1/2006	Age: 9.9	Grade: 4th		
POST-ASSESSMENT SUMMARY GRAPH						
	60-79	80-89	90-109	110-119	120-129	Grade Level
	Vary Low / Low	Low Average	Average	High Average	Superior	
Intelligence (IQ)		WM:74	FSIQ:97	VCI:100	PIRI:119	FSIQ:97
Math						
V.M.A.T. (given 9/2004)						
Oral Language			100			3.9
V.M.A.T. Listening Comprehension						
V.M.A.T. Oral Language						
Reading Comprehension			84			3.1
V.M.A.T.						
Reading Real Words			85			2.9
V.M.A.T. Word Reading						
Spelling			97			3.2
V.M.A.T.						
Reading Nonsense Words			85			2.0
V.M.A.T. - Pseudoword Decoding						
Phonological Skills		79				
CTOPP PA Composite						
CTOPP Phonological Memory			82			
Rapid Automatic Naming		73				
CTOPP RN Composite						
CTOPP Alternate RN composite	52					

Part II: Formative Assessment w/ADEPT

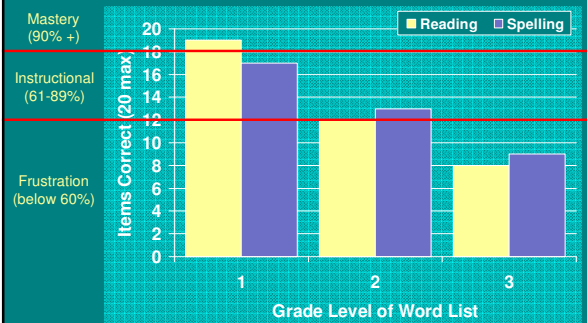
Goal: determine children's levels of proficiency in phonemic awareness, decoding, and word reading in order to determine phase of development and set instructional goals.

ADEPT (Sawyer, 1998)

- Phonemic Awareness**
 - segmenting with blocks: rat → ■■■, last → ■■■
 - manipulating phonemes with letters
 - manipulating phonemes with blocks
- Decoding**
 - Pseudoword reading lists, increasing in complexity. Levels are based on Frith's (1985, 1986) stage model of development.
- Word Reading & Spelling**
 - Grade level reading & spelling lists. Items sampled from grades K-8.
- Fluency**
 - Pre-primer through 3rd grade – passages from the University of Oregon
 - 4th grades and above from Spargo (1989)



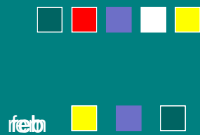
Aaron's Grade Level Reading & Spelling Accuracy (testing in 4th grade)



Phoneme Manipulation Task

Instructions: Use blocks to show the sounds in words and changes in sounds.

Pseudoword Color Tiles	
	bip
1.	fip
2.	fop
3.	fom
4.	pom
5.	pim
6.	pims
7.	pums
8.	pum
9.	um
10.	flum
___ / 10	total



Four Task Versions:
Pseudoword Letters
Pseudoword Color Tiles
Word Letters
Word Color Tiles

Developmental Phase Checklist

Early Alphabetic Phase / Early Letter Name / K
+ can identify initial sound in spoken words
+ can identify final sound in spoken words
+ can produce rhyming words
+ can say the sound associated with most consonants
+ can blend spoken sounds into a word
+ can segment spoken words of two or three phonemes (s-o, t-a-p)
+ can read and spell most initial and final consonants in one-syllable words
Late Alphabetic Phase / Letter Name / Grade 1
+/- can segment spoken words of four or more phonemes (d-e-s-k, b-l-a-s-t)
+ can manipulate phonemes in words of 3 phonemes
+/- can read and spell consonant blends correctly
+/- can read and spell preconsonant nasals correctly (lamp, pond)
+/- has mastered reading and spelling short vowels in one-syllable words
- can read pseudowords which are of comparable difficulty to real words read

Developmental Phase Checklist:

Early Orthographic Phase / Within Words / Grades 2-3	
±/:	can delete one phoneme from a blend in spoken words
±/:	spells plurals and inflectional endings correctly (e.g., s, es, ing, all pronunciations of -ed)
±/:	can distinguish between the short and long vowel sound in spoken words
±/:	gaining automaticity of word recognition
-	understanding syllable patterns
-	has mastered reading and spelling long vowel-silent e pattern in one-syllable words.
-	has mastered reading and spelling r-controlled vowel patterns in one-syllable words
-	has mastered reading and spelling most common vowel digraphs in one-syllable words
-	spells most homophones correctly
-	reads two-syllable words containing short vowels (CVCCVC)

Part III: Report, Instruction, & Progress Monitoring

Goal: Give report to parents & schools.
Schools provide interventions based on recommendations.

Intervention: Report to Parents & Teachers

- Suggested IEP Goals**
 - Detailed goals are provided that are based on a student's current level of achievement and the sequence of instruction within the remedial curriculum suggested by the center.
 - Specific curricula and products are recommended that have scientific evidence of effectiveness and are likely to be available within the children's schools.
- Intervention Plan (example)**
 - Explicit instruction in **phonemic awareness**
 - Ample **repetition & practice** to insure learning to mastery
 - Add new skills **after 70% application** of previous ones.
 - Systematic, structured, & comprehensive** instruction in decoding and spelling.

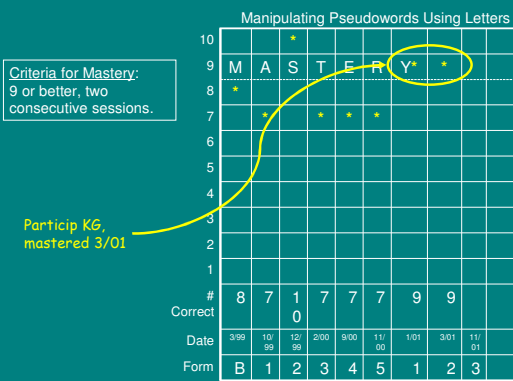


Progress Monitoring Tests

- Semi-Annual Progress Monitoring**
 - Curriculum-based measurements of fluency, word reading, decoding, and PA.
 - Tests consist of lists of items sampled from curricula.
 - Scores indicate whether performance reflects instructional level competence or mastery.
 - Multiple lists allow repeated testing.
- Final Monitoring**
 - Final measurements (avg. of 2.7 years after diagnosis) of comprehension, fluency, word reading, decoding.
 - Curriculum-based measurements to assess final mastery.
 - Norm-referenced measurements to assess achievement.



Phonemic Awareness - Progress Graph

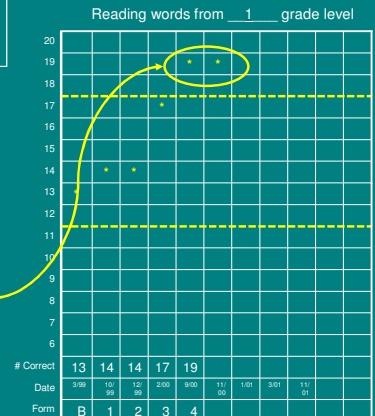


Grade Level Lists - Reading Progress Graph

Criteria for Mastery: 90% (18 items) or better, two consecutive sessions.

Instructional Level: 60% (12 items) or better, two consecutive sessions

Particip KG, mastered 1st grade material 2/00



Recap: Integrated Service Model & Center Data Archives

- **Integrated Service Model**
 - The Center both directly provides and trains school personnel to administer formative assessments and use the results to guide instruction.
 - Assessment and monitoring data is retained for research.
- **Center Data Archives**
 - Initial Assessment
 - Initial assessment of 5 components with norm & criterion referenced tests
 - Archive contains 1,000+ assessments
 - Progress Monitoring Data
 - Curriculum-based measurements of fluency, word reading, decoding, and PA.
 - 3 years of Monitoring data for 100+ cases on file



Part IV: A Study of Archival Progress Monitoring Data

Goal: document reading progress made by children with dyslexia enrolled in Tennessee schools.

Study of Archival Data

- **Study of Progress**
 - How much reading & spelling progress do Tennessee children diagnosed with phonological dyslexia make in school-based programs?
- **Relationships Among Skills**
 - To what extent are gains in PA & decoding associated with gains in fluency & comprehension
- **Age of Identification**
 - Are there different outcomes for early vs. late ID children?
- **Limitations**
 - Schools received treatment recommendations but we have no data about treatment fidelity.
 - Initial age / grade varies randomly.

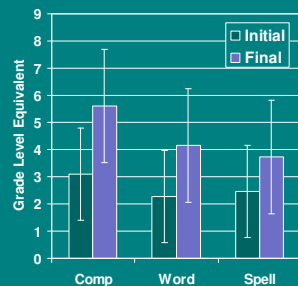


Participant Characteristics

	Early ID (1-3)	Late ID (4-10)	Overall
N	44	56	100
Age	8.6 (0.8)	11.1 (1.4)	10.0 (1.7)
Grade	2.5 (0.7)	5.1 (1.3)	3.9 (1.7)
Gender	M = 29, F = 15	M = 39, F = 17	M = 68, F = 32
WISC-III Verbal	102.1 (12.4)	101.5 (11.9)	101.7 (12.1)
WISC-III Performance	103.8 (13.0)	102.4 (13.9)	103.0 (13.4)
WISC-III Full Scale	102.8 (11.9)	102.3 (11.5)	102.5 (11.6)
WIAT Listening Comp SS	106.0 (12.7)	100.1 (9.1)	102.7 (11.2)
WIAT Listening Comp Grade	3.9 (1.9)	5.8 (2.7)	5.0 (2.6)

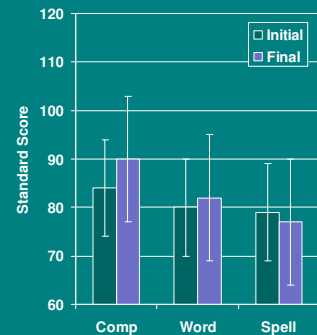
Grade-Level Progress over Time seen in Standardized Achievement Test Scores

- **WIAT-II Comprehension**
 - 2.5 grades of progress
 - = 0.9 grades per year
- **WIAT-II Word Reading**
 - 1.9 grades of progress
 - = 0.7 grades per year
- **WIAT-II Spelling**
 - 1.3 grades of progress
 - = 0.5 grades per year



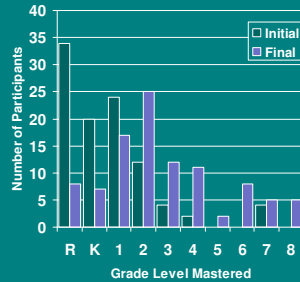
Limited Gains Relative to Age Norms Seen in Standard Scores

- **WIAT-II Comprehension**
 - Children gain relative to age norms.
- **WIAT-II Word Reading**
 - No change relative to age norms.
- **WIAT-II Spelling**
 - Children lose ground relative to age norms.



ADEPT: Grade Level Reading Progress

- **Initial Mastery**
 - Most children at readiness, K, & 1.
 - e.g. Words Mastered K
 - *all, by, box, eat, put, stop*
- **Final Mastery**
 - Average level of mastery approached 3rd grade level.
 - e.g. Words Mastered 3rd
 - *cottage, floppy, scissors, pitcher, million, recognize*

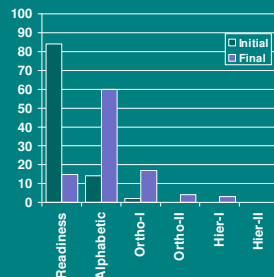


Phonemic Awareness: Initial Scores and Progress in ADEPT

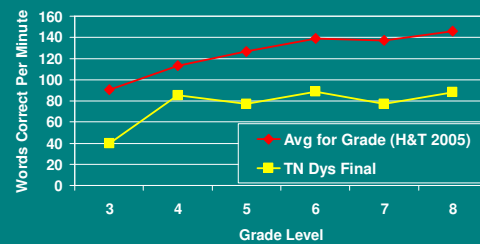
	Mean (SD) 10 max		Mastery Information	
	Initial	Final	# Child Mastered	Years to Mastery
Segmenting Words	6.5 (1.7)	9.5 (1.1)	81	1.5 (1.1)
Manipulating Word Letters	8.6 (1.4)	9.9 (0.6)	95	0.7 (1.1)
Manipulating Word Blocks	7.1 (2.2)	9.4 (1.5)	82	1.2 (1.0)
Segmenting Pwords	5.9 (2.1)	9.2 (1.4)	73	1.7 (1.0)
Manipulating Pword Letters	7.8 (2.0)	9.7 (0.8)	89	0.9 (1.1)
Manipulating Pword Blocks	6.6 (2.4)	9.0 (1.8)	74	1.4 (1.1)

Decoding ADEPT Nonword

- **Initial Below Alphabetic**
 - Most children at readiness,
 - Only 16% mastered alphabetic features (short vowel CVC items) and beyond
 - *rit, vad, lut, chom, gomp, drant*
- **Final Below Orthographic**
 - 60 of 100 mastered short vowel CVC items
 - Only 34% of children mastered orthographic features and beyond
 - *loxes, molting, saded, stape*



Final Passage Fluency by Grade



- Averages for grades based on Hasbrouck & Tindal (2005)
- Children are not closing the gap in fluency.

Summary of Changes over Time PA, Decoding, & Word Reading

- **Progress in Phonemic Awareness**
 - Most children mastered PA tasks with CVC items within 1.5 years.
- **Progress in Decoding**
 - 85% of children mastered decoding CVC items.
 - Only 24% of children mastered any orthographic & morphological features.
- **Progress in Grade Level Word Reading**
 - Children began without mastery of any grade level and progressed to an average of grade 3 mastery.
- **Progress in Comprehension**
 - Comprehension is the only outcome in which children gained relative to their age-based normative group.

Accounting for Changes in Final Scores (all participants: N = 100)

	Decoding	Word Reading	Spelling	Fluency	Comp
Initial Score	.095	*** .589	*** .498	*** .538	*** .349
Age at final testing	*.202	-.030	.094	-.052	-.016
Verbal IQ (initial testing)	** .338	.141	.110	.093	.136
Phon. Awareness YTM	*** .222	-.049	-.099	.101	-.061
Decoding at final testing	--	** .218	*** .250	.059	.161
Word Reading ³	--	--	--	** .286	*** .400
Fluency ⁴	--	--	--	--	-.014
<i>r² over initial score</i>	***.201	***.086	***.121	** .074	***.226
<i>total r²</i>	***.301	***.605	***.553	***.620	***.715

Accounting for Changes in Final Scores (early ID only, grades 1-3: N = 44)

	Decoding	Word Reading	Spelling	Fluency	Comp
Initial Score	** .377	*** .483	** .406	.174	.084
Age at final testing	-.125	.175	.112	-.039	-.031
Verbal IQ (initial testing)	.207	.078	-.117	.166	* .227
Phon. Awareness YTM	-.243	.014	-.139	.172	-.191
Decoding at final testing	--	*** .484	** .418	-.088	** .377
Word Reading ³	--	--	--	* .480	.197
Fluency	--	--	--	--	.169
<i>r² over initial score</i>	.135	** .164	** .232	.172	*** .488
<i>total r²</i>	** .341	*** .630	*** .446	*** .380	*** .718

Accounting for Changes in Final Scores (Late ID only, grades 4-10: N = 55)

	Decoding	Word Reading	Spelling	Fluency	Comp
Initial Score	-.127	*** .533	*** .531	*** .693	*** .451
Age at final testing	* .258	.095	.158	.049	-.125
Verbal IQ (initial testing)	*** .459	* .236	*** .287	.137	.043
Phon. Awareness YTM	-.240	-.086	-.038	.032	.023
Decoding at final testing	--	.108	.117	.070	.125
Word Reading	--	--	--	.097	*** .861
Fluency	--	--	--	--	-.114
<i>r² over initial score</i>	* .071	* .081	** .142	.043	*** .211
<i>total r²</i>	*** .367	*** .655	*** .665	*** .771	*** .737

Accounting for Changes

- *Nested scaffolding of skills*
 - Gains in phonemic awareness were associated with gains in decoding.
 - Gains in decoding were associated with gains in word reading.
 - Gains in word reading were associated with gains in fluency and comprehension.
- *Small Gains in Decoding*
 - The modest progress in decoding are a factor in why children are not closing the gap in word reading, spelling, and passage fluency.



Early vs. Late ID

- **Early ID (Grades 1-3)** clear nested scaffolding of skills.
 - Gains in word reading and spelling are strongly associated with gains in decoding.
 - Gains in fluency are strongly associated with gains in word reading.
 - Gains in comprehension are strongly associated with gains in decoding.
- **Late ID (Grades 4-10)** children may be learning to retrieve
 - Faster mastery of phonemic awareness is associated with larger gains in decoding. However, the gains in decoding are not associated with any other outcomes.
 - Gains in word reading and spelling are associated with initial verbal IQ.
 - Gains in word reading rather than decoding are significantly associated with gains in comprehension.

Conclusion: Progress of Children with Dyslexia in Tennessee Schools

- Children are making progress in phonemic awareness
- Children close the gap in comprehension
- Children are not closing the gap in word reading, spelling, and fluency.
 - Why? No true mastery of orthographic patterns in words.
- Early ID children apply their gains in decoding while late ID children do not
- Forthcoming book chapter
 - Sawyer, D. J., & Bernstein, S. E. (under review). Students with phonological dyslexia in school-based programs: Insights from Tennessee schools. In V. Berninger, A. Fawcett, G. Reid & L. Siegel (Eds.), *Dyslexia handbook*. Thousand Oaks, CA: Sage.

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