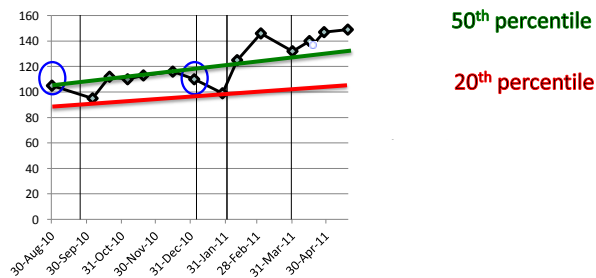


Within Year Achievement Growth Using Curriculum Based Measures

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CBMs: Data-Based Decisions

An Example: One intervention followed by flat growth, then additional intervention followed by some growth



Intervention 1	Rewards 2x/week for 20_x000D_ Strategic and Intensive kits for comprehension and vocabulary 2 x/week for 20 min_x000D_ Read Naturally 20 min 3x/week_x000D_
Intervention 2	Group Change: Moved to ___'s group(smaller size). Doing Harcourt Intensive materials, Read Naturally 2x/week and Study Island 2x/week to practice fluency and comprehension.
Intervention 3	Study Skills: 20 min. of test taking practice and strategies
Intervention 4	Concerns noted with teacher about the lack of comprehension. Decided to wait a few more weeks to see if extra class helped out.

Researchers	Grades	N	Measure	N of Meas.	Slope Calc.	Ave. Growth (per week)
Fuchs, et al. (1993)	1-6	16-25	'Generic passages were used' (p.31)	Unknown with 7+ measures for quadratic calculation	Ordinary Least Squares (OLS)	Grade 1 (n=19) @ 2.10 Grade 2 (n=25) @ 1.46 Grade 3 (n=14) @ 1.08 Grade 4 (n=16) @ .84 Grade 5 (n=20) @ .49 Grade 6 (n=23) @ .32
Deno et al. (2001)	1-6	2,999	'Grade-appropriate' as determined by LEAs	Weekly and seasonally (fall, winter, spring)	Ordinary Least Squares (OLS)	Grade 1-2 @ 1.82 (GE) Grade 1-2 @ .71 (SE) Grade 3-4 @ 1.11 (GE) Grade 3-4 @ .58 (SE) Grade 5-6 @ .62 (GE) Grade 1-2 @ .60 (SE)
Ardoin & Christ (2008)	K-5	540	DORF 2 nd grade passages	Three universal screenings	Gain from fall to spring	.99 to 1.04 per week
Graney, Missall, Martinez, & Bergstrom (2009)	3-5	442 Yr1 456 Yr2	R-CBM AIMSweb passages from 2004-2006	Screening passages in fall, winter, and spring	Raw score difference / number of weeks in interval	.55 (F-W) vs .94 (W-S) for Year 1 .92 (F-W) vs 1.12 (W-S) for Year 2
Jenkins, Graff, & Miglioretti (2009)	4-8	41 LD	Standard reading passages from Vanderbilt	A total of 29 measures in 1, 2, 3, 4 weeks and pre-post (Sept.-Nov.)	Linear regression	1.09 (true slope) 1.49 (1 BL-1 wk) 1.94 (1 BL-2 wk) 1.77 (1 BL-3 wk) 1.83 (1 BL-4 wk) 1.60 (1 BL-pre-post)
Christ, Silbergliitt, Yeo, & Cormier, (2010)	2-6	4,824	CBM-R passages from 2001-2005	Fall, winter, and spring passages (0, 18, and 36 weeks)	Linear Mixed Model (LMM) for linear and piece wise growth	.88-1.71 vs .74-1.02 (GE) .69-1.17 vs .73-1.08 (SE)
Jenkins, J., & Terjeson, K. (2011).	2-6	31	Std. reading passages 1-2 grades below student grade level	Measures every 2, 4, and 8 weeks	Least squares slopes	1.67 (every 2 weeks) 1.48 (every 4 & 8 weeks) 1.29 (grade 3 @ 8 weeks) 1.63 (grade 5 @ 8 weeks)
Nese, Biancarosa, Anderson, Lai, & Tindal (2012)	3-5	2,465	easyCBM passages	Benchmark passages (fall, winter, spring)	Hierarchical Linear Model (HLM) for linear and discontinuous growth	Grade 3 - curvilinear growth (74-106-108) Grade 4 - curvilinear growth (99-123-131) Grade 5 - linear growth (132-142-156)

Non-linear Growth

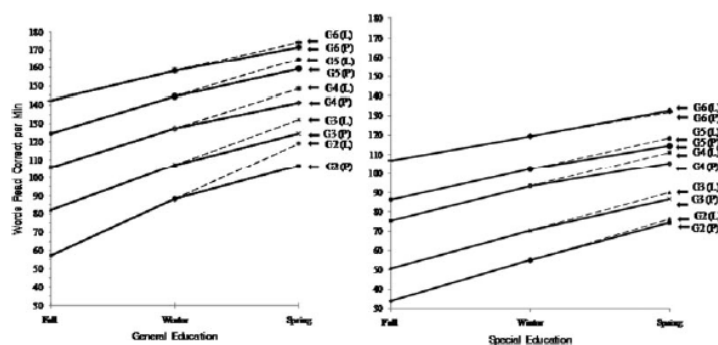


Figure 1. Differences for linear (L, solid line) and piecewise (P, dashed line) models of growth (G) for students in second through sixth grade within either the general (left) or special education population (right)

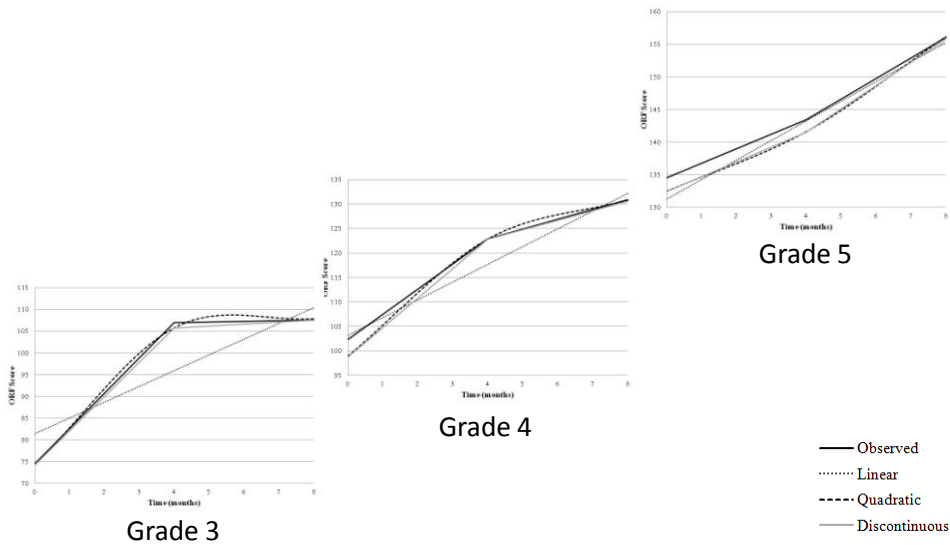
Christ, T. J., Silbergliitt, B., Yeo, S., & Cormier, D. (2010). Curriculum-based measurement of oral reading: An evaluation of growth rates and seasonal effects among students served in general and special education. *School Psychology Review*, 39, 447-462.

ORF Means and SDs by Grade*

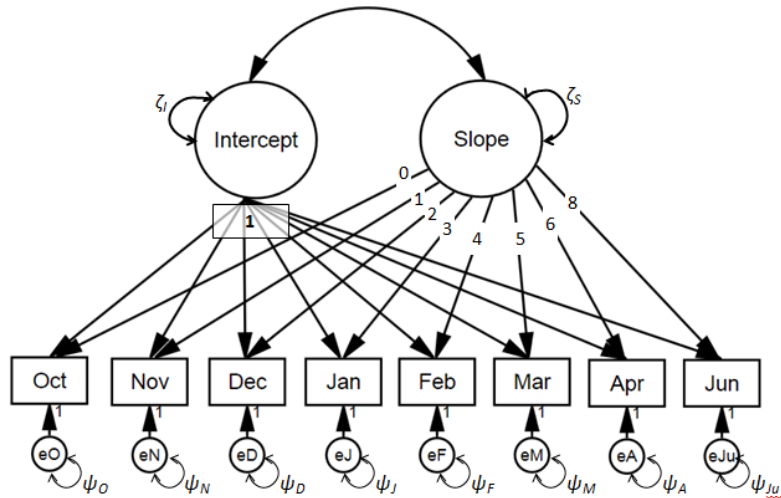
Grade	Fall	Winter	Spring
	Mean (SD)	Mean (SD)	Mean (SD)
3	74.48 (35.41)	106.90 (39.94)	107.48 (39.24)
4	102.31 (36.58)	122.89 (38.43)	130.91 (41.49)
5	134.48 (42.81)	143.38 (39.72)	156.01 (40.18)

*Nese, J. F. T., Biancarosa, G., Anderson, D., Lai, C. F., Alonzo, J., & Tindal, G. (2012). Within-year oral reading fluency with CBM: A comparison of models. *Reading and Writing: An Interdisciplinary Journal*.

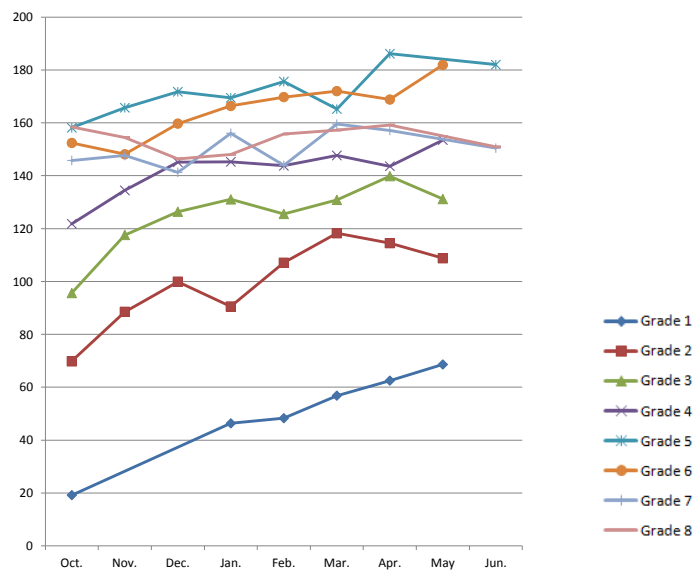
Predicted Trajectories for Three Parameterizations of Growth Compared to Observed Growth



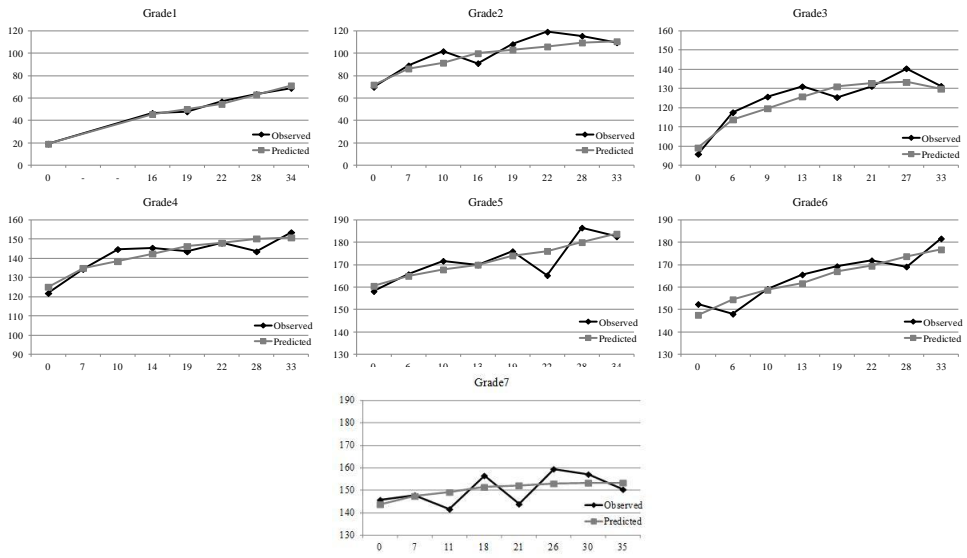
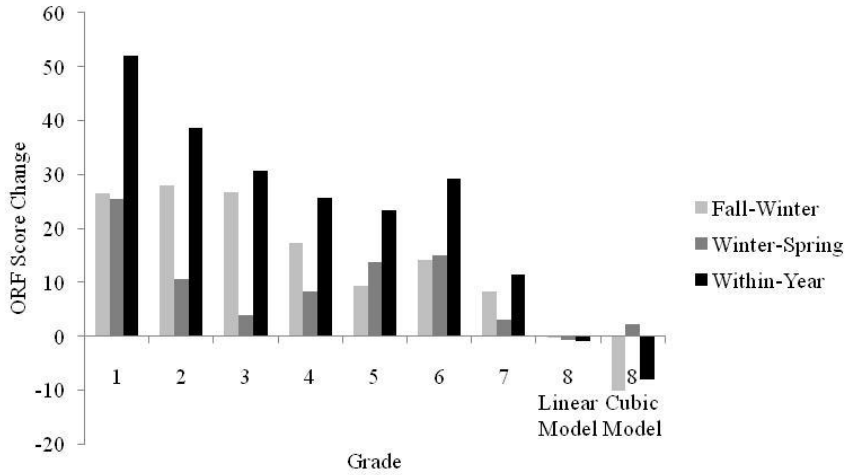
Within-Year ORF Growth, Grades 1-8



Observed ORF Growth, Grades 1-8



Predicted Seasonal and Total Yearly ORF Gains by Grade Based on Final Models



Within-year mean oral reading fluency (ORF) scores by grade

- ◆— Observed mean
- Predicted mean

Nese, Biancarosa, Cummings, Kennedy, Alonzo, & Tindal

Growth Trajectories

- Non-linear
- But our growth rates are from OLS or HLM, which estimates a mean growth for the sample, and assumes:
 - all students within the sample are from the same population, and
 - that a single mean growth trajectory can adequately describe an entire population
- No trajectories for different groups of students based on initial starting point or instructional program.
- What does growth look like for students receiving Tier 2 and Tier 3 intervention?

Back to Results from Nese et al. 2012

- The mean fall reading fluency score was about 88, 111, and 145 cwpm for students in grades 3, 4, and 5 respectively*
- Across grade levels, females began the year reading about **4** more cwpm than males.
- Students eligible for FRPL began the year reading about **11** cwpm less than students not eligible for FRL.
- SWD began the year reading about **37** cwpm less than general education students.
- LEP students began the year reading about **20** cwpm less than non-LEP students

Table 6
Number of Passage Reading Fluency Measures Administered

		Frequency	Percent	Valid Percent	Cum. Percent	
Valid	1	743	28.6	28.6	28.6	
	2	376	14.5	14.5	43.0	
	3	198	7.6	7.6	50.6	
	4	258	9.9	9.9	60.6	
	5	207	8.0	8.0	68.5	
	6	119	4.6	4.6	73.1	
	7	150	5.8	5.8	78.9	
	8	110	4.2	4.2	83.1	
	9	88	3.4	3.4	86.5	
	10	70	2.7	2.7	89.2	
	11	73	2.8	2.8	92.0	
	12	60	2.3	2.3	94.3	
	13	52	2.0	2.0	96.3	
	14	41	1.6	1.6	97.8	
	15	11	.4	.4	98.3	
	16	14	.5	.5	98.8	
	17	19	.7	.7	99.5	
	18	4	.2	.2	99.7	
	20	2	.1	.1	99.8	
	21	2	.1	.1	99.8	
	22	2	.1	.1	99.9	
	23	1	.0	.0	100.0	
	30	1	.0	.0	100.0	
	Total		2601	100.0	100.0	

Table 7
Descriptive Statistics on Progress Measures: Weeks from September 1

	N	Min	Max	Mean	SD
Measure 1	2601	1.00	38.29	10.7879	7.99305
Measure 2	1858	3.00	38.86	15.7434	8.67117
Measure 3	1482	3.86	38.00	18.6795	8.79860
Measure 4	1284	3.86	38.00	21.7593	8.81420
Measure 5	1026	5.29	38.14	23.2122	7.88417
Measure 6	819	6.00	38.14	24.7971	6.65498
Measure 7	700	6.86	38.00	26.4461	6.59604
Measure 8	550	6.86	38.00	27.4577	5.85003
Measure 9	440	7.86	38.00	29.0847	5.54604
Measure 10	352	9.00	38.29	30.1116	5.30065
Measure 11	282	10.00	38.14	31.1930	5.08908
Measure 12	209	10.86	38.14	31.9973	5.16017
Measure 13	149	12.86	38.00	32.5877	5.30219
Measure 14	97	18.29	38.00	32.7909	5.43683
Measure 15	56	18.86	38.00	32.1556	6.20026
Measure 16	45	19.86	38.00	32.9333	5.81754
Measure 17	31	20.86	38.00	32.6498	5.69698
Measure 18	12	21.86	37.29	31.5476	5.46360
Measure 19	8	22.86	36.29	29.8750	4.67824
Measure 20	8	23.86	37.29	32.8036	4.87926
Measure 21	6	24.86	37.29	33.8095	4.90203
Measure 22	4	25.86	37.86	34.5714	5.81577
Measure 23	2	27.86	37.86	32.8571	7.07107
Measure 24	1	28.86	28.86	28.8571	.
Measure 25	1	30.86	30.86	30.8571	.
Measure 26	1	32.14	32.14	32.1429	.
Measure 27	1	32.86	32.86	32.8571	.
Measure 28	1	33.86	33.86	33.8571	.
Measure 29	1	35.86	35.86	35.8571	.
Measure 30	1	36.86	36.86	36.8571	.

Table 10

Final Estimation of Fixed Effects on Oral Reading Fluency in Grade 4 Students

Fixed Effect	Std. Coeff.	Approx. Error	T-ratio	d.f.	P-value
<u>For INTRCPT1, B0</u>					
INTRCPT2, G00	122.59	2.06	59.51	951	0.000
GRADEMEAS, G01	-10.65	3.53	-3.02	951	0.003
GENDER, G02	-2.82	2.16	-1.32	951	0.192
PROGPLACE, G03	-26.80	3.14	-8.52	951	0.000
ETHNIC, G04	-1.37	2.24	-0.61	951	0.540
ELL, G05	-18.76	3.04	-6.18	951	0.000
NPRF, G06	-2.43	0.36	-6.77	951	0.000
<u>For CLOCK slope, B1</u>					
INTRCPT2, G10	0.73	0.07	10.09	951	0.000
GRADEMEAS, G11	0.02	0.10	0.18	951	0.858
GENDER, G12	-0.10	0.07	-1.29	951	0.196
PROGPLACE, G13	-0.07	0.10	-0.74	951	0.461
ETHNIC, G14	0.01	0.08	0.10	951	0.922
ELL, G15	0.26	0.13	2.00	951	0.045
NPRF, G16	0.00	0.01	0.62	951	0.535