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A Multivariate Study of Individual Differences in Performance on the Reading Portion of the Florida Comprehensive Assessment Test: A Brief Report

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Purpose of the Study

This study was conducted in order to identify the major reading, cognitive, and linguistic skills that contribute to individual differences in performance on the reading portion of the FCAT at third, seventh, and tenth grades. We were also interested in understanding the primary deficiencies in skill and knowledge that are associated with below grade level performance on the FCAT (levels 1 and 2). Our expectation was that this knowledge would be helpful in planning more effective methods to prevent performance difficulties on the FCAT and more effective remedial procedures for students who have demonstrated deficiencies on the FCAT.

Method

We administered a two-hour battery of tests measuring a variety of reading, language, and cognitive skills to approximately 200 children at each of grades 3, 7, and 10 during the late spring of 2003. The students were attending 32 public schools selected to represent low, middle and high socio economic status, and were randomly selected from those who returned consent forms. The schools were located in Tallahassee, Tampa, and Ft. Lauderdale.

The sample was 41% white, 39% African American, 17% Hispanic, and 2% Asian. 56% were female. 17% of the students indicated that they spoke Spanish, 5% spoke Haitian-Creole, and 2% spoke French.

Table 1 below shows the percentage of students in the sample at each FCAT achievement level at each grade level in comparison to corresponding percentages in the state student population.

Table 1: Percentage of students at each FCAT SSS achievement level-2003 administration

	<u>3rd Grade</u>		<u>7th Grade</u>		<u>10th Grade</u>	
	State Wide	Study Sample	State Wide	Study Sample	State Wide	Study Sample
Level 1	23	23	28	15	33	29
Level 2	15	13	21	17	32	41
Level 3	33	26	29	35	20	16
Level 4	25	30	17	26	8	8
Level 5	5	9	6	7	8	6

Table 2 below shows the mean FCAT performance level of students in the sample compared to state wide averages

Table 2: Mean FCAT performance levels for students in the sample

	<u>3rd Grade</u>		<u>7th Grade</u>		<u>10th Grade</u>	
	State Wide	Study Sample	State Wide	Study Sample	State Wide	Study Sample
FCAT-NRT % Rank	61	57 (30) <i>n</i> =122	57	67 (25) <i>n</i> =138	46	42 (24) <i>n</i> =108
FCAT-SSS	298	310 (64) <i>n</i> =209	297	320 (55) <i>n</i> =183	302	307 (45) <i>n</i> =175

The tests that were given measured the following five broad areas of reading, language, and cognitive ability

Verbal Knowledge and Reasoning – WISC Vocabulary and Similarities
Listening Comprehension with FCAT passages

Text Reading Fluency – Oral reading fluency passages from FCAT,
Grade level texts, Gray Oral Reading Test

Phonemic decoding efficiency -- Test of Phonemic Decoding Efficiency

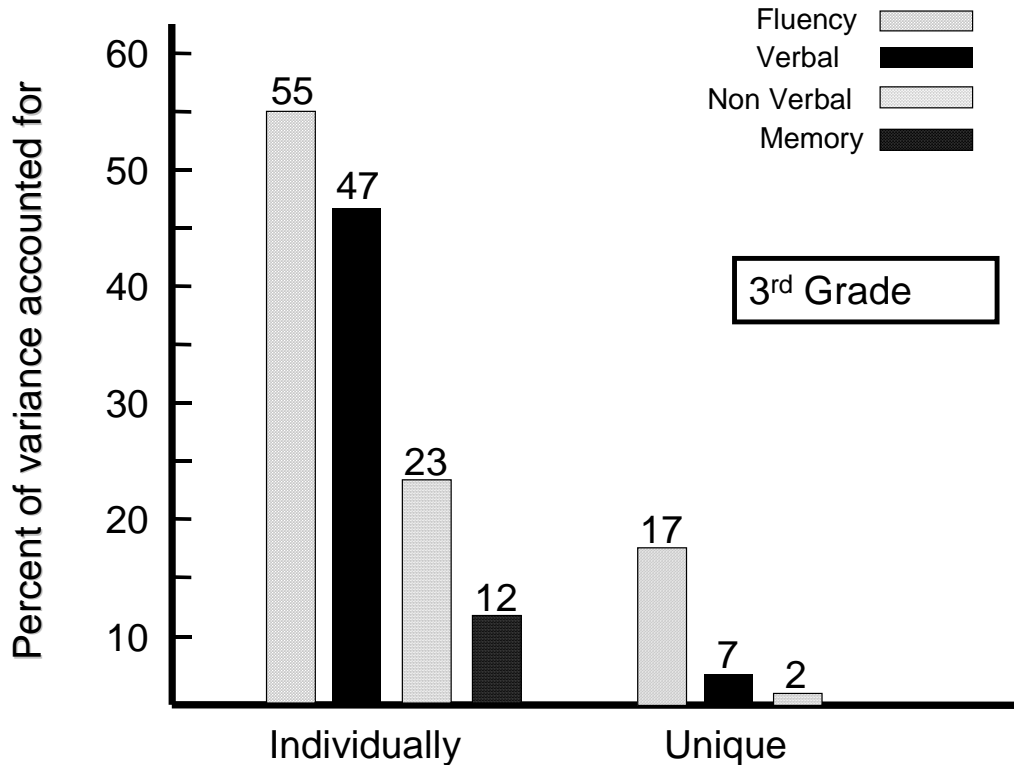
Non verbal reasoning -- WISC Matrix Reasoning, Block Design

Working Memory -- Listening Span, Reading Span

Study Results

The results of the study are described by grade level. We will first provide an analysis of the relative importance of each of these factors in accounting for individual differences in performance on the FCAT. In this first analysis, phonemic decoding efficiency does not appear as a separate factor because it was so highly correlated with text reading fluency. The fluency variable, then, encompasses both text reading fluency and phonemic decoding fluency.

Note: The tables and graphs in this paper are based on a preliminary analysis of the results from this study and may change slightly in the final version. The major conclusions from this brief presentation are not likely to change as a result of further, and more detailed analysis of the data.

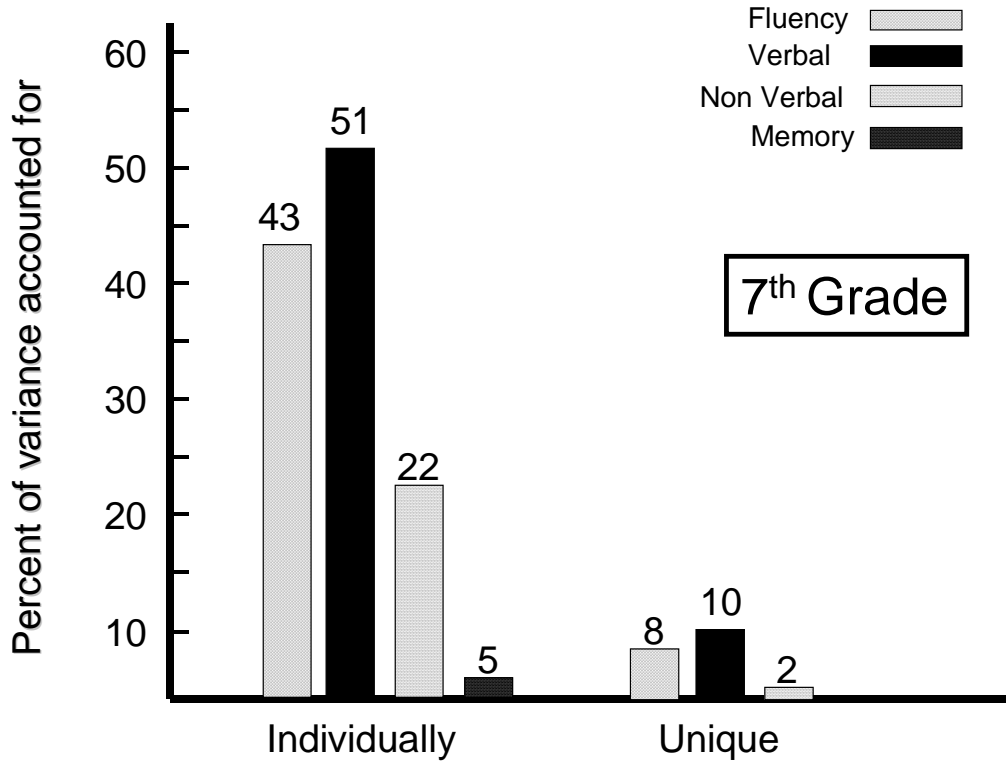


Analysis: We used a statistical procedure called *dominance analysis* to establish that text reading fluency is the dominant factor in explaining individual differences in performance on the FCAT in third grade. Verbal knowledge and reasoning is the second most dominant, and is significantly more important than nonverbal reasoning and working memory. Of all the variables, more of the variability in reading fluency is unique to the prediction of FCAT performance.

What skills are particularly deficient in level 1 and level 2 readers in 3rd Grade?

Skill/ability	FCAT Performance Level (N)				
	1 (47)	2 (26)	3 (54)	4 (63)	5 (17)
WPM on FCAT	54	92	102	119	148
WPM on DIBELS	61	96	111	132	155
Fluency Percentile	6 th	32 nd	56 th	78 th	93 rd
Phonemic Decoding	25 th	45 th	59 th	74 th	91 st
Verbal knowledge/reasoning	42 nd	59 th	72 nd	91 st	98 th
FCAT NRT percentile	31 st	45 th	69 th	87 th	95 th

Analysis: Third grade children at both levels 1 and 2 on the FCAT performed substantially below average in reading fluency, with children at Level one being particularly dysfluent readers, at the 6th percentile. It is also apparent that Level 1 readers are relatively weak in their phonemic decoding skills, which is one of the most important skills required for becoming an accurate reader. In contrast to their relatively severe difficulties with word level reading skills, Level 1 children performed at the 42nd percentile in verbal knowledge and reasoning, which is only slightly below the average range. The reading comprehension of children at all levels is below that predicted by their broad verbal ability. Reading comprehension was measured by a version of the SAT9 (referred to as FCAT NRT) which reports a comparison of performance with a national sample of students.

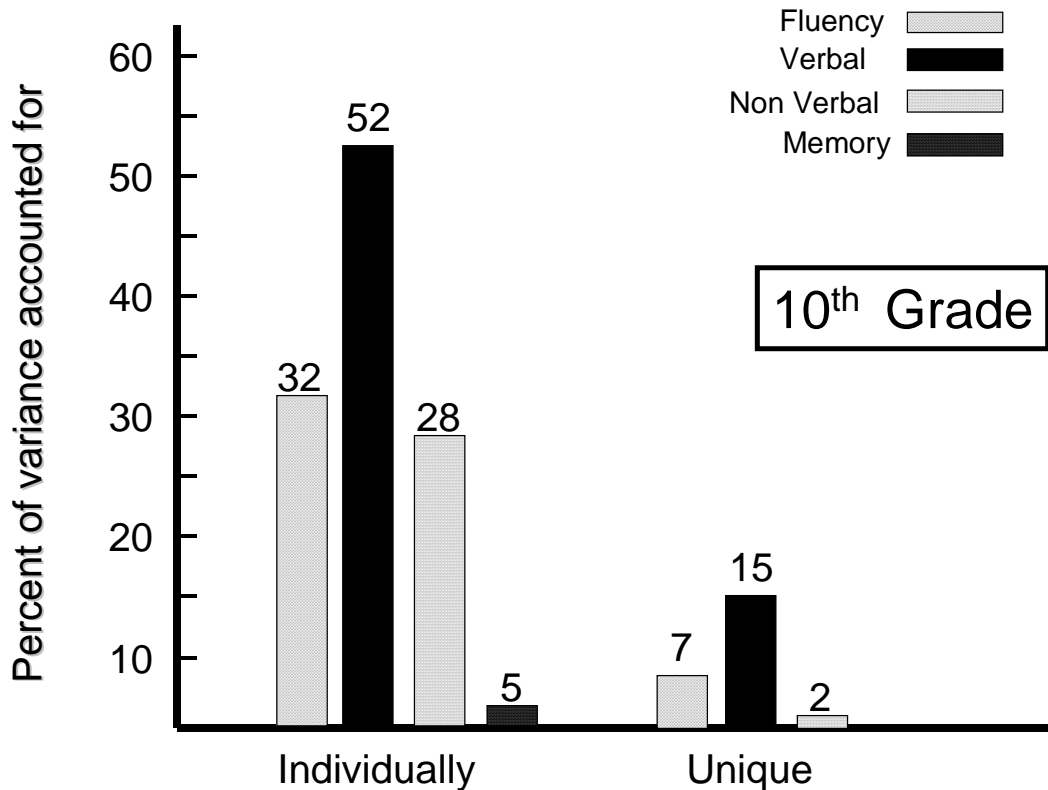


Analysis: Text reading fluency and verbal knowledge/reasoning are equally dominant factors in explaining individual differences in performance on the FCAT in 7th grade.

What skills are particularly deficient in level 1 and level 2 readers in 7th Grade?

Skill/ability	FCAT Performance Level (N)				
	1 (27)	2 (32)	3 (63)	4 (47)	5 (14)
WPM on FCAT	88	113	122	144	156
Fluency Percentile	7 th	25 th	45 th	82 nd	95 th
Phonemic Decoding	27 th	53 rd	63 rd	74 th	84 th
Verbal knowledge/reasoning	34 th	45 th	64 th	88 th	93 rd
FCAT NRT percentile	31 st	51 st	68 th	86 th	94 th

Analysis: 7th grade students at levels 1 and 2 continue to be substantially below average in reading fluency, with children at level one being of particular concern (7th percentile). Students at level one continue to perform substantially below average on a measure of phonemic decoding ability, and it also appears as though their verbal knowledge and reasoning skills are further below average than was the case for level 1 readers in third grade. In fact, the scores on the measures of verbal knowledge/reasoning are lower at all levels in 7th than in 3rd grade, with the largest discrepancies occurring at FCAT levels 1, 2, and 3. The reading comprehension scores at Level 1 are below those predicted by their Verbal knowledge/reasoning skills. Note that students performing at grade level on the FCAT (level 3) have average scores on the SAT9 (FCAT NRT) at almost the 70th percentile. The average performance of students at level 2 on the FCAT, which is considered below grade level in Florida, is the 51st percentile when compared to a national sample.



Analysis of Tenth Grade performance: Individual differences in verbal knowledge and reasoning is now the clearly dominant factor in explaining variability in test performance on the FCAT. Text reading fluency continues to be an important factor in accounting for FCAT performance, and it is significantly more important than variability in nonverbal reasoning or working memory.

What skills are particularly deficient in level 1 and level 2 readers in 10th Grade?

Skill/ability	FCAT Performance Level (N)				
	1 (50)	2 (77)	3 (28)	4 (14)	5 (10)
WPM on FCAT	130	154	175	184	199
Fluency Percentile	8 th	30 th	68 th	87 th	93 rd
Phonemic Decoding	18 th	27 th	45 th	56 th	72 nd
Verbal knowledge/reasoning	30 th	58 th	66 th	84 th	89 th
FCAT NRT percentile	25 th	44 th	62 nd	83 rd	85 th

Analysis of 10th grade performance: 10th grade students at levels 1 and 2 continue to be substantially below average in reading fluency, with children at level one being of particular concern (8th percentile). Students at level one and level two performed substantially below average on a measure of phonemic decoding ability. Students at level one showed a further decline in their performance on the measures of verbal knowledge and reasoning, while students at level two showed a substantial gain from the 7th grade cohort.

Overall Comments and Conclusions:

1. These results provide substantial evidence for the construct validity of the FCAT test as a measure of reading comprehension in which the proportion of items that assess “higher order thinking skills” increases substantially from 3rd through 10 grade. The major evidence here is the gradual increase in the relative dominance of the verbal knowledge/reasoning factor in accounting for variance on the FCAT. It is also important to note that, without exception, across the three grades, skills on every reading and language measure increased as FCAT scores increased. This indicates that scores on the FCAT consistently identify children who are both better readers (text level fluency) and who have more verbal knowledge and reasoning skills. FCAT reading comprehension levels were also completely consistent with reading comprehension scores from the SAT9 test, which is a nationally standardized test referred to usually as the FCAT NRT test. Correlations between the FCAT scores and the SAT9 scores were .86 at third, .78 at seventh, and .74 at tenth grades.

The table below lists the FCAT NRT percentile rank by FCAT SS level for each grade. The major point from this table is that the FCAT does not appear to be getting differentially harder from lower to higher grades. Rather, the difficulty level, compared to the FCAT NRT appears to be quite consistent across the grade levels, and, if anything, it becoming slightly easier to attain levels 3,4, and 5. The table also shows, however, that the FCAT levels, as they are currently established, set relatively high standards for Florida’s students. The strongest evidence for this latter assertion is that students who meet the grade level standard on the FCAT (level 3) also perform, on average, substantially above the 50th percentile on the FCAT NRT.

FCAT NRT comprehension%	FCAT Performance Level (N)				
	1	2	3	4	5
Grade 3	31 st	45 th	69 th	87 th	95 th
Grade 7	31 st	51 st	68 th	86 th	94 th
Grade 10	25 th	44 th	62 nd	83 rd	85 th

Data from last year (2004) in Florida’s Reading First schools indicates that performance norms on the new SAT10 may be more closely aligned with Florida’s grade level standards than were those of the older SAT9. For example, in the spring of 2004, 58.3% of students in the 320 Reading First schools achieved performance at level 3 and above on the FCAT. At the same time, 53% of the students achieved the grade level standard (performance at or above the 40th percentile) on the SAT10. The average percentile on the SAT10 for students performing at each of the levels on the FCAT in 3rd grade is given in the table below:

SAT10 comprehension%	FCAT Performance Level (N)				
	1	2	3	4	5
Grade 3	15 th	34 th	54 th	77 th	91 st

2. The major problem that appears to prevent students from passing the FCAT in third grade is inability to read text accurately and fluently. Whereas the average verbal knowledge/reasoning skills of students at level one fell at the 42nd percentile, their fluency score fell at the 6th percentile, and their ability to “sound out” words fell at the 25th percentile. The reading comprehension scores for level 1 children on the SAT9 (FCAT NRT) were, on average, at the 30th percentile, which is not a severe level of impairment.

3. It also appears that students performing at level 1 are losing substantial ground from grade 3 through 10 in terms of the relative growth of their verbal knowledge and reasoning skills. This is to be expected, given the fact that these students are very likely not reading as extensively as students with higher levels of reading proficiency

We plan to replicate parts of this study during the coming school year (2004-2005) in order to learn more about the specific difficulties of students at level 1 and 2 on the FCAT. We also recognize that some of the outcomes might shift a little because sample size, at some of the FCAT levels, was relatively small at several grade levels.

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