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ABSTRACT

The Cognitive Abilities Test (CAT) provides separate ability estimates organized into three components; verbal, quantitative and non-verbal. There is no composite score. An analysis of scores obtained on the CAT and the Iowa Tests of Basic Skills (ITBS) by a sample student population indicated that discrepancies of twenty points or more among the CAT ability scores occurred in twenty percent of the students. The verbal score of the CAT showed the highest correlation with the ITBS composite score of the three ability measures. It is a good predictor of school achievement. A significant discrepancy among the three CAT component scores is not of significance in relation to academic performance. High scores in non-verbal and quantitative areas do appear to compensate for low verbal scores. The separate ability scores on the CAT provide useful information for students who demonstrate low verbal abilities, but much higher quantitative and/or non-verbal abilities. (DWH)

ABILITY DISCREPANCIES ON THE CAT: ARE THEY EDUCATIONALLY SIGNIFICANT?

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ABSTRACT

Analysis of scores obtained on the Cognitive Abilities Test and the Iowa Tests of Basic Skills for 976 fourth grade children indicated that discrepancies of 20 points or more among the verbal, quantitative, and non-verbal ability scores on the CAT occurred in one of every five children. The verbal ability score was the best predictor of school achievement followed by the quantitative and non-verbal score. Prediction equations developed for the total group proved to be a good fit for individuals with highly discrepant scores. Results indicated that highly discrepant scores are rather frequent and cannot be interpreted as characterizing a special "deviant" group.

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The Cognitive Abilities Test (Thorndike & Hagen,1978) is a recent revision of the Lorge- Thorndike intelligence test. The test is a widely used group test and provides ability estimates that are organized into three components: verbal ability, quantitative ability, and non-verbal ability. There is no composite score reported. Users of the test are advised that the pattern of abilities for an individual can be diagnostically useful and provide a basis for effective school intervention (examiner's manual, p. 5) If a test is to be diagnostically useful, the relationship between scores on the test and relevant criteria should be known and validated. However, as Nichols (1978) has pointed out, there is a question as to whether the separate ability scores on the CAT provide useful differential information.

Since the introduction of the point scale by Yerkes in 1915, considerable efforts have been devoted by psychologists to the interpretation of scatter of performance on tasks provided on intelligence tests. For example, highly discrepant scores on the WISC-R have been viewed as one sign of emotional disturbance (Wechsler and Jaros, 1965), learning disabilities (Huelsman, 1970), and speech problems (Holroyd,1968). However, researchers have failed to completely validate the various interpretations presented for scatter. As Kaufman (1976) has pointed out, the interpretation of ability discrepancies requires that we have some knowledge about the frequency with which these discrepancies occur in the general population and the degree to which these discrepancies are characteristic of sub-populations. Furthermore, it is appropriate to challenge the assumption that individuals with highly discrepant scores should be thought of as a unique sub-group for whom predictions made for the majority do not hold.

The purpose of the present study was to: 1) determine the relationship between

the separate ability measures of the CAT and measures of school achievement; 2) determine the multiple correlation between the CAT ability scores and general school achievement; 3) compute a multiple regression equation to predict school achievement on the basis of the three ability estimates on the CAT; 4) determine the frequency of large discrepancies among ability estimates on the CAT; and 5) cross-validate the multiple regression equation developed for the total sample for the sub-groups with highly discrepant ability scores.

Subjects

The entire fourth grade class of a medium-sized school district in the midwest was selected for study. There were 979 students in the sample. Of that number, approximately 15 per cent were ethnic minorities.

Procedure

The Cognitive Abilities Test and the Iowa Tests of Basic Skills were administered to the students as part of the districts testing program. Pearson product-moment correlations were computed between the CAT and ITBS scores.A multiple regression analysis was computed for the total sample with the ITBS composite scores as the dependent variable and the verbal, non-verbal, and quantitative scores from the CAT as the predictor variables. The resulting regression equation was used to compute predicted composite scores. Students were identified as having highly discrepant ability scores when there was 20 points difference between two or more of their ability scores.

Results

Correlations between ability and achievement scores are presented in Table 1. The verbal score of the CAT shows the highest correlation with the ITBS composite score of the three ability measures. The multiple correlations presented in Table 2 indicate that the addition of the quantitative and non-verbal score adds very little to the prediction of composite achievement. Given the fact that the verbal

	CAT VERBAL	CAT QUANT	CAT N-VERB	ITBS VERBAL	ITBS MATH	ITBS WK ST	ITBS COMP
V		.75	.63	.79	.72	.80	.86
Q			.69	.66	.74	.73	.76
NV				.58	.63	.65	.66
V					.73	.80	.87
M						.80	.87
WS							.92

Table 1. Correlations between CAT verbal, quantitative, and non-verbal ability scores and ITBS achievement scores.

Variable	Multiple R	R^2	Change	Simple r	B
CAT Verbal	.86	.74	.74	.86	.04757
CAT Quantative	.87	.76	.02	.76	.01453
CAT Non-Verbal	.88	.77	.01	.66	.00842

CONSTANT: -2.8938

Table 2. Summary of multiple correlations and prediction equation with ITBS composite as dependent variable and CAT ability scores as predictor variables

ability score itself has a correlation of .86 with composite achievement leaves little room for improvement. The fact that the three ability measures are also are rather highly intercorrelated would also be a factor. The regression weights used to compute estimated achievement scores are also presented in Table 2. The verbal scores were weighted about 3 times the quantitative score and 6 times the the non-verbal score.

Table 3 shows the incidence of discrepancies of 15+ and 20+ point discrepancies between the ability scores of the CAT. Nearly 20 percent of the sample had non-verbal scores 15+ points greater than verbal and 11 per cent had 20+ point discrepancies in favor of non-verbal. It should be noted that since there are several comparisons that can be made among scores, an individual could show up in more than one category. (For example, an individual could have a verbal score of 90, a non-verbal score of 115, and a quantitative score of 89 and would b counted in the NV>Q as well as NV>V category.) When these duplicates are eliminated, the incidence of 20 point discrepancies was found to be approximately one in five individuals and one in three for 15 point discrepancies.

Table 4 presents mean ability, achievement, and estimated achievement scores for the various discrepancy groups. These results again demonstrate the potency of the verbal score with respect to school achievement but there does appear to be some some modest influence evident for the non-verbal and quantitative scores in that groups with low average ability scores but very high quantitative or non-verbal scores achieve better ITBS composite scores than would be anticipated from the verbal score alone. This argument is confirmed by the fact that the prediction equation generated by the multiple regression analysis predicted composite achievement scores for each of these groups with a high degree of accuracy. The correlations between estimated and actual composite scores were as high or higher than one could anticipate from the multiple correlation of .88 obtained for the total sample. Residual scores were also plotted and the plots indicated that the prediction equation is a good fit for high and low achievers as well as those in between.

	15 PTS.+		20PTS +	
	N	PERCENT	N	PERCENT
V>NV	42	3.4	13	1.1
NV>V	189	19.8	103	10.9
V>Q	44	3.6	15	1.3
Q>V	92	9.5	38	4.0
Q>NV	52	5.4	15	1.3
NV>Q	147	15.3	70	7.3

Table 3. Incidence of ability discrepancies of 15 and 20 points among 967 fourth graders.

Table 4

Mean ability, achievement, and estimated achievement scores for groups whose verbal, non-verbal, and quantitative scores differ by 20 points or more.

Group	N	VIQ	QIQ	NVIQ	TOT MATH	TOT VERB	ITBS COMP	PREDICTED COMP	r*
V>NV	13	118.9	108.1	95.4	4.9	5.1	5.1	5.1	.95
NV>V	103	91.4	103.3	115.4	4.0	3.8	3.9	3.9	.85
V>Q	15	114.8	92.2	103.0	4.1	4.5	4.7	4.7	.93
Q>V	38	84.8	108.0	105.2	3.9	3.5	3.6	3.6	.86
NV>Q	70	95.2	89.8	114.9	3.9	3.8	3.9	3.9	.91
Q>NV	15	109.0	120.9	93.8	4.8	4.9	4.9	4.8	.91
Total	979	98.2	99.5	102.9	4.0	4.0	4.1	4.0	

* r represents correlations obtained between actual and predicted composite scores on the ITBS

Discussion

The fact that large discrepancies among measured abilities occurred so frequently has important implications. As Kaufman (1976) noted with respect to Verbal-Performance discrepancies on the WISC-R, there has been some tendency for the clinician to interpret various discrepancies as "abnormal". From a normative perspective, such an interpretation is unfounded with respect to the CAT abilities for this group of fourth grade students.

Discrepancies in favor of non-verbal abilities were much more frequent in this sample than discrepancies in favor of quantitative and verbal abilities. Children of professionals have been found to be more likely to be high verbal and children of semi-skilled and unskilled workers are more likely to be high in performance abilities (Kaufman, 1976). Precise information regarding parent occupation was lacking in this study but the general occupational pattern evident in the community suggest that parent occupation may have been a factor in the present study.

Of particular importance is the fact that the individuals with highly discrepant scores achieved ITBS scores as predicted by the regression equation based upon the total group. This result implies that test users should focus on the individual ability scores rather than the fact that large discrepancies have occurred. In this regard, it should be noted that the test manual does provide examples of hypothetical students with large discrepancies. The advice to the user would appear to be quite practical and generally wise particularly with respect to finding plausible reasons for the discrepancy and stressing implications of ability rather than disability.

Conclusions

1. Students with discrepancies of 20 or more points among the verbal, non-verbal, and quantitative ability scores on the CAT are not unusual--in this study, approximately 20 per cent of the students had one or more such discrepancy.

2. The verbal score of the CAT best predicts ITBS achievement followed by the quantitative and non-verbal score. This is true of students with discrepancies as it is with those without.

3. The fact that a student has a significant discrepancy among verbal, non-verbal, and quantitative scores is not of significance in itself insofar as a relationship to academic performance is concerned. However, high scores in the non-verbal and quantitative areas do appear to compensate to some extent for low verbal scores.

4. The separate ability scores on the CAT provide useful information, particularly for students who demonstrate low verbal abilities but much higher quantitative and/or non-verbal abilities.

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