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ABSTRACT

This study evaluated interrelationships among the scores of 51 high school seniors on the Remote Associates Test (RAT), verbal subtests of the Torrance Tests, the Alpha Biographical Inventory (ABI), and IQ. For all subjects, RAT scores, IQ, and the ABI Academic Success score comprised an interrelated "intelligence cluster." With males, none of the scores in the intelligence cluster correlated well with the Torrance Test scores nor with the ABI Creativity score. Further, for males the Torrance scores were unrelated to ABI Creativity. With females, individual tests in the intelligence cluster (especially IQ and ABI Academic) correlated significantly with Torrance Test and ABI Creativity scores. Also with females, Torrance Test and ABI Creativity scores were significantly related. Using as an "outside" validating criterion ABI items which provide self-ratings of creativity and originality and self-reports of art, writing, and science activities, Torrance Test scores proved to be the best predictor (except for the ABI Creativity score itself, which was partly based upon the criterion items). Recommendations are made for assessing creative potential in high school and in earlier grades. (Author)

Interrelationships Among Three Standardized Creativity Tests and IQ

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The construction of a valid, reliable instrument for measuring creative potential is the most pressing and the most challenging problem facing researchers and teachers concerned with human creative behavior. Whether studying traits of the creative individual or evaluating educational programs for increasing creative potential, the researcher always somehow must index "creative" ability. Like the researcher, the teacher also needs a reasonable and reliable creativity test, either for assessing the value of some creative classroom experiences, or for obtaining more complete information on her students than that provided by traditional IQ's, grade point averages, or reports of earlier teachers.

Now it is true that creative behavior may take an endless variety of specific forms. We find flexible, innovative thinking not only in science, medicine, and all varieties of the creative arts, but in everyday problem solving and decision making, for example, in cooking, gift shopping, home decorating and even in entertaining children on a rainy day. The problem of devising an instrument sufficiently general to tap a "general creative potential" is indeed a difficult one.

Three of the best-known tests claiming to measure creative ability, all commercially available, are Mednick's Remote Associates Test (RAT),

the Torrance Tests of Creative Thinking, and the Alpha Biographical Inventory (ABI). Substantively, the three tests are very, very different. Each individual taking the RAT responds to 30 items of a "convergent" variety. For example, given three words (e.g., surprise, birthday, and line), he is asked to find a fourth word (party) which is somehow related to all three stimulus words. According to Mednick's theory, the RAT distinguishes between the uncreative individual with a steep associative hierarchy (composed of just a few strong, common associations) and the innately more creative person who possesses a flat associative hierarchy (constructed of a large number of more equally-available responses).

Each subtest of the verbal forms of the popular Torrance Tests of Creative Thinking requires the individual to divergently list as many different ideas as he can. For example, he might be required to ask all the questions he can about a curious picture, list unusual uses for cardboard boxes or tin cans, think of improvements for a stuffed elephant or dog, and predict consequences of an unlikely event.

The Alpha Biographical Inventory, developed by Calvin Taylor and others, has had an extensive validation history with NASA scientists, college students, and high-school students. The ABI is a 300-item survey tapping the areas of family life and developmental history, academic background, and adult life and interests. Prepared specially for high school juniors and seniors, the ABI produces both a Creativity score and an Academic Success prediction score.

The purpose of the present study was to compare interrelationships among scores and subscores of the Alpha Biographical Inventory, the Remote Associates Test, the verbal Torrance Tests and IQ. As an experimental

population, we used a sample of high school seniors. Some fairly definite relationships were expected. First of all, performance on the convergent RAT, it would seem, depends to a large extent upon a genetically-determined associative ability not totally unlike "general intelligence." Indeed, the Mednicks themselves reported that, "The correlations that have been obtained between the RAT and standard measures of intelligence indicate that the high scorer on the RAT also tends to be in the upper IQ range." We predicted then, that a student scoring high on the RAT also should score high on the Henmon-Nelson IQ test and on the ABI Academic Success measure. On the other hand, even though the Torrance Tests and the creativity-keyed items of the ABI are totally different in format--one asking for divergent, original ideas in a timed 5- or 10-min. period, the other asking for factual biographical information--we expected that both the Torrance Test scores and the ABI Creativity score should reflect the habitually flexible thinking of the creative individual.

The main overall prediction then, was that an individual's RAT, IQ, and ABI Academic scores would form one interrelated "intelligence cluster," while his scores on the Torrance Tests and his ABI Creativity score would comprise a mostly independent "creativity cluster."

Now a study such as this would not be complete without some outside validating criterion of "creativity"--to determine which test measures "real" creative ability. With professional adults, real-life creative ability may be estimated by such criteria as number of scientific articles (or pages, or books) published or number of patents applied for. Unfortunately, with high school students the indexing of "True" creative ability is more difficult. One not entirely satisfactory criterion, however,

was readily available in the present experiment: Five items in the Alpha Biographical Inventory ask the student to rate himself on originality and creativity and to report any activities, recognition, or awards in the areas of creative art (including drawing, photography, architecture, etc.), creative writing, and science. Since the ABI Creativity score already was based upon these five and other ABI items, the ABI Creativity score naturally would correlate highly with our Validating Criterion. The only question we could reasonably ask was whether or not the Torrance Test, RAT, or IQ scores also would predict the creativity self-ratings and self-reported creative activities and awards. We expected the Torrance Test scores to better predict the validating criterion score than RAT or IQ scores.

Method

The subjects were 51 Wisconsin high school seniors who were tested for about one hour on each of four days. The Torrance Tests of Creative Thinking, (Verbal Form A) and the Remote Associates Test each required two class periods; the longer 300-item Alpha Biographical Inventory required two class periods. The standardized instructions specified in the test manual for each of the three creativity tests were read aloud to the Ss in the prescribed manner. The Ss seemed to understand all tasks. Testing conditions were generally very ideal.

We had then, Henmon-Nelson IQ scores (which were obtained from school records), scores for the RAT (number correct out of 30 items), fluency, flexibility, originality and total creativity scores of the verbal Torrance Tests, and Alpha Creativity and Alpha Academic Success scores. The data were computer analyzed, primarily for a Pearson product-moment correlation matrix.

Results and Discussion

Since the results for males and females differed in some important respects--usually in the direction of larger and "more orderly" correlations for females--data for the two sexes are summarized separately in Tables 1 (males) and 2 (females).

Our first expectation that a student's performance on the Remote Associates Test would relate strongly to his IQ score and to his Alpha Biographical Inventory Academic Success score clearly was confirmed for both males and females. All intercorrelations among Henmon-Nelson IQ, RAT scores, and ABI Academic Success were substantial and statistically significant.

It was also predicted that scores in a student's RAT-IQ-ABI Academic "intelligence cluster" would not be strongly related to scores in his ABI Creativity-Torrance Test "creativity cluster." As it turned out, sex differences prevented across-the-board confirmation of this prediction. For males, no test in the intelligence cluster correlated with ABI Creativity or Torrance Creativity. Further, the correlations between ABI Creativity and Torrance Creativity themselves were exceedingly close to zero.

For female students, most intercorrelations were strikingly higher than for males. Some individual tests from the intelligence cluster correlated significantly with scores in the creativity cluster. Also, ABI Creativity and Torrance Creativity scores tended to be related; for example, ABI Creativity and the Torrance composite score correlated $r = .38$, $p < .025$.

Attempting to unravel the critical problem of "Which test is best?" we took as an "outside" validating criterion five items from the Alpha Biographical Inventory itself. These items seemed, intuitively, to measure what often is meant by "creativity." Two items asked S to rate himself on originality and creativity, three additional items asked S to report his interests and activities in science, writing, or art. As we expected, for males and females, the strongest predictor of the Validating Criterion score was the ABI Creativity score itself, which is based upon these five and other items in the ABI. For males, no other test score correlated significantly with the Validating Criterion. For females, apart from the ABI Creativity score, only the Torrance Test scores correlated significantly with the Validating Criterion. It is ture, however, that had our sample size been larger, correlations of the ABI Academic and the RAT scores with the Validating Criterion score likely would have reached statistical significance; but again, only for girls.

Regarding recommendations, if a teacher or researcher wishes to estimate the creative potential of high school juniors or seniors, the Alpha Biographical Inventory probably is the most accurate and valid instrument available, based as it is upon many years' research with creative NASA scientists and college and high school suudents. One important difficulty with the ABI, however, is that it very likely is insensitive to efforts to teach skills of creative thinking--one cannot easily alter an individual's personal history. Therefore, if the success of some form of creativity training is to be evaluated, the teacher or researcher must use instruments which are both valid and sensitive to training effects.

Certainly, the Torrance Tests are useable. Also, since virtually every effort to "teach creativity" focuses strongly upon changing attitudes and interests in a more creative direction, in addition to the Torrance Tests, the teacher or researcher should consider the use of attitude, interest, or personality tests, such as the Gough Adjective Check List or the Opinion, Attitude and Interest Survey published by the OAIS Testing Service in Ann Arbor, Michigan. For high school students, the present research suggests that the Remote Associates Test may be too difficult (the average score was 12 correct out of 30 items, with a range of 0 to 23) and too highly related to general intelligence. For students below high school level, the Torrance Tests supplemented by one of the attitude or interest inventories previously mentioned, or perhaps Covington's Childhood Attitude Inventory for Problem Solving, should provide a helpful and realistic estimation of a student's creative potential.

Table 1

Test Intercorrelations for Male Ss (n = 22)

Test	IQ	RAT	Alpha		Torrance Tests			
			Acad.	Creat.	Flu.	Flex.	Orig.	Comp.
RAT	.76****							
Alpha Ac.	.57****	.70****						
Alpha Cr.	.18	.23	.04					
Torrance:								
Flu.	.04	.08	.18	-.04				
Flex.	.09	.15	.32	-.02	.94****			
Orig.	.26	.16	.21	.06	.77****	.70****		
Comp.	.15	.13	.23	.00	.96****	.91****	.92****	
Val. Crit.	.19	.19	.04	.42**	.17	.13	.24	.20

**p < .025

****p < .005

Table 2

Test Intercorrelations for Female Ss (n = 29)

Test	IQ	RAT	Alpha		Torrance Tests			
			Acad.	Creat.	Flu.	Flex.	Orig.	Comp.
RAT	.60****							
Alpha Ac.	.54****	.38**						
Alpha Cr.	.29	.28	.55****					
Torrance:								
Flu.	.25	.33*	.36*	.27				
Flex.	.24	-.06	.28	.09	.67****			
Orig.	.45***	.26	.68****	.52****	.68****	.68****		
Comp.	.36*	.26	.53****	.38**	.91****	.82****	.90****	
Val. Crit.	.15	.27	.31	.61****	.35*	.18	.34*	.35*

*p < .05

**p < .025

***p < .01

****p < .005