

# Research

## A Comparison of the Concept of Overexcitabilities with Measures of Creativity and School Achievement in Sixth-Grade Students

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**T**his was an investigation of 12 gifted and 12 randomly selected sixth-grade students to determine the relationships between levels of overexcitability and scores on the Torrance Tests of Creative Thinking and the California Achievement Test. Responses to the Overexcitability Questionnaire were compared to the Torrance Tests of Creative Thinking Verbal and Figural subtests via a Pearson  $r$  correlation and a Mann-Whitney test of significance. Subjects who scored in the top third on the Verbal subtest of the Torrance Tests of Creative Thinking had significantly higher Imaginational Overexcitability scores than those who scored in the lower third, whereas those whose scores were in the top third on the Figural subtest had significantly higher Psychomotor Overexcitability scores.

**P**icture, if you will, the following scene: four educators are asked to use their individual criteria to select one person who would qualify as their prototype of a "gifted individual." Each responds with one of the following persons: Pablo Picasso, Bill Bradley, Albert Einstein, and Eleanor Roosevelt. Hardly a cohesive group! Sadly enough, if the criteria of only one of the experts had been used to select for actual programming, three of these extremely gifted persons would have been excluded — and whom would you have left out?

Although the reasons why there is such diversity in the concept of giftedness are many, one of the most important is that the procedures used to identify various dimensions of giftedness do not spring from one cohesive framework. There is, however, a theory of human development which states that the overt characteristics of intelligence, sensitivity, and creative ability may be the indicators of a deeper structural

organization. The Theory of Positive Disintegration (TPD), developed by Dabrowski (1964), establishes five areas of human development which, in various combinations, could be representative of an innate potential for a higher level of development. The innate tendency for "psychic overexcitability," or the ability to take in and process larger than usual amounts of stimuli from the environment, may be expressed in any or all of five areas: Psychomotor, Sensual, Imaginational, Intellectual, and Emotional. Thus, intelligence and creativity may be separate but equal avenues of expressing potential. These Overexcitabilities (OEs) work in combination with the environment and the individual's drive to excel to form what we recognize as a gifted person.

Not all OEs are apparent to the same degree in one person, and it is the degree of intensity of the different OEs which could be used as an indicator of giftedness. In the attempt to discover whether or not this is the case, a questionnaire has been developed which is designed to elicit indicators of OEs in the respondents. This Overexcitability Questionnaire (OEQ) has been used in studies comparing adult gifted persons and persons with normal intelligence on measure of IQ and exhibited OEs. Results indicated that Intellectual and Emotional OEs are higher in gifted adults than in a random sample of graduate students (Silverman & Ellsworth, 1980). Piechowski and Colangelo (1984) reported data concerning the use of the OEQ to measure developmental potential in gifted adolescents. In this study, 49 gifted adolescents, aged 12-17, were asked to complete the OEQ. The scores on these protocols were compared with the scores of gifted adults, average adults, and adult artists. Some of the results included the following: (a) gifted adolescents had lower scores than gifted adults on Sensual and Intellectual OEs, but made equivalent scores on Imaginational and Emotional OEs; (b) gifted adolescents scored lower than normal adults on Sensual OE; (c) gifted adolescents scored higher than normal adults on Intellectual and Emotional OEs; and (d) gifted adolescents scored significantly higher than normal adults on Imaginational OE. These results led the authors to conclude that three OEs may be associated with intellectual giftedness: Emotional, Intellectual, and Imaginational (Piechowski and Colangelo, 1984).

A recent development in the attempt to measure indicators of OE in children is the use of an oral questionnaire, developed by Piechowski on a grant from the Spencer Foundation. This interview consists of using verbal

Question-response techniques to administer simplified versions of the questions found on the OEQ. The rationale behind developing an oral protocol for use with children is easy to understand — It allows a chance for the interviewer to clear up vague issues in terminology or unclear responses; the interviewer can ask the child for more information to make sure that the response is as complete as possible; and the oral interview takes less time to complete. In a study conducted by Piechowski, the oral OEQ was administered to a population of gifted students aged 9, 11, or 13 years old. The responses of the subjects were rated and then examined to determine the level of each of the five OEs. A preliminary review of the data (reported in Axley, 1983) indicated that the levels of OE in each of the three groups paralleled the OE profiles of the gifted adults examined in the previous studies: "We saw a predominance of Imaginational, Intellectual, and Emotional OE scores and a clearly much smaller frequency of Psychomotor and Sensual OEs" (Axley, 1983, p. 9). A more recent study reported in Volume 7, No. 4, for *Roeper Review* (Schiever, 1985) compared 21 seventh- and eighth-grade gifted students, ages 12-14, on the Something About Myself portion of the Khatena-Torrance Creative Perception Inventory (SAM) and the Overexcitability Questionnaire. The study revealed that "the High Creative group showed higher levels of Imaginational, Emotional, and Intellectual OE than the Low Creative group" (p. 225). However, no study has yet been completed comparing the level of indicated OE in gifted and nongifted children as opposed to gifted adults. In addition, most of the other studies conducted to date have used subjects selected on the basis of intellectual giftedness rather than creativity or other identifiers of giftedness. Until these alternatives are investigated, it will be unclear whether or not this questionnaire can be used as an identifier of "giftedness" in children or if the OEs represent a substrata of intellectual giftedness alone.

The focus of the present study was to determine if there was a significant difference in observable OEs between the following groups: (a) High Verbal Creative and Low Verbal Creative sixth-grade students; (b) High Figural Creative and Low Figural Creative sixth graders; (c) high and low scorers on the CAT subtests — reading, grammar, and mathematics; (d) sixth graders identified as gifted and a random sample of sixth-grade subjects. Other topics investigated included which of the OEs differentiated high and low groups in the specific research areas, and the effect of the subjects' sex on his/her OE profile.

## Method

### Subjects

The subjects for this study were 24 sixth-grade students from a suburban middle school in an upper middle-class neighborhood. Twelve

of the students were members of the school's program for gifted students (GATE) and half were selected at random from the regular school program. Qualification for the GATE program included teacher evaluation based on a modified version of the Scale for Rating Behavioral Characteristics of Superior Students (Renzulli; Smith; White; Callahan; & Hartman, 1971); a high academic record; above average performance on the California Achievement Test (CAT); and a superior score on the Otis Lennon Test of Mental Ability. All of the subjects were from middle and upper middle-class households. The students were either 11 or 12 years old. There were five males and seven females in the gifted group, and four males and eight females in the random sample. All of the subjects in both samples were Caucasian, with the exception of one Oriental-American in the gifted sample. Of the subjects in the random sample, two had been identified for the GATE program but chose not to participate.

### Instruments

*Torrance tests of creative thinking (TTCT).* Two parts of the TTCT were used in the study, Verbal, (Form A), and Figural (Form A). The Verbal subtest of creativity measures a person's ability to manipulate semantics creatively. There are seven tests in this part of the battery including Asking Questions, Guessing Causes, Guessing Consequences, Product Improvement, Unusual Uses of a Box, Unusual Questions About a Box, and Just Suppose. This test, which can be administered to individuals or in groups, takes 45 minutes to complete.

The Figural subtest measures the ability to construct and name creative pictures through the use of three tests: Figural Completion, Picture Completion, and Repeated Parallel Lines. This part of the TTCT can be administered to groups or to individuals and takes 30 minutes to complete.

Scores for each of the tests are reported in terms of one overall score and separate measure of fluency, flexibility, originality, and elaboration ratings for each test. The TTCT has been tested for test-retest reliability (Buros, 1972), interscorer reliability (Torrance, 1974), concurrent validity (Nelson, 1963), and long- and short-term predictive validity (Cropley, 1971, 1972; Torrance, 1963, 1971b; Yamamoto, 1963).

*California Achievement Test (CAT).* The CAT is a widely used measure of "school achievement in terms of student performance in the basic curricular content areas of reading, mathematics, and language" (Buros, 1977). Questions on the CAT are presented in a multiple choice format. Three content areas are covered by the CAT, reading (R), grammar (G), and mathematics (M). The subtests are administered separately and final results are reported in terms of stanines.

The validity of the CAT scores are reported in terms of inter-correlation coefficients between grade and percent of correct responses (Buros,

1977). A measure of alternate form reliability is provided for the total score and for the three subtests (Buros, 1977).

*Overexcitability Questionnaire (OEQ).* The OEQ is a 21-question, free-response battery. When administered in its oral form, the test can be completed in 25 minutes for each individual. Scores for the OEQ are reported in terms of the total sum of each of five OEs elicited: psychomotor (P); sensual (S); imaginational (M); intellectual (I); and emotional (E). Because the oral OEQ is an in-process instrument and not yet in its final form, validity and reliability measures are not yet available. The interrater reliability between the two raters in this study was measured at  $r = .81$ , based on Pearson Product-Moment correlations. The independent scorers and the auditing scorer had an 86% agreement in their ratings of the protocols. This percentage was based on the degree of agreement between the raters' original rating of each question, before consensus was reached, and the ratings submitted by the auditor.

### Analysis of Data

A Pearson Product Moment correlation coefficient was computed comparing the subjects' TTCT scores, verbal and figural, with the levels of indicated OE in each of the five modes. The entire sample of subjects was also divided into two groups, High Creative (top third), and Low Creative (bottom third), so that a test of significance could be conducted between the two groups. The Mann-Whitney nonparametric two-sample rank test was used for this comparison.

The Mann-Whitney test was also performed to determine the level of difference of the mean OE scores between (a) the gifted subjects and the random sample; (b) students scoring High (stanine 8-9) and Low (stanine 5-6) on the CAT, R, G, and M subtests; (c) gifted boys and gifted girls; and (d) boys and girls in the random sample.

### Procedure

The Verbal and Figural subtests of the TTCT were given to the subjects on consecutive days, and make-up days were provided for subjects who were absent. The TTCT was scored by professionally trained raters.

The examiner then chose a random order in which to give the OEQ for each group. The examiner gave the subjects a copy of the questions to take home a day before they were interviewed to leave time for a thorough consideration of their responses. Prior to the interviews, which were conducted individually, the examiner gave the subject a set of assurances dealing with the confidential nature of their responses and the nonthreatening purpose of the interview. (i.e., no grades or parent involvement).

The examiner asked follow-up questions during the interview if the responses given by the subject were unclear, or if the subject did not understand the question in its original form.

The taped interview was then transcribed and scored. Scoring of the interview was based on two factors: the type of OE indicated in the response, and the intensity of the OE. Indicators of type and intensity were based on a predetermined set of specific characteristics. Within each question, any or all of the OEs may be reflected. The intensity of a response is rated from one to three, one being the likelihood of the presence of an OE, and three being a strong manifestation of a particular OE. A zero score was given for a response with no indication of OE. Ratings on each questionnaire were added for each of the modes of OE, yielding a possible score of 63 for each separate OE.

Both the examiner and an independent rater were trained in the scoring procedure at the University of Denver by a team of qualified scorers. Because they were both novice raters, the examiner sent 25% of the protocols to the University of Denver after completing the ratings to be audited by a trained rater. For a more complete description of the procedure, see S. Gallagher (1985).

## Results

The Pearson Product Moment correlation performed on the verbal and figural scores and the five OE scores revealed small but nonsignificant correlations between Verbal subtest scores and Sensual OE ( $r = .21$ ), Figural subtest scores and Sensual OE ( $r = .31$ ), and Figural subtests scores and Psychomotor OE ( $r = .21$ ). All other correlations approached zero.

An arbitrary break in the verbal and figural TTCT scores was selected to designate High and Low Creative groups. The top third of the scorers represented the High Creative group, and the bottom third, the Low Creative group. A Mann-Whitney test performed between the high and low Verbal subtest scores revealed a significantly higher level of Imaginational OE in the High Creative group as compared to the Low Creative group ( $p .05$ ). When high and low Figural subtest scores were compared, significant differences were found in the level of Psychomotor OE ( $p .05$ ), in favor of the high group. Other differences between the two groups were not significant.

A Mann Whitney analysis of the high (stanine 8-9) and low (stanine 5-6) scores on each of the CAT subtests yielded the following results:

1. Reading subtest — High scorers were significantly higher in Intellectual OE than low scorers ( $p .02$ ). No other significant differences were found in levels of OE.
2. Grammar subtest — High and low scorers on the Grammar subtest were significantly different on measures of indicated Intellectual OE ( $p .05$ ). No other modes of OE were significantly different between the two groups.

**Table 1.**  
Mean Overexcitability Scores of Students Scoring High or Low on Measures of Creativity and School Achievement

	TTCT									
	Verbal		Figural		Math		Reading		Grammar	
	L	H	L	H	L	H	L	H	L	H
P	5.75	6.38	6.50	8.00*	5.57	7.00	6.37	7.00	6.70	7.50
S	1.88	2.00	2.00	3.13	1.57	2.25	2.13	1.90	2.40	2.00
M	7.50	9.43*	9.75	8.13	4.14	10.50*	8.13	10.40	8.60	10.00
T	10.88	12.63	11.86	13.75	7.85	14.00*	8.13	24.00*	10.50	14.25
E	8.25	8.62	7.88	8.13	4.50	8.25	7.50	9.40	7.50	8.25

P — Psychomotor OE, S — Sensual OE, M — Imaginational OE, T — Intellectual OE, E — Emotional OE.  
\*Significant at  $p < .05$

3. Math subtest — Subjects who scored higher on the Mathematics subtest were also significantly higher in levels of Intellectual OE ( $p < .01$ ) and Imaginational OE ( $p < .00$ ) than subjects who received low mathematics scores. Relevant data are presented in Table 1.

Comparisons between the subjects identified as gifted and the random sample of subjects revealed the gifted group as being significantly higher in levels of Intellectual OE ( $p < .002$ ), Emotional OE ( $p < .02$ ), and Imaginational OE ( $p < .02$ ). Other differences were nonsignificant (See Table 2).

Comparisons made between gifted boys and gifted girls on levels of indicated OE revealed no significant differences. Comparisons between boys and girls in the random sample of subjects revealed that girls have significantly higher levels of Emotional OE ( $p < .02$ ). Other differences were nonsignificant.

Table 2.		
Mean Overexcitability Scores of a Random Sample of Students and a Sample of Gifted Students		
	Random Sample	Gifted Sample
P	6.24	7.17
S	2.17	2.25
M	6.66	11.58*
T	8.33	15.41*
E	5.50	11.30*

P — Psychomotor, S — Sensual, M — Imaginational, T — Intellectual, E — Emotional.  
\*Significant at  $p < .05$

### Discussion

The lack of correlation between OE scores and the TTCT raises some questions about the nature of different creativity tests. Why would the OEQ fail to correspond to the TTCT? The most probable answer is that

while scores for the OEQ are based on behaviors which indicate potential, the TTCT is based on actual creative performance. Creative potential does not necessarily guarantee the ability to create on command. Thus, one-to-one parallels between personality and creative products may not be a realistic expectation.

The significant difference obtained by means of the Mann-Whitney test between High and Low Creative subjects did reveal some interesting results. The High Figural Creative subjects were consistently higher on measures of Psychomotor OE. This result indicates that high levels of activity and energy, as well as intellectual aptitude, may be connected with giftedness.

High Verbal Creative subjects were generally higher on measures of Imaginational OE, although this difference was not apparent between the Figural Creative groups. This could indicate a bias on the part of the OEQ towards responses based on semantic representations, which may prove to be a limitation of the protocol, as those without good semantic ability may not perform as well on the questionnaire as those with high verbal aptitude.

Significant differences were found between high and low scorers on the CAT subtests. As the difference between high and low scorers on the Reading and Grammar subtests involve memory recall and the ability to use specific and detailed rules, it is natural that the subjects who were highly capable in these areas would have strong Intellectual OE. The high scoring subjects on the Math subtest were significantly higher in Intellectual OE, possibly reflecting the highly intellectual process of solving mathematical equations. The level of Imaginational OE could be indicative of the visual/spatial relationships connected with mathematical reasoning, as well as the subjects' ability to use flexible thought.

The results found between the subjects identified as gifted and those in the random sample lend further support to the theory that giftedness is multidimensional, as significant differences we found along three modes of OE: Intellectual, Imaginational, and Emotional.

Since the selection for the GATE program was based on intellectual ability, the significant differences in Intellectual OE between the gifted and random groups is understandable, but the intellectual identifiers would not account for the large differences between the groups on Imaginational and Emotional OE. Again, it seems that emotional sensitivity may walk hand in hand with superior intellectual ability.

The limited sample size of the study demands that it be replicated to substantiate the current results. Not only could replication provide potential verification of the significant differences found here, it could also clear up the true direction of the differences which came tantalizingly near significance (See Table 1). This is especially true of the difference between high and low Scorers on the CAT Mathematics subtest on the measure of Emotional OE ( $p < .06$ ), and the difference between Low Verbal Creative subjects and High Verbal Creative subjects on Intellectual OE ( $p < .08$ ). Each of these statistics, whether or not they should prove significant in a larger population, would add now perspectives on our understanding of characteristics associated with mathematic and creative ability.

The current findings do give further credence to the use of the OEQ as an identifier of giftedness in children. Not only is there an indicated relationship between giftedness and level of certain OEs, the OEQ could provide previously unavailable data on each child by measuring five different characteristics. Because these modes can be directly paralleled on one scale, their intensities can be directly compared. As there currently is no other protocol which measures intelligence, creativity, and emotional sensitivity simultaneously, this instrument could prove to be a valuable addition to the field.

In conclusion, the most promising aspect of this theory is that it could provide a connecting bridge between the different areas of

giftedness. By identifying how intellect, creativity, leadership, and other kinds of giftedness are alike, rather than dissimilar, perhaps we can find how these avenues can be linked and shared. Interconnections such as these may play a critical role in creating broader levels of understanding in a diverse and rapidly expanding field.

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### Learning Preferences: A Comparison of Gifted and Above-Average Middle Grades Students in Small Schools

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This study focused on the learning style differences between gifted and above-average middle grades children in rural school districts. The Renzulli/Smith Learning Style Inventory was administered to sixty children (30 gifted and 30 above-average) enrolled in grades 6, 7 and 8 in rural schools in Northeastern South Dakota. In comparing the differences between gifted children and their above-average peers, significant differences were found in the dimensions of Independent