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ABSTRACT

The objective of this study was to conduct an intensive investigation of the relationship between Lorge Thorndike IQ subtest and Torrance creativity subtest scores. Ss were 154 twelfth graders. First order partial correlations were about .50 between different sets of creativity subtests with different IQ subtests partialled out. Canonical correlations between sets of creativity subtests vis a vis sets of IQ subtests were about .40. Multiple regression analyses indicated that different individual IQ subtests accounted for small amounts of creativity subtests variance and combinations of IQ subtests accounted for larger but still small amounts of creativity subtests' variance. (Author)

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Multivariate Analysis of the Relationship Between Creativity and Intelligence

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Introduction

The objective of this study was to investigate the relationships between creativity subtest scores and scholastic aptitude subtest scores from which inferences could be made about the relationship between creativity and intelligence.

Considerable research has been conducted concerning the relationship between creativity and intelligence, especially since Getzels and Jackson's (1962) monograph. There have been a number of reviews of this research, Crockenberg (1972), Madaus (1967), Rossman, and Horn (1972), and Wallach (1970), for example A common characterization of the relation between creativity and intelligence is that creativity tests correlate no more highly with themselves than they do with intelligence tests (Rossman, and Horn, 1972; Wallach, 1970). In general, creativity tests intra-correlate ca. .30 and also correlate ca. .30 with intelligence tests (Madaus, 1967; Rossman, and Horn, 1972). That the relationship between creativity and intelligence remains unresolved is apparent from conclusions by Madaus (1967), Cronbach (1968), Crockenberg (1972), Wallach (1970), and Rossman, and Horn (1972).

Criticisms of the methodology of prior research have been raised by Cronbach (1968), and Wallach (1970), respectively. Wallach (1970) criticised the use of a creativity overall index score in many of the studies and recommended research on the subtest level. Cronbach (1968) criticized the Wallach and Kogan (1965) statistical methodology and suggested the use of stepwise regressio

It is apparent from this review of the literature that the relationship between creativity and intelligence remains unresolved. It is also apparent that certai methodological refinements may contribute to a resolution of the relation betwee creativity and intelligence. Specifically, multiple regression on the subtest level should enhance the efficacy of the research methodology.

This study is the second analysis of data collected in a factor analytic study of creativity and critical thinking. In that study Follman, Kincaid, Malone, and Coop (1972) investigated the relationships between creativity, critical thinking, scholastic aptitude, and scholastic achievement test and subtest scores.

Subjects (Ss) were 154 twelfth grade students from Pasco Comprehensive High School, Dade City, Florida. The Ss were randomly selected from the population of Pasco Comprehensive High School twelfth graders. This population is considered to represent lower and middle socio-economic class.

The following tests were used: The Torrance Tests of Creative Thinking Verbal (TTCT V); the Torrance Tests of Creative Thinking Figural (TTCT F); and the Lorge-Thorndike Intelligence Tests Level 5 (IQ). TTCT V subtests were: Fluency (FLU); Flexibility (FLEX); and Originality (ORIG). TTCT F subtests were: FLU, FLEX, ORIG, and Elaboration (ELAB). IQ verbal subtests were: Vocabulary (VOCAB); Sentence Completion (SENT COMP); Arithmetic Reasoning (ARITH REAS); Verbal Classification (VERB CLASS); Verbal Analogies (VERB ANAL); Figural Classification (FIG CLASS); Number Series (NUMB SER); and Figural Analogies (FIG ANAL) The tests were administered on a group basis in two sessions on successive days.

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The creativity verbal subtests correlated low, ca. .10 to .20, with the IQ verbal subtests, and slightly lower with the IQ non-verbal subtests. The creativity figural subtests correlated low with the IQ verbal subtests, with many correlations near zero and six negative. The creativity figural subtests and IQ nonverbal subtests also correlated low although all correlations were positive.

Principal components analysis was conducted of the 27 x 27 subtests' matrix of the critical thinking, and scholastic aptitude and scholastic achievement subtests. It indicated a large group factor composed of all subtests except the creativity figural subtests, and four small factors.

Rotation indicated four factors; verbal creativity, figural creativity, critical thinking and scholastic achievement, and IQ.

The current study was conducted to investigate more intensively the relationship between creativity and IQ introduced in the previous analysis. Methodological refinements ~~and improvements included:~~ first and second order partial correlations of different sets of creativity subtests with different combinations of IQ subtests partialled out; canonical correlations between sets of creativity subtests and sets of IQ subtests; and multiple regression analysis of the influence of different combinations of IQ subtests on different combinations of creativity subtests.

It was anticipated that these analyses would provide more precise and refined evidence of the relationships between creativity and IQ, and particularly provide evidence of the nature of creativity by determining the influence of different intelligence marker ability tests on different creativity ability test scores.

Statistical Analyses Conducted

First order partial correlations were run between TTCT V FLU and TTCT F FLU, between TTCT V FLEX and TTCT F FLEX, and between TTCT V ORIG and TTCT F ORIG, respectively, with IQ verbal removed.

Second order partial correlations were conducted between TTCT V FLU and TTCT F FLU, between TTCT V FLEX and TTCT F FLEX, and between TTCT V ORIG and TTCT F ORIG, respectively, with both IQ verbal and READ INDEX partialled out.

Canonical correlations were conducted between the set of TTCT V FLU, TTCT V FLEX TTCT V ORIG and between the sets of: IQ VOCAB, IQ SENT COMP, IQ ARITH REAS, IQ VERB CLASS, IQ VERB ANAL; and the set of IQ VOCAB, IQ SENT COMP, IQ ARITH REAS, IQ VERB CLASS, IQ VERB ANAL, IQ FIG CLASS, IQ NUMB SER, IQ FIG ANAL. Canonical correlation was conducted between the set of TTCT F FLU, TTCT F FLEX, TTCT F ORIG, TTCT F ELAB and the set of IQ FIG CLASS, IQ NUMB SER, and IQ FIG ANAL. Three canonicals were conducted between the set of TTCT V FLU, TTCT V FLEX, TTCT V ORIG, TTCT F FLU, TTCT F FLEX, TTCT F ORIG, TTCT F ELAB and between the sets of: IQ VOCAB, IQ SENT COMP, IQ ARITH REAS, IQ VERB CLASS, IQ VERB ANAL; IQ FIG CLASS, IQ NUMB SER, IQ FIG ANAL; and IQ VOCAB, IQ SENT COMP, IQ ARITH REAS, IQ VERB CLASS, IQ VERB ANAL, IQ FIG CLASS, IQ NUMB SER, IQ FIG ANAL.

Many multiple regression analyses were conducted. The five IQ verbal subtests (VOCAB, SENT COMP, ARITH REAS, VERB CLASS, VERB ANAL) were regressed one at a time, two at a time, three at a time, four at a time, and five at a time for the creativity verbal subtests (FLU, FLEX; ORIG, COMPOSITE) and for the creativity figural subtests (FLU, FLEX, ORIG, ELAB, COMPOSITE). The same procedure was used for the multiple regression analyses between the IQ nonverbal subtests (FIG CLASS, NUMB SER, FIG ANAL) and the creativity verbal subtests (FLU, FLEX, ORIG, COMPOSITE) and for the creativity figural subtests (FLU, FLEX, ORIG, ELAB, COMPOSITE).

Results

First order partial (zero order correlations in parentheses) correlations were: .53(.43) for TTCT V FLU and TTCT F FLU with IQ verbal partialled out; .50(.32) for TTCT V FLEX and TTCT F FLEX with IQ verbal removed; and .42(.28) for TTCT V ORIG and TTCT F ORIG with IQ verbal removed.

Second order partial correlations were: .54(.43) for TTCT V FLU and TTCT F FLU with both IQ verbal and READ INDEX partialled out; .52(.32) for TTCT V FLEX and TTCT F FLEX with IQ verbal and READ INDEX removed; and .42(.28) for TTCT V ORIG and TTCT F ORIG with IQ verbal and READ INDEX removed. READ INDEX is a composite of language activities determined from the Florida Statewide Twelfth Grade Test. Partial correlations are difficult to interpret. However since the respective zero order correlations were somewhat lower before the partial variable, language ability, was removed, language ability apparently represents additional unrelated variance which when removed causes the several relationships to become clearer. This suggests that IQ, language ability, vocabulary, etc., has little relationship with most of the pairs of creativity variables.

~~These canonical correlations are of interest.~~ The three creativity verbal scores as a set correlated .14 with the five IQ verbal subtests as a set, and .38 with the five IQ verbal and three non-verbal subtests. The four creativity non-verbal tests as a set correlated .25 with the three IQ non-verbal subtests. The three verbal and four non-verbal creativity set correlated ca. .40 with the five IQ verbals, the three IQ non-verbal, and total IQ. These correlations were not corrected for unreliability since evidence of their reliability has been amply demonstrated in previous studies. The moderate strength of these canonical correlations sugges that creativity and IQ, as represented by the tests used, do not strongly relate.

Multiple correlations of the IQ verbal subtests singly and in various combination and (a) TTCT V FLU ranged from .08 to .22; (b) TTCT V FLEX from .15 to .25; (c) TTCT V ORIG from .14 to .21; and (d) TTCT V COMPOSITE from .13 to .25. Multiple correlations of the IQ verbal subtests singly and in various combinations, and (a) TTCT F FLU ranged from .06 to .27; (b) TTCT F FLEX from .01 to .32; (c) TTCT F ORIG from .02 to .14; (d) TTCT F ELAB from .02 to .08; and (e) TTCT F COMPOSITE from .02 to .11.

Multiple correlations of the IQ non-verbal subtests singly and in various combinations, and (a) TTCT V FLU ranged from .07 to .34; (b) TTCT V FLEX from .07 to .35; (c) TTCT V ORIG from .16 to .33; and (d) TTCT V COMPOSITE from .13 to .31. Multiple correlations of the IQ non-verbal subtests singly and in various combinations, and (a) TTCT F FLU ranged from .02 to .17; (b) TTCT F FLEX from .11 to .21; (c) TTCT F ORIG from .01 to .21; (d) TTCT F ELAB from .05 to .19; and (e) TTCT F COMPOSITE from .06 to .17.

The highest multiple correlation between the IQ verbal subtests and creativity subtests was .32 between IQ VOCAB, SENT COMP, ARITH. REAS, VERB CLASS, and VERB ANAL vs TTCT F FLEX. The highest multiple correlations between the IQ non-verbal subtests and creativity subtests was .35 between IQ NUMB SER and FIG ANAL vs TTCT V FLEX). Worth noting also are the correlations between the IQ non-verbal subtest FIG ANAL and TTCT V FLU, TTCT V FLEX, TTCT V ORIG and TTCT V COMPOSITE. They were respectively .27, .29, .30, and .29.

Needless to say the coefficients of determination are proportionally smaller so the influence of the IQ subtests individually and in combinations on creativity scores is very limited.

It is concluded that IQ and creativity, as measured by the tests used herein, relate weakly or at best moderately. This is clear from the first and second order partial correlations, from the moderate strength canonical correlations, and from the small multiple regression coefficients.

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