

Field Dependence-Independence on the Children's Embedded Figures Test: Cognitive Style or Cognitive Level?

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In research at the interface of personality and intellectual development, an important issue concerns the distinction between cognitive ability and cognitive style. Achenbach and Weisz (1975) recently demonstrated that the distinction is rather difficult to draw with respect to the cognitive style dimension of impulsivity-reflectivity.

Another widely studied cognitive style construct that deserves such scrutiny in the global-articulated dimension, which Witkin and others (cf. Witkin, Oltman, Raskin, & Karp, 1971) have investigated through tests of perceptual field dependence-independence. Witkin's view that field-dependent persons are relatively poor at imposing structure upon experience has been supported in part by the finding that ability to structure Rorschach responses correlates significantly with field independence. Yet Zigler (e.g., 1963) has argued that many such correlations between field dependence and other measures may result from a common relationship between the measures employed and level of cognitive ability, or mental age (MA). Studies of Rorschach structuring ability and of field dependence in children do indicate that both are related to general development as measured by chronological age (CA). This fact suggests that the Zigler hypothesis bears further examination; such an examination was the major purpose of the present investigation.

In contrast to studies in which age was the only measure of development, the present study was designed to separate the effects of CA and MA by employing them as orthogonal factors. Four groups (shown in Table 1) formed a 2×2 (MA, 9 and 12 years vs. CA, 9 and 12 years) factorial design. The CA 9-MA 12 group contained five boys and seven girls, the other groups six boys and six girls each.

In the first of two sessions an experienced

female tester individually administered the Peabody Picture Vocabulary Test and the Rorschach. Two scoring systems were employed to measure Rorschach structuring ability. These were Holt's form accuracy system, for scoring the degree of congruence between the subject's response and actual inkblot characteristics, and Friedman's developmental level system, for scoring the accuracy and location of responses. About 4 weeks later, a male experimenter administered the Children's Embedded Figures Test (CEFT), which requires the subject to locate a specific two-dimensional figure (i.e., tent or house shape) embedded within designs in varying degrees of complexity.

A 2×2 (CA \times MA) analysis of variance performed on CEFT scores and the two Rorschach variables showed significant improvement with MA, $F(1, 44) > 8.0$, $p < .01$, for each of the three analyses. The CA effect, however, did not approach significance on any dependent variable.

There were significant correlations between MA and CEFT scores, $r = .72$, $p < .001$, between MA and form accuracy, $r = .49$, $p < .001$, and between MA and developmental level, $r = .45$, $p < .01$; correlations of the three dependent measures with CA were low and non-significant.

To explore the possibility that the MA effect was enhanced by the positive MA-IQ correlation which is inevitable in any CA-MA orthogonal design, a comparison was made of the CA 9-MA 9 and CA 12-MA 9 groups, and the CA 9-MA 12 and CA 12-MA 12 groups with respect to Rorschach measures and CEFT. None of these six t tests comparing groups matched for MA, but differing in IQ approached significance. Thus, MA was a stronger developmental correlate than CA or IQ, of both Rorschach structuring ability and field dependence, and was the appropriate variable to control when partialing out developmental variance.

Consistent with the Witkin view, there were highly significant correlations between CEFT performance and Rorschach developmental level, $r = .54$, $p < .001$, as well as form accuracy, $r = .49$, $p < .001$. Yet the correlations of CEFT with developmental level and form accuracy were not significantly different from the correlations of the two Rorschach variables with MA; and the

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Table 1: Group Means in the CA-MA Orthogonal Design

Variable	MA 9		MA 12	
	CA 9	CA 12	CA 9	CA 12
CA ^a	9.53	12.65	9.41	12.37
MA ^a	9.88	9.73	12.54	12.82
IQ	101.67	80.92	123.67	104.17
RDL ^b	3.11	2.94	3.54	3.38
RFA ^c	4.62	4.38	5.18	4.94
CEFT ^d	14.00	14.83	21.08	21.08

Note. CA = chronological age; MA = mental age.

^a In years.

^b Rorschach developmental level.

^c Rorschach form accuracy.

^d Children's Embedded Figures Test.

CEFT-MA correlation was substantially higher than the correlation of CEFT with developmental level, $t(45) = 1.77$, $.05 < p < .10$, and form accuracy, $t(45) = 2.24$, $p < .05$.

The hypothesis that the relationship between field dependence and Rorschach responding is a function of their common relationship with MA was tested by partialing MA out of the CEFT-Rorschach correlations. Removing the effects of MA reduced the correlation between CEFT and Rorschach developmental level from $.54$ ($p < .001$) to $.35$ ($p < .05$) and the correlation between CEFT and form accuracy from $.49$ ($p < .001$) to $.23$ (*ns*). Thus, partialing out MA caused the percentage of variance in developmental level scores accounted for by the CEFT to drop from 29% to 12%; with respect to form accuracy, variance accounted for dropped from 24% to 5%.

In the present study 52% of the CEFT variance was accounted for by its correlation with MA, and the strength of the theoretically important Rorschach-field dependence relationship appeared to derive largely from the mutual correlation of the variables with cognitive developmental level as reflected in MA. This finding is relevant to that large body of research on correlates of field dependence, often cited as validation for the global-articulated cognitive style construct. Studies with children have reported relationships between field dependence and socioeconomic status, race, articulation of body concept in human figure drawings, and susceptibility to the effects of approval and disapproval. Each of these factors is known to vary with MA, and when children in such studies are grouped by CA level

alone, IQ and thus MA are uncontrolled. The present findings argue for reexamination of such evidence gathered without MA controls.

It should be noted that the psychometric MA, though often used to assess developmental level, is essentially atheoretical and yields little information about specific psychological processes. Thus, there is some comfort in noting that a significant correlation remained between Rorschach developmental level and the theory-generated CEFT, after MA was partialled out. This fact provides some support for the cognitive style variable in Witkin's theory.

Yet the major findings raise significant questions, particularly in the light of Campbell and Fiske's (1959) proposal that to establish the existence of a psychological trait it must be demonstrated that methods of measuring the trait correlate more highly with one another than with measures of other traits. In the present study correlations among CEFT performance and Rorschach measures presumed to tap the global-articulated cognitive style trait were not higher than correlations of the three measures with MA, as the Campbell-Fiske standard would demand. In fact the CEFT-Rorschach correlations were substantially lower than the correlation between CEFT and MA. These results, together with the findings of Achenbach and Weisz (1975) on impulsivity-reflectivity, suggest an important objective toward which cognitive style theorists should strive: to delineate experimentally the distinction between proposed traits of cognitive style and the fundamental trait of cognitive developmental level.

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