

DEVELOPMENTAL CHANGES IN RESPONSE DIFFERENTIATION ON A COLOR-ARRANGEMENT TASK

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Color Pyramid Tests administered to 806 children from kindergarten to Grade 12 were classified by computer scoring into categories of color and form dominance. Significant developmental increment of form dominance was found up to age 13 for boys and to age 14 for girls. Defective children with a chronological age of 14 compared on form level to normal 8-yr.-olds, while psychiatric patients and delinquent adolescents had form levels comparable to middle childhood. The form level of college students was equal or above that found in adolescence.

Line (1931) has suggested that there is a regular increase in perceptual capacity with age, and Piaget and his co-workers (1956, 1960) have shown similar age changes in the perception of good gestalten. Ford (1946), furthermore, found that the Rorschach protocols of young children showed increments in $F+\%$ and decrements in color-dominated responses as a function of increasing age. If one assumes that response to color is used to represent affective states (Schaie, 1961a, 1961b, 1966), then one may argue that increased personality differentiation accompanying normal development should be expressed in increased form dominance. In the present study the Color Pyramid Test (CPT), which permits a gradual shift from color to form dominance, is used to test the hypotheses that increased form dominance occurs with increasing age; that young adults, therefore, show greater form dominance than children; and that psychiatric patients, mental defectives, and delinquents show lower form dominance than normals of equal chronological age.

METHOD

Subjects. Thirteen subsamples, each with 31 boys and 31 girls, were randomly drawn from grade rosters for kindergarten to Grade 12 in three large metropolitan schools which were selected so as to obtain a broad socioeconomic representation. Subsamples did not differ significantly on intelligence levels or father's occupation. Comparison groups consisted of 95 college sophomores, 43 girls in a training school for delinquents, 29 boys and 29 girls in a home for defectives, and 80 unselected patients in the admissions ward of a psychiatric state hospital.

Procedure. The CPT was administered to all Ss in groups of from three to six Ss under standard conditions. In this test, which is described in detail elsewhere (Schaie, 1963; Schaie & Heiss, 1964), S is presented with a pile of colored chips in 24 different hues and a pyramid form with 15 fields. The

instructions simply call upon S to make the pyramid as pretty as possible by placing chips on the fields of the pyramid. Three trials are allowed. The 15 fields of the CPT pyramid can be filled with colored chips by attending exclusively to the hues, or it can be filled by attending to the structural attributes of the pyramidal surface.

Form scoring principles. Pyramids can be classified into those dominated by color, those dominated by form, and an intermediate level. The S who treats the pyramid as a flat surface will construct a carpet-like design characterized by color scatter and will attempt to achieve harmonious blending. Such behavior would be expected from young children and adults with undifferentiated labile personality patterns. The S who recognizes the structural attributes of the pyramid, but who is still dominated by the impact of color, is likely to produce a more or less well ordered "layer" design which shows color separation. This pattern is commonly found in later childhood and probably represents a transitional and somewhat constricted personality configuration. In those Ss, however, where the need to organize and structure their experience predominates, color organization in relation to the pyramidal structure will prominently appear. The latter approach is presumed to be the appropriate reaction of a well-differentiated mature adult.

RESULTS AND DISCUSSION

A pattern-scanning computer program was developed which incorporates all necessary classification rules and which permits the unambiguous and mutually exclusive assignment of each pyramid to the appropriate form level. Each color-dominated design was scored zero, and values of one or two were assigned to those pyramids showing color separation or form dominance, respectively. Form level scores based on three trials, consequently ranged from zero to six. Means and standard deviations were computed for all groups. They are reported for the samples of children 6-18 years old in Table 1 and for the comparison groups in Table 2.

TABLE 1

FORM LEVEL ON THE PRETTY PYRAMIDS OF THE COLOR PYRAMID TEST FOR VARIOUS AGE GROUPS

Age group ^a	Male		Female		Total	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
6	2.65	1.80	2.39	2.14	2.52	1.96
7	2.58	1.95	2.10	1.62	2.34	1.80
8	2.58	2.31	2.16	1.62	2.37	1.98
9	2.97	2.09	3.32	2.14	3.15	2.10
10	3.58	2.39	3.35	2.20	3.47	2.28
11	3.83	2.03	3.97	2.01	3.90	2.01
12	3.83	1.85	3.52	2.28	3.68	2.05
13	4.23	1.75	3.68	2.29	3.95	2.04
14	4.35	1.47	4.58	1.46	4.47	1.46
15	4.19	1.94	4.39	1.58	4.29	1.76
16	4.45	1.67	4.32	1.51	4.39	1.58
17	4.64	1.22	4.39	1.69	4.52	1.47
18	4.13	1.89	4.45	0.99	4.23	1.68

Note.—*N* = 31 males and 31 females in each group.
^a In years.

The analysis of variance of the data (age, sex, and age × sex) derived from the school children indicates that age differences were significant at the .001 level of confidence. No significant overall sex differences occurred, but when means were compared via Duncan's new multiple-range method, it was noted that form levels appear to stabilize for boys at age 13 and for girls at age 14. These data suggest what appears to be an asymptotic developmental gradient toward increased form dominance.

If these data can be taken as evidence of increased personality differentiation, then one should expect comparisons with pathological groups and well-differentiated adults to yield significant discrepancies in either direction. In this vein, it was hypothesized that the average form level for a group of college students (*M* age = 20), equals or exceeds that of adolescents.

This is indeed the case, and further evidence of increasing stabilization of personality differentiation with age is provided by the finding that the students show less variability than the adolescents.

Next, data were examined for a group of girls in a training school for delinquents (*M* age = 16). The form level for the delinquent group was hypothesized to be lower than that of a comparison group of 16-year-old high school girls. This hypothesis was confirmed at the .05 level of confidence.

If performance on the CPT is indicative of developmental differentiation, then it should also be possible to show differences between normally developing and defective individuals. A sample of residents of a home for mentally defective children with an average chronological age of 14 years was compared with the corresponding form level scores for normal 14-year-olds. The mean difference between the defectives and normals was significant in the expected direction at the .005 level of confidence.

A final comparison was made with a group of 80 unselected adult psychiatric patients. This comparison was made with a group of normal 18-year-olds, and the form level of the psychiatric patients was found to be significantly below that of the young adults.

Inspection of the mean values for the comparison groups shows that the 14-year-old mental defectives compare in form level to that of the normal 8-year-olds, which is just slightly above their mental age level on the Stanford-Binet. The delinquent adolescent girls aged 16, as well as the unselected psychiatric patients, have a form level similar to that of the normal 12-year-olds.

It may be argued that the performance of the comparison groups could be accounted for by their lowered level of intellectual functioning. Other studies relating form dominance and intellectual ability have shown, however, that when

TABLE 2

FORM LEVEL ON THE PRETTY PYRAMIDS OF THE COLOR PYRAMID TEST FOR VARIOUS COMPARISON GROUPS

Group	Male			Female			Total		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
College student	49	4.67	1.03	46	4.54	1.00	97	4.61	1.01
Delinquent adolescent				43	3.58	2.08			
Mentally defective adolescent	29	2.55	1.97	29	2.86	2.01	58	2.71	1.98
Psychiatric patient	44	3.32	1.51	36	3.83	1.81	80	3.55	1.66

proper adjustment is made for age, correlations are of a very low order (Schaie, 1962). It does seem, therefore, that the present data show cogent support for the hypothesis that the extent of form over color dominance is a reasonable representation of the developmental level of personality differentiation.

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