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ON QUANTITATIVE RORSCHACH SCALES[1]

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Two types of quantitative Rorschach scales are discussed: first, those based on the response categories of content, location, and the determinants, and second, global scales based on the *S*'s responses to all 10 stimulus cards. Two questions were asked of the data from children, ages 7–14, reared in geographic and social isolation and their matched urban controls: "Do the two sets of scales differentiate between the two groups of children?" and "How many dimensions exist in the two sets of scales?" Five of the 22 scales based on the standard scoring categories and eight of the 15 global scales differentiate between the isolate and control groups at $p < .01$. Principal component analyses were used to estimate the dimensionality of each set of scales and to compare the dimensionality of the 15 global Rorschach and 11 WISC scales administered to the same *S*s. Questions of the utility of statistically non-independent scales and the development of new Rorschach scales which are appropriate to the *E*'s research interests are also discussed.

RORSCHACH's test has been a focus of controversy ever since he published it in 1921. Some authors, dubious of this test's "reliability" and "validity" in the classical sense, question its utility (e.g., Zubin,

[1] This research is an outgrowth of a study of the effects of being reared on an isolated farm, as compared to being reared in a small community or in urban settings, which was conducted through the Institute for Social Research, Oslo, and the Department of Psychiatry, University of Illinois at the Medical Center, Chicago. The research was supported by grants from the Foundations' Fund for Research in Psychiatry (62-259, 65-321, G69-465) and the Grant Foundation, and by a U. S. Public Health Service Career Program Award (MH-K6-9415) from the National Institute of Mental Health. Colleagues who participated in the collection and coding of the Rorschach data include, principally, Carl-Martin Borgen and Anna Brekke, but also Claus Fasting and Anna von der Lippe: Logan Green and Joung K. Whang aided in the data analysis; and R. Darrell Bock, Samuel J. Beck, Donald W. Fiske, Robert R. Holt, and Philip Holzman have made helpful suggestions in connection with this paper.

Eron, and Schumer, 1965), whereas others affirm its great value as a clinical diagnostic tool (e.g., Beck, Levitt, and Molish, 1961; Klopfer, Ainsworth, Klopfer, and Holt 1954; Rapaport, Gill, and Schafer 1968; Schachtel, 1966). Also, some investigators have used this test successfully to predict *S*s' adaptations to a wide variety of situations (e.g., Brawer, 1970), including cross-cultural research (e.g., Hallowell, 1956). Why, then, such discrepant appraisals?

In addition to a temperamental distaste in some quarters for the allegedly "unstructured" nature of the Rorschach test, several methodological criticisms have been raised against it. For example, the inkblots elicit an almost infinite variety of possible responses which, to say the least, make the data unwieldy. And, often lacking explicit norms for interpreting the *S*'s responses, the *E* must rely on his own "data bank" and use his own "computer" to rationalize, interpret, and formulate the meaning of the *S*'s responses. To the extent that either are deficient or faulty, the utility of the test will suffer. But along with the *S*'s responses, the *E*'s methods of administering, scoring and interpreting the test contribute major sources of variance to what eventually will be said about the person to whom the Rorschach test was administered.

Two related considerations complicate the analysis and interpretation of Rorschach data. One consideration stems from the test's probing of the general structural properties of the *S*'s functioning in the perceptual-cognitive-personality domains. Thus, insofar as the test samples how the *S* characteristically perceives, structures, and deals with "reality," it indicates his probable modes of adaptation to other life situations, both actual and potential. The *S*'s responses to the Rorschach test do not necessarily indicate specifically how he will perceptually structure and respond to other life situations. As a consequence, valid predictions based on responses to this test may appear to fail when specific behaviors are involved, since such behaviors depend not only on various general or characteristic properties of the *S* but also on his personal history, the kind and degree of any temporary internal stress, conflict, etc. and the characteristics of the situation in which he finds himself.[2] A second consideration stems from the nature of the test and the fact that the *E* is an integral part of the test situation. Because of the lack of constraints on the *S* as to what he should "see" in the inkblots, and the assumption that his responses reveal deep and/or significant things about him, some *E*s assume that

[2] For example, if the test correctly indicates (potential) pathology, the "prediction" of such pathology may be incorrect so long as the *S* remains comfortable in a sufficiently benign environment; the pathology could be expected to become manifest only under conditions of increased internal and/or external stress. See also Haggard, 1964, 1974.

practically everything important about the *S* can be fathomed from his responses to this test. Such *E*s, especially the non-expert (like the sorcerer's apprentice), often seem unable to stop once they have started interpreting the *S*'s responses. It is likely that the utility of the Rorschach test would be increased if some *E*s asked less of it.

The fact that each *S*'s responses to the inkblots appear to reveal important aspects of his perceptual-cognitive-personality functioning leads to a common dilemma. It is: How can one retain the intuitive sense of meaningfulness inherent in each *S*'s responses to the inkblots, while at the same time reduce the verbal statements to a form which permits systematic data reduction and analysis? Clinicians and research workers tend to differ in their preferences as to how far one properly should go in reducing (or generalizing from) the *S*'s verbal responses. In this connection, one can distinguish between two types of Rorschach "data." One type attempts to reflect the most cogent characteristics of what the *S* says in each of his responses to the inkblots, examples of which include the standard scoring categories of content (what is seen), location (where it is seen), and the determinants (how or why it is seen). A rather different type of data result from the *E*'s inferences or generalizations based on all the *S*'s responses to one or more of the inkblots, examples of which are the numerous global rating scales that have been proposed. One may—somewhat arbitrarily for the sake of convenience—call these two types of data "primary" and "secondary," depending on how closely they are tied to the *S*'s verbal responses to the inkblots.

One's strategy for reducing and analyzing Rorschach data will depend in part on whether primary or secondary data are involved. On the one hand, primary data—as frequency scores—are difficult to analyze statistically, partly because of the large number of scoring categories and the usually small and varying number of responses per *S* per category (cf. Cronbach, 1949). Many approaches have been used to reduce primary and secondary Rorschach data in order to draw meaningful conclusions from statistical analyses of such data. Some Rorschach workers have developed a wide range of categories and scoring procedures based on the *S*'s responses to the inkblots (e.g., Holt, 1970a; Mayman, 1970; Piotrowski, 1957, 1964; Zubin et al., 1965). Correspondingly, a variety of scales have been proposed (e.g., Lerner, 1975), and such techniques as factor analysis have been used to reduce primary and/or secondary Rorschach data (e.g., Beck, 1965; Efron and Piotrowski, 1966; Webb, 1956; Wittenborn, 1949, 1950). However, some workers while convinced of the meaningfulness of the *S*'s responses to inkblots, were not satisfied with the attempts to work with Rorschach data. Thus, Holtzman, Thrope, Swartz, and Herron

(1961) developed new sets of inkblot stimuli and scoring procedures to circumvent many of the psychometric difficulties inherent in the standard Rorschach scoring categories and to facilitate straightforward analyses of primary inkblot data.

One purpose of this paper is to discuss the development of Rorschach scales, some of which use the data of the major scoring categories of content, location, and the determinants. In using these data it is assumed that such formal characteristics of the *S*'s responses tell important things about him, quite aside from the idiosyncratic or anecdotal content of his responses. Although such scales may be useful in a research context, they are not substitutes for the clinical use of the test, especially as it is administered and interpreted by, for example, a Beck, a Klopfer, or a Schachtel.

A form of the procedure using scales based on the standard scoring categories appeared first in a study in which the Rorschach and Holtzman tests were administered to 72 normal adolescents, ages 16–17 (Bock, Haggard, Holtzman, Beck, and Beck 1963), with the data later reanalyzed (Zyzanski, 1968), and in a study of 68 Norwegian isolated and urban children, ages 7–14 (Haggard, 1973; Haggard and von der Lippe, 1970). In the first study it was found that the scales indicating the *S*s' tendencies to perceive, for example, wholes vs. details, form vs. color, form vs. movement, or animate vs. inanimate objects not only differentiated among *S*s but also showed significantly more intra-*S* stability than inter-*S* variation after a three-month interval. In the sample of 72 normal urban adolescents the scales did not differentiate well along groups of *S*s in terms of sex, school achievement, or socioeconomic status. In the Norwegian study, however, some of the same or similar scales effectively differentiated between the sex and isolation groups.[3] It appears, then, that scales of this type are able to differentiate among groups of normal *S*s along certain intrapsychic or interpersonal dimensions but may not do so along others.

A second purpose of this paper is to describe a set of global rating scales, based on all the responses of each *S* to the 10 inkblots. These global scales were selected and defined in terms of their general relevance to cognitive and personality development and, in particular, to the presumed effects of being reared in geographic and social isolation.

[3] For nine scales considered together, multivariate *F* tests differentiated between the sex groups ($p = .02$) and the isolation groups ($p = .01$), with several of the individual scales differentiating more or less successfully between these groups of *S*s (Haggard, 1973; Haggard and von der Lippe, 1970). The fact that significant differences appeared between the boys and girls in the Norwegian sample and not *S*s drawn from Chicago schools probably is because much greater differences exist in how the Norwegian boys and girls (especially the isolates) are reared.

Each set of scales—the 22 developed from the scoring categories and the 15 global scales—were based on the same set of Rorschach protocols.

Procedure

Subject sample

Forty social isolates (from families living on remote farms in Norway, far from the public roads) and 29 urban controls (reared in a town of about 7,000 in the same ecological-cultural area) served as *S*s (cf. Haggard, 1973; Haggard and von der Lippe, 1970).[4] The *S*s in the two groups, ages 7–14, were about evenly distributed over the eight-year span, and were matched in terms of their age, sex, and sibling position in the family, and their father's education and type of occupation.

Response Sample

The *E* who administered the test was unusually patient, and elicited at least five responses per card from each of the *S*s.[5] To simplify the data analysis, only the first five responses to each of the 10 cards were used. Consequently, 3,450 responses (i.e., 69 *S*s × 10 cards × 5 responses) comprised the basic data for the scales based on the scoring categories. The global scales were based on a somewhat larger number of responses, i.e., all the responses of each *S* to the 10 stimulus cards.

Rorschach Scales Based on Scoring Categories.

Although 22 scales were used in this part of the study, several of them overlap insofar as the responses coded in the content, location, and determinant categories entered two or more of the scales. Twelve of the scales—composed of single categories (e.g., *A*% and *F*+%), sums of two or more categories [e.g., (*Dd* + *S*)%], or ratios of cate-

[4] Although the Rorschach was given to 29 urban children (the number used for urban *S*s in this paper), one of these *S*s did not take the full battery of tests reported on by Haggard and von der Lippe (1970); hence 28 urban *S*s were used in that paper.

[5] Admittedly, this number of responses per card per *S* is well outside the typical range of responses for this test. The *E* who administered the Rorschach in this study was able to communicate silently an attitude such as: "I am interested in everything you see in the cards, and can wait until you are able to tell me what you see." The fact that so many responses were elicited from each of the *S*s in this study does not invalidate the scaling procedure itself, although the unusually large number of responses may limit the generality of any substantive conclusions based on these data, especially to groups and/or individuals who give a relatively small number of responses.

gories (e.g., F/C)—were taken from the Index of Klopfer et al. (1954). These 12 scales were selected on the assumption that they represented distillations of clinical experience and insight, and hence should signify important and meaningful dimensions of perceptual-cognitive-personality processes, and so might differentiate between the two clearly-defined groups of *S*s. On the same assumption, 10 additional scales were included from other sources, viz., Rorschach (1942), Beck et al. (1961) or his other writings, and Rapaport, et al., (1968), or scales which had been used in similar statistical analyses by Bock and Haggard et al. (1963), Zyzanski (1968), or Haggard and von der Lippe (1970). This list of 22 scales is meant to be representative (but not exhaustive) of the possible scales based on the various Rorschach categories. The scales and their sources are given in Table 1.[6]

Transformation of the Rorschach codings. Many forms of behavioral data—like Rorschach responses (i.e., frequencies, percentages, or ratios involving small *N*s)—often do not meet the assumptions underlying such statistical procedures as the analysis of variance. When the data deviate too much from such assumptions as normality, independence of means and sigmas, etc., the "findings" may be highly distorted or outright misleading (cf. Haggard, 1949 a, b); hence, it may be necessary to transform such data before they are analyzed (see also Bartlett, 1971).

An appropriate transformation for the Rorschach data used in the 22 scales is: $X' = \log (X + .5)$, where X is the original frequency and X' is the transformed score. The addition of .5 to each X avoids the problem of taking the logarithm of a 0 frequency score. All the original frequencies were thus transformed in developing the 22 scales. More specifically, in this analysis, in which the number of responses was constant at 50 for each S, the first step was to sum the frequency of the separate Xs in each of the scoring categories for each S. The 22 scales were then developed by transforming each X, or combination of Xs for each S, as for example:

Original scale	*Transformed scale*
1. $A\%$	$\log (A\% + .5)$
2. $(Dd + S)\%$	$\log [(Dd + S)\% + .5]$
3. F/C	$\log (F + .5) - \log (C + .5)$

The 22 transformed scales were considered to be normal, continuous

[6] It should be noted that the Rorschach protocols were scored according to Klopfer's system. Consequently, scales 15 (Rorschach's "Experience Balance") and 16 (Beck's "Experience Actual") may not be completely accurate representations of what Rorschach and Beck had in mind. That is, since Rorschach and Beck tend to score movement (M) responses somewhat differently from Klopfer, the definition of scales may differ somewhat, depending on which scoring procedure is used.

TABLE 1

Scales Based on Rorschach Scoring Categories: Isolation and Control Group Differences

Scales[a] Age	Source[b]	Correlation with Age[c] *r*	Group Means[d] Isolate (N = 40)	Group Means[d] Control (N = 29)	Diff. Between Groups (Isolates vs. Controls) *p* values
			10.38	10.35	
		(1)	(2)	(3)	(4)
1. *A%*	K, B	−.02	42.10	43.10	.41
2. *(Dd + S)%*	K	.18	24.75	22.41	.42
3. *F%*	K, B	−.07	70.65	65.17	.16
4. *Classical F + %*	K, B, BH	.51**	57.17	63.28	.006
5. *F/C*	K, B, BH, Z	.18	33.74	31.22	.96
6. *FC/CF*	K, B	.24	1.23	1.58	.44
7. *FC/ (CF + C)*	K, B	.29*	1.17	1.56	.27
8. *(FK + F + FC)%*	K	−.01	38.17	36.48	.51
9. *(FM + m)/(FC + c + C′)*	K	.05	.83	.67	.04
10. *(H + A)/(Hd + Ad)*	K, B	−.17	3.05	2.05	.73
11. *M/FM*	K	.05	.56	.85	.87
12. *M/(FM + m)*	K	.15	.48	.53	.84
13. *W/M*	K, B	−.24	.48	.53	.06
14. *F/M*	B	−.23	27.81	20.88	.007
15. *(M + M_t)/(Sum C)* = "E.B."[e]	Ro, B	.45**	1.71	2.09	.003
16. *(M + M_t + (Sum C)* = "E.A."[e]	B, BH	−.03	5.78	6.83	.007
17. *Special F + %*	Ra, B	.48**	68.90	70.90	.30
18. *(M + M_t + FM + FM_t + m + Fm_t)/F*	BH, Z	.15	.40	.50	.0005
19. *W/(D + Dd + de + di + dr)*	BH, Z, HL	.04	.16	.21	.09
20. *S*	HL	.01	1.70	.83	.01
21. *(M + M_t + FC)/F*	HL	.24	.17	.23	.0004
22. *(H + A)/(Anat. + Obj. + Bot. + Nat.)*	BH, Z, HL	−.02	1.38	1.68	.02

[a] To avoid confusion the subscript: $_t$ is used to indicate "tendency," as in M_t or FM_t (instead of *M-* or *FM-*).

[b] Source: B = Beck et al. (1961); BH = Bock and Haggard et al. (1963); HL = Haggard and von der Lippe (1970); K = Klopfer et al. (1954); Ra = Rapaport et al. (1968); Ro = Rorschach (1942); Z = Zyzanski (1968). This indication of "sources" is by no means complete following Rorschach (1942), many others (e.g., Schachtel, 1966) have used several of the scales (e.g., *F+%*) in their writings.

[c] * = $p < .05$; ** = $p < .01$.

[d] The group means, percentages or ratios are based on raw (not transformed) scores. For scales 1 to 3, the raw frequencies are multiplied by 2 to give percentage, since $R = 50$.

[e] *Sum C* is defined as: $[(FC + 2CF + 3C)/2]$. If the means for these scales are computed from transformed scores (e.g., Haggard and von der Lippe, 1970), the absolute magnitude of the means will differ, but their relative magnitude (i.e., the direction of the difference) will remain constant.

variates and were used in all the statistical analyses; however, the isolation and control group means given in Table 1 are based on the original scales for ease of interpretation by persons familiar with the Rorschach test. The assumption that the distributions of the 22 scales adequately approximate normality rests primarily on a visual examination of them (see also Zyzanski, 1968).

Certain features of the 22 scales used in this study should be noted. Since the number of responses was constant for all *S*s (i.e., $R = 50$): (*a*) the *S*'s productivity, *R*, is not a confounding consideration in the 22 scales, and (*b*) with *R* constant, some scales designated as percentages (e.g., scale 1:*A*%) are essentially frequencies; the percentage designation is used to conform to standard Rorschach terminology. Also, two scales, 4: the *classical* *F*+% and 17: *special* *F*+%, which are true percentages, are treated as frequencies since, when transformed, their distributions are approximately normal (on goodness-of-fit tests, $p > .85$).

In most instances where Rorschach data are to be analyzed, the number of any given *S*'s responses will vary from card to card, and also the total number of responses, *R*, will vary from *S* to *S*. In such cases the effect of *R* will be taken into account if *contrasts or ratios of codings* are used (cf. Bock, 1975, Ch. 9). In terms of the scales used in this study, the contrasts are of two types: *a/total-a* and *a/b*, where *a* and *b* signify different codings or variables. For example, a scale of the *a/total-a* type may be illustrated by the *F*+% scoring, which may be approximated by using the following frequency scores to form the ratio: SUM *F*+/(sum *F* − sum *F*+), or as transformed: log (sum *F*+ + .5) − log (sum *F* − sum *F*+ + .5). (One could, of course, construct somewhat different contrasts, such as: *F*+/*R* − *F*+, depending on one's interests and purposes.) Correspondingly, a scale of the *a/b* type, which is intended to reflect the *S*'s tendency to perceive wholes vs. details, can be constructed by forming the ratio: $W/(D + Dd + de + di + dr)$, or as transformed: log (sum W + .5) − log [(sum D + Dd + de + di + dr) + .5]. When such scales are thus written, *R* enters both aspects of the contrast, since with an increase in *R* it is assumed that the number of both *F*+ and non-*F*+ form responses, and the whole and detail responses, will increase proportionately.[7]

Rorschach Scales Based on Global Ratings

In addition to the 22 scales based on the scoring categories, ratings were made on 15 global scales which were based on all the responses of

[7] The tenability of this assumption is questionable with respect to some codings, however, since as the *R* increases the *S* is likely to give, e.g., relatively more *D* and *Dd* than *W* or *F*+% responses (cf. Fiske and Baughman, 1953).

each *S* to the 10 inkblots. Each of the 15 scales were defined in terms of either five or seven points, and the extremes and midpoints of each of these 15 ordinal scales were anchored or defined by examples taken from the protocols. The 15 scales, with indices of inter-rater agreement (and ordered according to how well they differentiated between the isolate and control groups) pertained to the following abilities, characterological tendencies, ego resources, etc.: (1) Perceptual organization (r = .76)[8]; (2) Ego strength (r = .85); (3) Empathy and ability to establish and maintain object relations (r = .87); (4) Intelligence (r = .78); (5) Reality testing (r = .87); (6) Constructive use of fantasy (r = .68); (7) Regressive use of fantasy (r = .81); (8) Social contact function (r = .89); (9) Defensive control (r = .94); (10) Conventional reality perception (r = .90); (11) Integrative control (r = .47); (12) Primitive use of fantasy (r = .97); (13) Secondary process thinking (r = .87); (14) Ability to mobilize affect (r = .60); and (15) Affect aroused by inkblots (r = .70).

Over-all reliability of the ratings. Two trained judges (who also had worked on the definitions, etc. of the scales) rated all 15 scales for three blocks of five *S*s, with discussions of discrepant ratings after each block. The intraclass correlation coefficients (cf. Haggard, 1958) for the first, second, and third blocks were .80, .88, and .92, respectively. The inter-judge reliabilities for each of the 15 scales (over the 15 *S*s), as given in the preceding section, range from .47 to .97, with an average inter-judge r of .84. All of the reliability coefficients for single scales and blocks of scales are significant at $p < .01$.

Research questions and data analysis. Assuming that the 22 scales based on the scoring categories and the 15 global rating scales reflect important aspects of perceptual-cognitive-personality functioning, and given the particular samples of *S*s, two questions were asked of the data:

1. *Do the scales differentiate between the social isolates and their urban controls?* It should be noted in passing that the sample of 40 social isolates was drawn from five state-run boarding schools in Norway, each located in remote isolated areas, whereas the 29 urban controls were drawn from a single school in a large town in the same general region. In testing for the isolation-control group differences, a multivariate analysis of covariance procedure (Finn, 1972) was used in order (*a*) to remove the effects due to any differences among the five isolated schools, which also varied somewhat in their degree of social isolation (and to determine the significance of any differences among the isolated schools for each scale); (*b*) to partial out the effect of the

[8] The correlation coefficients (*r*s) following each of the 15 scales are used as indices of the inter-judge agreement, and are based on the ratings of two trained judges (one of whom had administered the test), using a random sample of 15 protocols.

Ss' age on the scales (and to determine each scale's correlation with age over the 7–14 year age span); and (*c*) to determine whether all the scales in each set considered together, or which scales considered separately, differentiate successfully between social isolates and their urban controls. (Effects attributable to the sex of the *Ss* were also removed in making the isolation vs. control group comparisons, but sex differences on the scales will not be considered in this paper.)

2. *How many dimensions exist in the two sets of Rorschach scales?* A principal components analysis of the correlation matrix for each set of scales was used in seeking an answer to this question. However, since the isolate and control groups differ on many of the scales, and hence may be considered to be from different statistical populations, any differences among the various sub-group means were removed statistically in computing the correlations used in this analysis. Also, the effect of the *Ss*' age was partialled out of the inter-scale coefficients to provide "factors" (or groupings of scales) in which age trends are not confounded with the basic characteristics of the scales.

Results[9] *and Discussion*

Part 1: Rorschach Scales Based on Scoring Categories

Age trends. Before turning to the research questions, it may be noted that only a few of the 22 scales are highly correlated with age over the 7–14 year span (cf. Table 1, col. 1). Scales which show substantial correlation with age include: 4, the *classical* $F+\%$ ($r = .51$)[10] and 17, Rapaport's *special* $F+\%$ ($r = .48$), with a few of the other scales (e.g., 6, 7, 13, 14, 15, and 21) correlating moderately with age.

Question 1: Do the scales differentiate between the isolates and controls? From the multivariate F for this comparison, which is based on the set of 22 scales taken together, it is clear that scales of this type can differentiate effectively between the social isolates and their urban controls ($F(22, 36) = 2.25$; $p < .01$). It is also clear that only five of the scales differentiate between these groups at or beyond the .01 level of significance. Generalizing from these five scales, it appears that the urban children are better able to structure and articulate what they see in the stimuli used in the Rorschach test and also possess a richer,

[9] Essentially all of the statistical computations reported in this paper were provided by the MULTIVARIANCE Program (Finn, 1972) at the Computation Center, University of Chicago.

[10] In addition to correlating with age, several of the scales, including individual codings, correlate with other measures on the same children. For example, the classical $F+\%$ scale correlates .40 with the WISC Verbal score and .52 with the WISC Performance score.

more flexible and better organized inner life (both affective and cognitive) than do the social isolates. It is possible, of course, that the norms used to draw such conclusions are biased by the fact that they are based primarily on contact with urban *S*s and are formulated and applied by urban *E*s. But apart from the possible effects of any such bias, one may be tempted to infer that the scales which do differentiate between the isolate and control groups are somehow "better" than those which do not. True, some of the scales clearly are more effective or useful than others in this respect—when applied to these particular groups—but, alas, not everyone is interested in studying social isolates in Norway.

Of more general interest than whether any or all of the scales in Table 1 can differentiate between the isolates and their controls is whether the scales can differentiate between *S*s who have been assigned to particular clinical groups and those considered to be "normal." It is to be expected that some of the scales which did not differentiate between the two samples used in this study would do so if used with groups of urban normal and clinical *S*s. This expectation is based on the assumption that, since many of the scales in Table 1 were generated out of extensive experience with *S*s from clinical groups, the scales are likely to differentiate normal from clinical *S*s. In the final analysis the utility of a scale will depend, among other things, uponwhat it measures and the characteristics of the sample or samples to which it is applied.

Question 2: How many dimensions exist in the set of 22 scales? The fact that several of the scales in Table 1 differentiate between the isolate and control groups does not indicate the number of dimensions in this set of scales, especially if such scales are intercorrelated. Other things equal, the number of dimensions will be reduced with increased intercorrelation among the scales. For example, in the limiting case where two scales are perfectly correlated, as the Fahrenheit and Centigrade temperature scales are, only one dimension exists, since the second scale adds no information not implicit in the first. The fact that several of the scales in Table 1 contain the same elements (e.g., determinants) insures that such scales will be correlated.

A principal components analysis (cf. Harman, 1967) was used to estimate the number of independent dimensions in the set of 22 scales based on the responses of the non-clinical *S*s used in this study. The results of this analysis are given in Table 2. In appraising these results, two points should be kept in mind: (*a*) Five pairs of scales (dyads) are highly correlated, primarily because they contain many common elements, hence the members of each dyad may be thought of as variations of a single scale. The five dyads are: scales 3 and 8 (r = .94);

TABLE 2
Principal Components for 22 Rorschach Scales Based on Coding Categories[a]

Factors	Scales	Coefficients
I:	3. $F\%$	.78
	8. $(FK + F + FC)\%$	.78
	14. F/M	.91
	18. $(M + M_t + FM + FM_t + m + Fm_t)/F$	−.70
	16. $(M + M_t + Sum\ C)$ = "E.A."[b]	−.84
	19. $W/(D + Dd + de + di + dr)$	−.70
	21. $(M + M_t + FC)/F$	−.72
	(Eigenvalue = 6.06; per cent of variance = 27.54)	
II:	6. FC/CF	.67
	7. $FC/(CF + C)$	.70
	15. $(M + M_t)/(Sum\ C)$ = "E.B."[b]	.71
	(Eigenvalue = 3.55; per cent of variance = 16.15)	
III:	4. *Classical* $F + \%$	.56
	17. *Special* $F + \%$	.69
	(Eigenvalue = 2.78; per cent of variance = 12.65)	
IV:	11. M/FM	.63
	12. $M/(FM + m)$	.75
	(Eigenvalue = 2.21; per cent of variance = 10.06)	
V:	1. $A\%$	.62
	22. $(H + A)/(Anat. + Obj. + Bot. + Nat.)$	.57
	(Eigenvalue = 1.64; per cent of variance = 7.45)	
VI:	20. S	.70
	(Eigenvalue = 1.35; per cent of variance = 6.16)	
VII:	5. F/C	.73
	(Eigenvalue = 1.00; per cent of variance = 4.55)	

[a] In case a scale shows high coefficients on more than one principal component, it is listed under the component with the highest coefficient.

[b] *Sum C* is defined as: $[(FC + 2CF + 3C)/2]$.

scales 4 and 17 (r = .80); scales 6 and 7 (r = .96); scales 11 and 12 (r = .89); and scales 14 and 18 (r = −.67);[11] and (*b*) four scales (numbers 2, 9, 10, and 13) are not included under any of the principal components for various technical reasons. (Scale 2 would qualify as principal component VIII, except that its eigenvalue is only .86; scale 9 has coefficients of about .40 on components II, III, and IV; scale 10 has coefficients of about .50 on components I and III; and scale 13 has coefficients of about .50 on components I, III, and IV.)

The first component in Table 2 suggests a bipolar dimension which runs from predominately *F* responses to predominately *M*, *W*, and *C* responses, including Beck's "Experience Actual" (scale 16). More

[11] Although from some points of view one of the scales in each dyad should have been eliminated before the principal components analysis was run, all 22 scales were retained in view of the earlier-mentioned purpose, viz., to compare, among others, those scales which, in terms of clinical practice, deserve independent status as indicated by the fact that they are listed as separate scales in the index of Klopfer et al. (1954).

specifically, scales 3, 8, and 14 lie at one end of the dimension (the average *r* among the three scales is .83), and scales 18, 15, 19, and 21 lie at the other end (average $r = .53$). The average *r* between these two sets of scales is $-.60$. The second component suggests a dimension of predominately *FC* responses and Rorschach's "Experience Balance" (scales 6, 7, and 15; average $r = .77$). The third and fourth components appear merely to identify two of the dyads: scales 4, 17, and 11, 12. The fifth component links scales 1 and 22 ($r = .72$), presumably because they have *A* (or perhaps animate) responses in common. The sixth and seventh components have large coefficients only for single scales 20 and 5, respectively.

The question remains: How many dimensions exist within the set of 22 scales in Table 1? If one accepts this method of analysis, about seven dimensions exist—unless one wishes to form unipolar scales from the two subsets in the first component and/or wishes to include one or more of scales 2, 5, 9, 10, 13, and 20. Although the principal components in Table 2 do not give a tidy solution to the problem of dimensionality for the set of 22 scales, they do suggest that Rorschach scales which are based on the standard scoring categories (or codings similar to them) can be developed and reduced to a manageable number of relatively independent measures.

Part II: Global Rorschach Scales

Age trends. As for the 15 global scales, 13 correlate positively with age (average $r = .20$), with the *r*s for five of the scales significant at $p < .01$. These scales are: Defensive control ($r = .48$), Ego strength ($r = .40$), Reality testing ($r = .39$), Regressive use of fantasy ($r = .35$), and Social contact function ($r = .33$). Only two scales correlate negatively with age: Primitive use of fantasy ($r = .30$) and Affect aroused by the inkblots ($r = -.22$). A likely reason for the correlations with age among the global scales is the fact that practically all of them pertain directly or indirectly to the socialization process.

It should be noted also that the scales which reflect socialized modes of perceiving and the management of affects and interpersonal relationships tend to correlate positively with age for the isolates more than for the controls. For example, for seven of the scales (Conventional reality perception, Ability to mobilize affect, Defensive control, Integrative control, Ego strength, Empathy and object relations, and Social contact function), the average correlation with age is .39 for the isolates but only .23 for the controls. The difference in the correlations for the two groups probably is because many of the environmental parameters within the separate isolate and urban ecologies are them-

selves correlated—for example, as compared with the urban children, the social isolates experience both less social and less intellectual stimulation.[12] If so, it is to be expected that between ages 7 and 14 the school experience helps to compensate for the greater "cultural deprivation" in the world of the isolated, as compared with the urban, children (see also Haggard, 1973; Haggard and von der Lippe, 1970).

Question 1: Do the scales differentiate between the isolates and controls? Since the 15 global scales are not defined here in detail, it is sufficient to note that the urban controls did "better" than the social isolates on most of the global rating scales. More specifically, the urban controls were given higher scores (at $p < .01$) on eight of the scales: Perceptual organization, Ego strength, Empathy and ability to establish and maintain object relations, Intelligence, Reality testing, Constructive use of fantasy, Regressive use of fantasy, and Social contact function. The urban controls were also given higher scores (at $p < .05$) on three additional scales: Defensive control, Conventional reality perception, and Integrative control. The data for the 15 global scales thus suggest that, at least during the 7–14 age span, the urban children develop a variety of intrapsychic structures and ego resources which are more complex and flexible than those of the social isolates.

Question 2: How many dimensions exist in the set of 15 scales? The global Rorschach scales tend to be correlated not only with age but also with each other. For example, the eight scales which differentiate between the isolate and control groups at $p < .01$ are all positively intercorrelated (the interscale *r*s range from .30 to .82, with an average *r* of .66).[13] It is difficult to tell from these data alone, however, whether the intercorrelation among the global scales is because (a) they reflect phenomena which are, in fact, correlated "in Nature," (b) they essentially are variants of the same scale and/or measure the same phenomena, or (c) they are correlated in the minds of the *E*s more than in the characteristics of the *S*s—i.e., intercorrelation due to "halo effect."

It frequently occurs that different traits, characteristics, or phenomena are correlated "in Nature," in the sense that if one is present the others tend to be also. For example, Terman and Oden (1947) reported that children who score well above average on the Stanford-Binet intelligence test also tend to be above average on such diverse traits as physical prowess and social skills. If sets of traits do, in fact,

[12] Although the role of the environmental context as a determinant of the *S*'s behavior has been emphasized (e.g., Brunswik, 1956; Haggard, 1964, 1974; Holt, 1970 b), in practice the importance of the context often has been all but ignored in the evaluation of behavior (cf. Wohlwill, 1970).

[13] The remaining seven scales are not so highly intercorrelated, either among themselves or with the first eight scales: in both cases (with signs ignored) the average *r* is .37.

TABLE 3
Summary of Interscale Correlations among Global Rorschach and Wechsler Intelligence Test Scales

Age of Subjects	Sample Size	Interscale Correlations[a] Range of *r*	Average *r*	Data Source
Global Rorschach Scales				
7–14 yrs.	69	.01 to .82	.47	present study
Wechsler Intelligence Test Scales				
7–14 yrs.	69	.03 to .53	.34	present study
7.5 yrs.	200	.12 to .55	.33	Wechsler (1949), p. 10[b]
10.5 yrs.	200	.10 to .75	.44	Wechsler (1949), p. 11[b]
13.5 yrs.	200	.13 to .74	.40	Wechsler (1949), p. 12[b]
20–34 yrs.	355	.16 to .72	.45	Wechsler (1944), p. 223
35–49 yrs.	235	.27 to .71	.47	Wechsler (1944), p. 224

[a] Ranges and averages based on absolute values of *rs* (i.e., ± signs ignored).
[b] Correlations for one scale (Mazes) are not included in these computations since this scale was not administered in the present study.

tend to occur together, it seems reasonable to expect that within the perceptual-cognitive-personality domains assessed by the Rorschach test individuals scored high on "Ego strength" will also be scored high on, say, "Reality testing."

Another characteristic of the global scales is that (a) they purport to measure several aspects of perceptual-cognitive-personality functioning, each of which can be distinguished from the others (at least conceptually) and (b) together the scales form a more or less coherent set (at least within the limitations of the test and the *E*s' research interests). Looked at in this way, the 15 global Rorschach scales are similar to the 11 scales of the WISC, which also were administered to the same children.[14] Since it is commonly assumed that the separate Wechsler scales (e.g., Vocabulary, Arithmetic, and Block Design) measure different aspects of cognitive functioning, it is instructive to compare the "dimensionality" of the global Rorschach and the Wechsler scales. These two sets of scales can be compared in terms of (a) the average intercorrelation among the scales, (b) the more sophisticated principal components analyses of the two correlation matrices, and (c) the step-down *F* test.

A comparison of the average intercorrelation among the global Rorschach scales and sets of Wechsler intelligence test scales (administered to both children and adults) shows the average *r* to be in the .30s or .40s for both types of scales (see Table 3). In other words, the scales in the two sets tend to be intercorrelated to about the same degree.

[14] One test (Mazes) was not used in this study; hence only 11 WISC scales are available for analysis.

On the basis of the average interscale correlations given in Table 3, one would expect to find many of the scales in both sets to fall in the first principal component. This expectation is confirmed by the findings in Table 4: for both the global Rorschach and the WISC scales, the first component accounts for almost half of the variance in each correlation matrix. More specifically, for the 15 global Rorschach scales the first component (with nine scales) suggest a dimension which pertains to the degree of general adequacy of cognitive, intrapsychic and interpersonal functioning. The second component (with five scales) suggests a dimension which pertains to the degree of congitive

TABLE 4
Principal Components for the Global Rorschach and the Wechsler Intelligence Test Scales[a]

Factors	Scales	Coefficients
Rorschach Global Scales		
I:	Ego strength	.93
	Empathy, object relations	.88
	Perceptual organization	.87
	Intelligence	.83
	Social contact function	.82
	Constructive use of fantasy	.77
	Reality testing	.74
	Integrative control	.74
	Regressive use of fantasy	.66
	(Eigenvalue = 7.16; per cent of variance = 47.71)	
II:	Conventional perception of reality	.86
	Primitive Use of fantasy	.65
	Secondary process thinking	−.61
	Defensive control	−.61
	Affect aroused by stimuli	.60
	(Eigenvalue = 3.04; per cent of variance = 20.25)	
III:	Ability to mobilize affect	.83
	(Eigenvalue = 1.67; per cent of variance = 11.14)	
Wechsler Intelligence Test Scales		
I:	Comprehension	.72
	Block design	.72
	Vocabulary	.70
	Similarities	.70
	Object assembly	.68
	Information	.66
	Picture arrangement	.63
	Picture completion	.62
	Arithmetic	.62
	(Eigenvalue = 4.42; per cent of variance = 40.19)	
II:	Digit span	.78
	Coding	.62
	(Eigenvalue = 1.25; per cent of variance = 11.36)	

[a] In case a scale shows high coefficients on more than one principal component, it is listed under the one with the highest coefficient.

and emotional maturity and flexibility. The third component, with only one scale, pertains to the ability to mobilize affect. As for the 11 WISC scales, only two principal components emrged so that, if anything, fewer dimensions exist in the set of WISC scales than in the set of global Rorschach scales.

A final comparison of the two sets of scales can be made by means of the step-down F test. In multivariate cases where a set of measures exist on the same persons, and where the measures can be ordered in some reasonable way, the step-down F test indicates the extent to which a measure differentiates after the information contained in the measures preceding it in the analysis has been partialled out (Bock and Haggard, 1968). Lacking any theoretical rationale for ordering the global Rorschach and WISC scales, they were ordered in terms of the extent to which they differentiate between the isolate and control groups on univariate F tests. On this basis Perceptual organization and Picture arrangement (each of which differentiates between the two groups at $p < .0001$) were placed first in their respective sets. The step-down F test shows that, for each set of scales, only the first scale in each set differentiated between the two groups at $p < .05$. In other words, because of the intercorrelation among the scales in both sets, and given the information contained in the Perceptual organization and Picture arrangement scales, none of the remaining scales in their respective sets contribute new information to an extent which reaches statistical significance.[15] Thus, if one were interested in working only with statistically independent measures, in this particular instance he would be obliged to discard 14 of the global Rorschach and 10 of the WISC scales. It is more often the case, however, that an E finds heuristic value in using a set of scales (e.g., to form profiles of scores), even though the individual scales may be intercorrelated.

Concluding Remarks

The development of psychometrically useful scales can be accomplished in several ways, two of which are: (*a*) to refine or "purify" existing scales and (*b*) to develop new scales. Since the procedures for developing rating scales—such as those recently proposed by Holt (1970 a), Mayman (1970), Zubin et al. (1965) or others cited in Lerner (1975)—are well known, the remaining comments will be concerned with Rorschach scales based on the standard (or other) scoring categories.

[15] The question of the amount of information contained in a set of scales or measures involves a good deal more than just their statistical independence (cf. Papaioannou and Kempthorne, 1971).

The advantages of refining existing Rorschach scales include capitalizing on the accumulated experience with the test and a sampling of the broad range of perceptual-cognitive-personality processes which have been assessed with it, principally in clinical settings. The methodology for refining existing scales is available in the psychometric literature. The advantages of developing new scales include the requirement that the *E* must make explicit his thinking as to what he wishes to measure and the possibility of measuring the psychological processes or functions directly relevant to his particular interests and goals, whether specific or general. New scales can be developed in terms of some a priori theoretical rationale or on the basis of empirical procedures, as the MMPI was.

If one develops new Rorschach scales in terms of an a priori theoretical rationale, he should maximize the congruence among: (*a*) his research interests—i.e., the characteristics, phenomena, or variables he wishes to measure, (*b*) the psychological processes signified by the particular response categories—including the content, location, and determinant categories, but not exclusive to them, and (*c*) their appropriateness in terms of the characteristics, etc. to be measured in the sample(s) he wishes to study. The task of developing new scales in this manner will be enormously simplified if the *E* yields the ambition to measure "everything important" about the *S*s, including each *S*'s unique individuality, and restricts himself to a limited number of relatively linear, unidimensional, and (at least conceptually) independent scales. As possible examples of such a priori scales, S. J. Beck has suggested (personal communication) two possibilities, based on combinations of response categories, to "measure": (*a*) ability to control (i.e., to not "act out") affectivity: ($F+\%/Sum\ C$) and (*b*) paranoid tendencies: $[(Z) + (F-) + (S) + (M-)]/R - [(Z) + (F-) + (S) + (M-)]$.

If one develops new Rorschach scales by empirical procedures, he should: (*a*) administer the test to clearly defined groups which are like those he wishes to study, (*b*) identify the response categories on which *S*s in the two or more groups tend to differ, (*c*) construct scales which both utilize such differences and also "make sense" in terms of our current knowledge of what the Rorschach test measures, and (*d*) confirm the utility of the scale on subsequent samples.[16]

[16] Scale 21 in Tables 1 and 2, viz. ($M + M_t + FC/F$), which presumably is a measure of the *S*'s realistic empathic insight into, or understanding of, others (sometimes called "psychological mindedness" in psychoanalytic circles) was developed in this manner, but has not been cross-validated on subsequent samples of isolates and controls. However, Rorschach protocols from *S*s in a variety of definable groups (e.g., *S*s assigned different clinical diagnoses and members of American Indian tribes living under different degrees of social isolation) have been collected. The extent to which scales such as are used in the present research differentiate among such groups will be reported in a subsequent publication.

In developing either a priori or empirical scales, one may wish to weight some response categories more heavily than others, as is done routinely in calculating *Sum C:* $[(FC + 2CF + 3C)/2]$. Also, the extent to which new scales effectively probe important perceptual-cognitive-personality processes can be checked against appropriate criteria or, if none are available, by the scale's ability to differentiate effectively between groups of *S*s who differ in terms of the characteristic(s) presumably measured by the scale.

The pro-and-con arguments regarding objective and projective personality tests are well known. Some of the arguments hinge on what is to be measured, and the inferences to be drawn, from projective tests. With such tests, satisfactory levels of inter-judge agreement can be reached without much difficulty if one restricts himself to the manifest, explicit, and descriptive aspects of the protocol. But as one moves toward its latent, implicit, and inferential aspects—then indices of reliability (and hence of validity) frequently seem to disintegrate partly because explicit definition is increasingly difficult, and also because the *E*'s own projections often get mixed up with the *S*'s productions. Under such circumstances, the projective test soon loses its usefulness.

In conclusion, the Rorschach test procedure can be divided into three phases: administration, scoring, and interpretation. If the test is administered in a standardized manner, the rules and procedures for scoring (e.g., for the content, location, and determinant categories) are rather straightforward and require the *E* to make relatively few subjective judgments which are far removed from the *S*'s reported perceptions. Scales which rely on such response categories alone thus tend to minimize the subjective aspects of Rorschach test evaluation. On the assumption that the response categories, by themselves, contain important information about the *S*, Rorschach experts have formulated a variety of scales to signify what they consider to be basic aspects of perceptual-cognitive-personality functioning. If the scales which were generated out of extensive clinical experience are meaningful and useful in the clinical setting, it is reasonable to expect that the research worker can use the existing scales, or may develop new scales of the same type, which are appropriate to his particular research interests.

REFERENCES

Bartlett, M. S. The use of transformations. In J. A. Steger (Ed.), *Readings in statistics for the behavioral scientist.* New York: Holt, Rinehart and Winston, 1971.

Beck, S. J., Levitt, E. E., and Molish, H. B. *Rorshach's Test, Vol. 1: Basic processes.* New York: Grune and Stratton, 1961.

Beck, S. J. *Psychological processes in the schizophrenic adaptation* (with chapters by H. B. Molish and J. C. Nunnally). New York: Grune and Stratton, 1965.

Bock, R. D. *Multivariate statistical methods in behavioral research.* New York: McGraw-Hill, 1975.

Bock, R. D., Haggard, E. A., Holtzman, W. H., Beck, A. G., and Beck, S. J. *A comprehensive psychometric study of the Rorshach and Holtzman inkblot techniques.* Unpublished manuscript, The Psychometric Laboratory, University of North Carolina, 1963.

Bock, R. D. and Haggard, E. A. The use of multivariate analysis of variance in behavioral research. In D. K. Whitla (Ed.), *Handbook of measurement and assessment in behavioral sciences.* Reading, Mass.: Addison-Wesley, 1968.

Brawer, F. B. The Rorshach in academic and vocational research: A review. In B. Klopfer, M. M. Meyer, F. B. Brawer, and W. G. Klopfer (Eds.), *Developments in the Rorshach technique: Vol. III, Aspects of personality structure.* New York: Harcourt Brace Jovanovich, 1970.

Brunswik, E. *Perception and the representative design of psychological experiments.* (2nd ed.). Berkeley: University of California Press, 1956.

Cronbach, L. J. Statistical methods applied to Rorshach scores: A review. *Psychological Bulletin,* 1949, 46, 393–429.

Efron, H. Y. and Piotrowski, Z. A. A factor analytic study of the Rorshach prognostic index. *Journal of Projective Techniques and Personality Assessment,* 1966, 30, 179–183.

Finn, J. D. MULTIVARIANCE: Univariance and multivariance analysis of variance, covariance, and regression. National Educational Resources, Chicago, 1972.

Fiske, D. W. and Baughman, E. E. Relationships between Rorshach scoring categories and the total number of responses. *Journal of Abnormal and Social Psychology,* 1953, 48, 25–32.

Haggard, E. A. On the application of analysis of variance to GSR data: I. The selection of an appropriate measure. *Journal of Experimental Psychology,* 1949, 39, 378–392. (a)

Haggard, E. A. On the application of analysis of variance to GSR data: II. Some effects of the use of inappropriate measures. *Journal of Experimental Psychology,* 1949, 39, 861–867. (b)

Haggard, E. A. *Intraclass correlation and the analysis of variance.* New York: Dryden Press, 1958.

Haggard, E. A. Isolation and personality. In P. Worchel and D. Byrne (Eds.), *Personality change.* New York: Wiley, 1964.

Haggard, E. A. Some effects of geographic and social isolation in natural settings. In J. E. Rasmussen (Ed.), *Man in Isolation and confinement.* Chicago: Aldine, 1973.

Haggard, E. A. and von der Lippe, A. L. Isolated families in the mountains of Norway. In E. J. Anthony and C. Koupernik (Eds.), *The child in his family, Vol. 1, International Yearbook of Child Psychiatry.* New York: Wiley, 1970.

Haggard, E. A. A theory of adaptation and the risk of trauma. In E. J. Anthony and C. Koupernik (Eds.), *The child in his family, Vol. 3, International Yearbook of Child Psychiatry.* New York: Wiley, 1974.

Hallowell, A. I. The Rorshach technique in personality and culture studies. In B. Klopfer (Ed.), *Developments in the Rorshach Tech-*

nique: Vol. II, Fields of application. New York: Harcourt Brace Jovanovich, 1956.
Harman, H. H. *Modern factor analysis* (2nd Rev. ed.). Chicago: University of Chicago Press, 1967.
Holt, R. R. Artistic creativity and Rorshach measures of adaptive regression. In B. Klopfer, M. M. Meyer, F. B. Brawer, and W. G. Klopfer (Eds.), *Developments in the Rorshach technique: Vol. III, Aspects of personality structure.* New York: Harcourt Brace Jovanovich, 1970. (a)
Holt, R. R. Yet another look at clinical and statistical prediction: Or, is clinical psychology worthwhile? *American Psychologist,* 1970, 25, 337–349. (b)
Holtzman, W. H., Thorpe, J. S., Swartz, J. D., and Herron, E. W. *Inkblot perception and personality: Holtzman inkblot technique.* Austin, Texas: University of Texas Press, 1961.
Klopfer, B., Ainsworth, M. D., Klopfer, W. G., and Holt, R. R. *Developments in the Rorshach technique, Vol. 1: Techniques and theory.* Yonkers-on-Hudson, N. Y.: World Book Co, 1954.
Lerner, P. M. (Ed.). *Handbook of Rorshach scales.* New York: International Universities Press, 1975.
Mayman, M. Reality contact, defense effectiveness, and psychopathology in Rorshach form-level scores. In B. Klopfer, M. M. Meyer, F. B. Brawer, and W. G. Klopfer (Eds.), *Developments in the Rorshach technique: Vol. III, Aspects of personality structure,* New York: Harcourt Brace Jovanovich, 1970.
Papaioannou, P. C. and Kempthorne, O. *On statistical information theory and related measures of information.* Aerospace Research, Wright-Patterson Air Force Base, Ohio: Aerospace Research Laboratories, March 1971 (ARL 71-0059, Contract No. F33615-68-C-1343, Project No. 7071).
Piotrowski, Z. A. *Perceptanalysis: A fundamentally reworked, expanded and systematized Rorshach method.* New York: Macmillan, 1957.
Piotrowski, Z. A. Digital-computer interpretation of inkblot test data. *Psychiatric Quarterly,* 1964, 38, 1–26.
Rapaport, D., Gill, M. M. and Schafer, R. *Diagnostic psychological testing* (Ed., R. R. Holt, Rev. ed.). New York: International Universities Press, 1968.
Rorshach, H. *Psychodiagnostics* (Transl. by P. Lemkau and B. Kronenberg). New York: Grune & Stratton, 1942.
Schachtel, E. G. *Experiential foundations of Rorshach's test.* New York: Basic Books, 1966.
Terman, L. M. and Oden, M. H. *The gifted child grows up.* Stanford, Calif.: Stanford University Press, 1947.
Webb, E. J. Statistical selection of individuals forming groups using Rorschach test scores. Unpublished doctoral dissertation, University of Chicago, 1956.
Wechsler, D. *The measurement of adult intelligence.* (3rd ed.). Baltimore: Williams and Wilkins, 1944.
Wechsler, D. *The Wechsler intelligence scale for children.* New York: Psychological Corporation, 1949.
Wittenborn, J. R. A factor analysis of discrete responses to the Ror-

schach ink blots. *Journal of Consulting Psychology,* 1949, 13, 335–340.

Wittenborn, J. R. A factor analysis of Rorschach scoring categories. *Journal of Consulting Psychology,* 1950, 14, 261–267.

Wohlwill, J. F. The merging discipline of environmental psychology. *American Psychologist,* 1970, 25, 303–312.

Zubin, J., Eron, L. D., and Schumer, F. *An experimental approach to projective techniques.* New York: Wiley, 1965.

Zyzanski, S. J. *A multivariate normal analysis for categorical data.* Unpublished doctoral dissertation, Psychology, University of North Carolina, 1968.