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DEVELOPMENT OF ALTERNATE METHODS FOR SCORING THE RORSCHACH INTERACTION SCALE[1]

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The Rorschach Interaction Scale (RIS) was recently developed to permit scoring the content of certain Rorschach responses in terms of the emotional tone (both positive and negative) associated with responses involving the interaction between two or more human, human-like, or animal figures. Scores on the original scale have been found to be related to later health or disease in a long-range, prospective investigation of medical students. In an effort to devise more sensitive scoring procedures that would express all information inherent in the scale, 18 additional RIS scores were defined and derived. Subsequent factor analyses of these measures revealed the existence of five factors, each of which was well represented by a single score with comparatively little overlap. The relationships of these five scores to later health outcomes will be the subject of ongoing research involving this data base.

IN the course of a longitudinal, prospective investigation of the physical, physiological, psychological, and genetic precursors of premature disease and death among former medical students, several psychological variables measured while the subjects were in medical school have been shown to be related to the subsequent occurrence of a variety of disorders as opposed to remaining in good health (Shaffer, Duszynski, and Thomas, 1982a; 1982b; Thomas and Duszynski, 1974; Thomas and Greenstreet, 1973). Included among the tests and measures obtained has been the Rorschach (Schori and

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Thomas, 1977; Shaffer, Duszynski, and Thomas, 1981). Unfortunately, comparatively few relationships between scores derived from using the traditional methods and subsequent health status have thus far been uncovered. More recently, however, the Rorschach Interaction Scale (RIS) devised by Graves (Graves and Thomas, 1981) has been shown to yield preliminary scores related to the subsequent occurrence of certain disease states. In view of this promising development, it was reasoned that the information obtained in the scale could be expressed quantitatively in several different ways and that certain of these measures may prove to be more powerful predictors of subsequent health outcomes than were those associated with the original scoring system. The purpose of this paper was to describe the scale as well as the development and refinement of several different indices derived from it.

Method

Subjects and Data Base

Beginning with the graduating class of 1948 and continuing to the class of 1964, medical students admitted to The Johns Hopkins University School of Medicine were administered a wide variety of physical, physiological, and psychological tests and questionnaires as part of a long-range, prospective investigation of the precursors of subsequent disease and death. A total of 1,337 men and women—now mostly teaching and practicing physicians—were registered in the Precursors Study, and information concerning the health status of each participant has been secured regularly by mailed questionnaire and has been supplemented by medical records such as death certificates, biopsy reports, and medical and autopsy records. Rorschach test data were available on a total of 1,123 former medical students (1,032 men and 91 women). These data formed the basis for the analyses and results described herein.

Rorschach Interaction Scale: Definition and Scoring

As the Rorschach Interaction Scale (RIS) has been described in detail elsewhere (Graves and Thomas, 1981), only a brief description is provided. The RIS was developed to permit scoring the content of Rorschach responses for themes of interaction. The assumption underlying this approach is that a person's basic expectations and definitions of human relationships are expressed in such thematic content. Only Rorschach responses involving two or more human,

human-like, or animal figures in interaction are utilized in scoring the scale. Further, only responses given in the spontaneous or free association part of the test are used, without regard to card, location, determinants, or elaborations added during the inquiry. Although objective criteria for scoring are available (as detailed in Table 1), rating of the scale depends largely on the emotional tone of the interaction and is therefore more clinical-intuitive than psychometrically objective. The bipolar 11-point scale consists of scores ranging between +5 and −5. Scores from +1 to +5 represent increasingly positive degrees of emotional involvement, whereas scores from −1 to −5 represent increasingly negative degrees of involvement with a score of zero indicating a neutral attitude.

Medical students' Rorschach responses, some 40,000 in all, were printed out by computer (Thomas, Freed, and Ross, 1971). The printout of each protocol, which was labeled only by a confidential identification number, was kept entirely separate from the subject's other data. Ratings were made from the printouts without knowledge of the subjects' identities.

Two research assistants and the second author, working independently from the printouts, rated the protocols. A satisfactory interrater correlation coefficient between each assistant and the second author was obtained ($r = 0.83$ and 0.82, respectively). However, to maximize the reliability of the final ratings, the team checked the individual ratings and, in cases of disagreement, made the final ratings jointly following discussion. In all, 7,312 ratings were obtained yielding approximately seven RIS-relevant responses per protocol (Mean = 6.51; $SD = 4.80$).

Definition of RIS Supplementary Scores

A total of 18 additional scores was defined and derived by using the data from the original RIS; these scores are labeled and defined in Table 2.

It was anticipated that many of the foregoing scores would be substantially intercorrelated and hence redundant. However, it was believed that the final selection of a small, nonredundant subset could best be achieved through the application of factor analytic methods to the intercorrelation matrix of the 18 scores. Prior to the factor analysis, however, each of the scores was correlated with total number of Rorschach responses (Total R) to determine the extent to which the Total R might have a distorting effect on the scores derived.

Correlation of Total R with each of the 18 measures revealed that

TABLE 1
Rorschach Interaction Scale*

Scale	Emotional Tone	Degree of Involvement	Examples
+5	Warm, affectionate	Close, intimate	A young couple kissing Two caterpillars embracing after a long separation
+4	Happy, gay	Mutual enjoyment and sharing	People telling jokes together Puppies playing around with each other
+3	Friendly, congenial	Sociable	Two people shaking hands Two children running hand in hand
+2	Implied goodwill	Collaboration or sharing	Two girls cooking Two cows looking at each other
+1	Undefined or neutral	Parallel activities	Two priests kneeling Two bats hanging from a roof
0	Undefined or neutral	"Action" nouns associated with a specific activity	Two dancers Two vampires
−1	Vague disharmony, mild discord	Parallel activities	Two young girls facing away from each other Two tigers slinking through the jungle
−2	Moderate discord	Moderate aggressive action	Cowboys having a tug-of-war over a cow's skull Rats fleeing from a cat
−3	Deliberate contention and/or antagonism	Overt confrontation	Two men shouting invectives at each other Two dogs snarling at each other
−4	Deliberate aggressiveness	Aggressive physical contact	Two knights on horseback striking at each other Two bears fighting with bloody forepaws
−5	Extreme feelings of aggression, violence	Physically destructive or violent acts	Two cannibals boiling Macbeth in a kettle Two animals fighting to tear apart another animal

* The scale and a rating manual are available on request from the second author.

TABLE 2
Labels and Definitions of 18 Supplementary RIS Scores

Label	Definition
NUMNEG	Number of negative responses
NUMPOS	Number of positive responses
NUMTOT	Total number of positive and negative responses
SUMNEG	Weighted sum of negative responses using weights from 1 to 5
SUMPOS	Weighted sum of positive responses using weights from 1 to 5
PNDIF	Positive/Negative difference (PNDIF = SUMPOS − SUMNEG)
PNDIFR	Positive/Negative difference adjusted for total number of responses (TOTR) (PNDIFR = SUMPOS/TOTR − SUMNEG/TOTR)
PNDIFM	Positive/Negative difference mean (PNDIFM = PNDIF/NUMTOT)
PRONEG	Proportion negative (PRONEG = NUMNEG/NUMTOT)
PROPOS	Proportion positive (PROPOS = NUMPOS/NUMTOT)
PNRAT	Positive/Negative ratio (PNRAT = NUMPOS/NUMNEG)
PNBAL	Positive/Negative balance (PNBAL = SUMPOS/SUMNEG)
MNEG	Mean Negative (MNEG = SUMNEG/NUMNEG)
MPOS	Mean Positive (MPOS = SUMPOS/NUMPOS)
PNMDIF	Positive/Negative mean difference (PNMDIF = SUMPOS/NUMPOS − SUMNEG/NUMNEG)
LVNEG	Log variance of scaled negative responses
LVPOS	Log variance of scaled positive responses
LVTOT	Log variance of scaled total responses

in many instances, a substantial portion of the variance in each score was a function of Total R. The consequent distortion of the intended meanings of the scores was also evident from the results of a preliminary, components-type factor analysis of the intercorrelation matrix of 17 of the previously cited 18 measures. (The NUMTOT scale was omitted because it is a function of the NUMPOS and NUMNEG scales.) This distortion was particularly evident following orthogonal (varimax) rotation, in which measures that would be assumed on logical and theoretical grounds to be distinct or even inversely related were found to be positively related.

An analogous situation had been found earlier in a factor analysis of a subset of this same Rorschach data base in which the traditional Rorschach scores served as input (Shaffer, Duszynski, and Thomas, 1981). A successful solution to this problem, which was employed in the former study as well as in the present one, involved holding the effects of Total R constant by residualizing each of the 17 measures with respect to Total R. Thus 17 new measures were created identical to the old ones except for the fact that the correlation of each with Total R is now precisely zero by mathematical construction. The names and labels of the original measures were retained, except that the word "Residualized" was now placed in front of each name, and an "R" was inserted in front of each label.

Results

A components-type factor analysis (unity in the main diagonal) was performed on the correlation matrix of the 17 residualized measures followed by orthogonal (varimax) rotation of those factors having eigenvalues greater than 1.00. Five factors were retained by this criterion, a result in agreement with the scree test (Cattell, 1966). These five factors accounted for 85% of the total variance. Moreover, the results were consistent with reasonable expectation, and each factor was defined by one or more measures with loadings so high (.94 or higher) that they could be considered "marker variables" for the factor. The results of this analysis are presented in Table 3.

As is seen from Table 3, the first factor was defined primarily by RNUMPOS and RNUMNEG at opposite poles, with loadings of .94 and −.93, respectively. RNUMPOS was chosen in the final set of five as a marker for this factor. The second factor was primarily defined by RMNEG, with a loading of .96. The third factor was primarily defined by RMPOS, also with a loading of .96. The fourth factor was defined primarily by RLVPOS, with a loading of .94, whereas the fifth factor was defined by RLVNEG, with a loading of .97.

TABLE 3
Varimax Rotated Factor Loading Matrix of 17 Supplementary RIS Scores

	Factor				
Label	I	II	III	IV	V
RNUMNEG	−.93	.24	.01	.07	−.05
RNUMPOS	.94	−.18	.06	−.12	.06
RSUMNEG	−.84	.35	.02	.01	.10
RSUMPOS	.75	−.07	.46	.21	.01
RPNDIF	.90	−.24	.25	.11	−.05
RPNDIFR	.70	−.27	.38	.03	.02
RPNDIFM	.54	−.48	.62	−.07	.07
RPRONEG	−.58	.54	−.10	.10	−.18
RPROPOS	.51	−.29	.49	−.35	.14
RPNRAT	.59	−.57	.05	−.14	.15
RPNBAL	.51	−.62	.16	−.05	.12
RMNEG	−.18	.96	.01	−.02	.03
RMPOS	.06	.05	.96	.08	−.04
RPNMDIF	.20	−.83	.47	.06	−.05
RLVNEG	.02	−.05	−.01	.01	.97
RLVPOS	.04	.08	.04	.94	.02
RLVTOT	−.30	.78	.19	.38	−.05

Discussion and Conclusions

The results of this study indicate that 17 additional measures derived from the Rorschach Interaction Scale are essentially a function of five orthogonal factors that are well represented by five of the measures. RNUMPOS would appear to be an index of a subject's total fund of positive interaction potential, regardless of intensity. RMPOS would index the average intensity of this positive interaction potential, whereas RMNEG would index the average intensity of negative interaction potential. In keeping with these formulations, RLVPOS would index the range of intensity of positive interaction potential, whereas RLVNEG would index the range of intensity of negative interaction potential.

The study also revealed that many Rorschach scores, no matter how defined, are to a large extent dependent on the total number of responses given (Total R), and that failure to control for this variable will frequently distort their intended meanings and interrelationships. Residualization appears to be a satisfactory solution to this problem, although the solution holds only for the data set analyzed. Unfortunately, the earlier practice of expressing scores as a percent of Total R cannot be relied upon to eliminate the problem, as several writers have pointed out (Cronbach, 1949; Kalter and Marsden, 1970).

In the final analysis, the value of any scores derived is an empirical question. In the context of the authors' research, scores on the five retained RIS measures will be useful to the extent that they are correlated with other variables of interest, especially subsequent health outcomes. Ongoing analyses will be directed toward the exploration of such possible relationships.

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