PREDICTION OF MALADAPTIVE RESPONSES UNDER CONDITIONS OF HABIT-INTERFERENCE FROM RORSCHACH COLOR RESPONSES

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By

Robert W. Harrington

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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AN ABSTRACT

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The need for adequate experimental validation of Rorschach hypotheses has long been realized by most users of the test. Regardless of the apparent usefulness of these hypotheses in dealing with individuals, attempts to test them in clinical use remain subject to errors of observation, judgement and preconceived ideas. While the application of experimental procedures to such problems does not necessarily eliminate these errors experience has shown that they make such errors less likely to occur.

One of the major propositions of the Rorschach test is that the type of response given to color is indicative of the level of emotional development of the subject. Specifically, it is held that the FC responses indicate a higher level of emotional development, i.e., emotional maturity, than do CF and C responses.

This investigation attempted to put this hypothesis to test by controlling a number of other variables and using response to color as the independent variable and reaction to conditions of frustration as the dependent variable. A major assumption underlying the investigation was that there is a positive relationship between emotional maturity and adequacy of reaction to conditions of frustration. This assumption

was shown to have empirical as well as formal validity.

The experimental design consisted of selecting two groups of subjects who were equated on several Rorschach variables as well as age and IQ. These groups were selected so that they differed on the independent variable of type of color emphasis on the Rorschach test. One group, called the FC group, had given color responses which were primarily of the FC or form-dominant type. The other, designated the C/CF group, had given color responses in which the emphasis was predominantly on the color element, i.e., C and/or CF responses. This provided two groups who differed on the variable of emotional maturity, as indicated by color responses on the Rorschach, while being equivalent in regard to other variables.

Each group was subjected to conditions of frustration and measures taken of their responses to these conditions. Habit-interference served as the frustration variable by interfering with the goal-directed behavior of the subjects. The prediction was that the emotionally immature group, i.e., the C/CF group, would show the greatest degree of impairment in performance under conditions of frustration. This prediction was clearly borne out on one of the tasks used (code-substitution) and six of the seven measures taken on the second task

were in the predicted direction. It is felt that the Rorschach assumption relating the types of color responses to varying levels of emotional development is supported to some extent by these findings.

It was suggested that the type of methodology used in this study could be extended to deal with more complex types of behavior such as are met with in the clinical use of the Rorschach test.

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INTRODUCTION

Since it was introduced in 1921 the Rorschach test has received a considerable amount of what may be called "clinical" validation; i.e., it seems to work in practice. On the other hand it has remained resistant to the more rigorous experimental validation desired for scientific acceptance. Although leading Rorschach workers such as Beck (11), Benton (13), and Hertz (29) have emphasized the need for the latter approach, relatively little progress has been made in this direction.[1]

The present experiment was undertaken in an effort to add to the scientific knowledge about the test by applying traditional experimental procedures to the problem of the validity of one of the major Rorschach dimensions--the color responses.[2]

The meaning of color responses. Rorschach assumed that color responses on the test had meaning in reference to the emotional life of the subject and stated, "The symptom value of the color interpretations lies in the field of affectivity" (56, p.193). The majority of workers following Rorschach have continued to work on the basis of this original assumption. A further assumption made by Rorschach was that the various types of color responses were meaningful in relation to the degree of emotional adaptation

[1] A review of validity studies on the Rorschach test is presented in Appendix A.

[2] A more complete discussion of color responses on the Rorschach, together with a review of pertinent validation studies, is presented in Appendix B.

of the individual. Thus, the C and CF responses were held to be indicative of the degree of emotional instability, impulsivity, suggestibility, sensitivity, lability, and irritability of the person producing them. The FC responses, on the other hand, were said to be characteristic of the normal individual who is well-adjusted and able to make new adaptations in emotional behavior. This latter type of color response, the FC, was held to indicate a combination of affective and intellectual adaptability.

Following the orientation provided by Rorschach, Beck (8) arranged the types of color responses in an order which he considered to correspond to the stages of "emotional maturity" (i.e., the level of emotional development) of an individual. He conceived the levels of emotional growth as ranging from the lowest, at which there is little or no control over the feelings, to the highest at which there are only intellectual responses. Beck arranged the color responses in the corresponding order of C, CF, FC, and F/. He considers the F/ response to be the principal index of the ability of a subject to "...direct his thinking from his higher centers..." (8, p. 19). Beck considers it as reflecting conscious control and respect for reality and goes on to state,

> "It is a measure of the strength with which the personality has organized its values, the force that holds it together when disruption threatens, and the central directive to which it refers at moments of decision....The F/ score becomes thus the measure of the stability of the personality" (8, p. 22).

A further discussion of F as an indicator of control is presented in Appendix B.

In regard to the meaning of the various color responses, Hertz and Baker state,

> "The CF and C together reflect egocentricity and the more primitive, childlike emotions, hence immaturity. Thus, emotional stability and adaptability vary directly with the excess of FC over CF and C. The smaller the proportion of FC in relation to CF and C the more egocentric and unadaptive the emotionality" (31, p. 13).

An important aspect of the representative viewpoints presented above is the idea that color responses provide information about the level of emotional maturity of the person producing them.

Emotional Maturity. The concept of emotional maturity is poorly defined in the literature. Saul (60) presents a discussion of the concept in which he lists eight characteristics of the fully mature individual. Recognizing the fully mature person as an ideal he lists the following as characteristics of this endpoint of development: (a) independence and self-reliance, (b) the ability to give rather than receive, (c) freedom from feelings of inferiority, egotism, and competitiveness, (d) socialization, (e) integrated sexual functioning, (f) creative rather than destructive expenditure of energy, (g) a firm sense of reality, and (h) flexibility and adaptability.

The view which Saul presents is essentially that as one achieves maturity he relinquishes earlier modes of behavior and does not fall back upon them in times of stress. The emotionally immature person, on the other hand, either fails to develop to

higher levels or this development is incomplete so that under stress the earlier forms of reaction reoccur. Many other writers on the subject of personality development agree on certain types of behavior which characterize the emotionally mature in contrast to the emotionally immature person (2, 33, 48, 68).

Emotional maturity is usually defined in terms of a developmental scale ranging from infancy to adulthood with certain types of behavior being considered appropriate or characteristic for a lower level but not for a higher level. Thus, most writers who have dealt with the problem agree that as a person grows from childhood to adulthood he optimally acquires more control over his emotional reactions. At the lower levels of development these reactions are said to be relatively gross, undifferentiated, and changeable. There is also agreement that with increasing maturity these reactions become more stable and differentiated; likewise, the reactions become more specific to and appropriate for the situations in which they are called forth. Thus, to refer to a person as being emotionally mature means, simply, that he characteristically behaves in certain ways such as those described above. Since the mature individual does not remain, in Klopfer's words, "a slave to his feelings," nor is he usually thrown violently off balance by them, he is able to engage in emotional behavior and relationships which are typically neither over-inhibited nor grossly exaggerated.

In discussing emotional development most writers use such

terms as "emotional stability," "well-adjusted," "emotional balance," "emotionally adaptable," and "emotionally healthy" as being either synonymous with or reflecting emotional maturity. In the material to follow it is to be understood that the use of such terms includes this element of emotional maturity or lack of it.

Color responses and emotional maturity. Rorschach workers maintain that a corresponding development occurs in the individual's performance on the Rorschach test. The position taken is that as an individual matures emotionally this development is reflected on the Rorschach test in that he no longer reacts with the pure C response, representing uninhibited emotional expression, but integrates an element of form into his percepts. The CF and FC responses, in which progressively greater emphasis is placed upon the form element, are said to reflect increasing degrees of control over emotional reactions.

Emotional maturity and reactions to conditions of frustration. Another common element in the various definitions of emotional maturity concerns the manner in which persons react to conditions of frustration. There seems to be general agreement that as an individual passes from one level of emotional development to a higher one his ability to maintain the efficiency of his adjustment under conditions of frustration will show improvement. Thus, the person at a low level of emotional development will tend to react with more random, maladaptive, types of behavior in the face of frustrating conditions than will a person who has

attained a higher level of development. As Symonds says, regarding response to frustration in relation to personality development,

> "Another criterion of the adequacy of reactions to frustration can be stated in terms of the progression or regression of these reactions....Where learning takes place we see evidences of growth and greater adaptability. This is a sign of increasing maturity" (68, p. 67).

The assumption that emotionally immature persons will show more-maladaptive responses under conditions of frustration than will the more mature plays a cardinal role in this experiment and hence deserves further discussion. On the one hand the validity of this assumption is a purely formal matter since emotional maturity is defined partly in terms of adequacy of reaction to conditions of frustration. On the other hand this assumption is supported by empirical evidence.

Pertinent to the problem are studies such as that of Zander (78) who demonstrated that emotionally unstable persons reacted aggressively to a smaller degree of frustration and interference than did emotionally stable persons. Additional support for the assumption is furnished by Sherman and Jost (63) who compared the reactions of normal children and adults and a group of emotionally disturbed children to frustrating conditions in a learning situation. Measures of physiological responses indicated that the neurotic individuals reacted more intensely to the frustrating conditions than did the normal. Similar findings are reported by Malmo, et.al. (45) and Miller (47). Moreover, Zander (78) has summarized the points of agreement in frustration studies

and concluded that the ability to tolerate frustration (i.e., maintain efficiency of behavior under conditions of frustration) is an indicator of a healthy personality.

In view of this general agreement regarding the relationship between emotional maturity and reaction to conditions of frustration this relationship provides us with the basic tool for the present investigation.

One result of accepting the above premise is that it suggests the possibility of testing the Rorschach assumption relating the several types of color response to varying levels of emotional development. This assumption may be experimentally tested in the following way:

> Two groups of subjects, who, on the basis of their Rorschach color responses, differ in their degree of emotional maturity are subjected to conditions of frustration. By definition, and on the basis of empirical evidence, the emotionally immature persons will be expected to show the greatest degree of disruption in behavior under such conditions. This breakdown in behavior, therefore, provides a basis upon which to compare the groups. The prediction is that the group which gives "immature," i.e., C and/or CF color responses will show greater disruption of behavior than will the group giving more "mature," i.e., FC, color responses. In this way disruption of behavior under conditions of frustration presents itself as a manageable variable for testing the Rorschach assumption under question.

Conditions of frustration. In this study "conditions of frustration" or "frustrating conditions" refers to interference with goal-directed behavior. This interference with goal-directed behavior constitutes a condition of frustration which can be experimentally manipulated. This usage of the term "frustration" is in accord with that of Barker (4), Kardiner (34), McGeoch and

Irion (43), Masserman (46), Murphy (49), and Symonds (67).

Although most common, this is not the only way the term "frustration" has been used in the literature. It is, therefore, important to keep in mind that it is the "interference with goal-directed behavior," and not some inner state in response to such conditions, which is herein referred to as "conditions of frustration" or "frustrating conditions." As will appear later, our research design utilizes habit-interference as the independent frustration variable which interferes with the goal-directed behavior of the subject.

Habit-interference. This construct, "Habit-interference," has been used to explain the typical negative effects found when a subject, after learning a response to a stimulus, is required to learn a new response to the same stimulus. This negative effect has been found with various types of learning tasks including code-substitution, verbal learning, and motor tasks. After building up a strong habit in response to a stimulus the subject is required to learn a new habit in response to the same stimulus in this type of study. The old responses seem to persist and to interfere with the acquisition of the new habit. It is apparent, then, that habit-interference may be considered to establish a condition of frustration since it constitutes a condition in which there is interference with the goal-directed behavior of a subject attempting to learn a new response.

HYPOTHESIS OF THE STUDY

After the preceeding review and discussion of the concepts employed in this experiment we may state the hypothesis of the study as follows:

> Individuals whose color responses on the Rorschach test are predominantly of the C and/or CF type will show greater impairment in performance under conditions of frustration, i.e., interference with goal-directed behavior, than will those whose color responses are primarily of the FC type.

This hypothesis is derived from the Rorschach assumption relating the types of color response to varying levels of emotional maturity and from the assumption that there is a positive relationship between emotional maturity and adequacy of reaction to frustrating conditions.

METHOD

The first step in testing this hypothesis consisted of selecting two groups of twenty subjects each. These groups, as will be seen later, were equated on a number of variables considered to be relevant to the problem. The groups were selected so as to differ on the independent variable of the type of color responses given on the standard Rorschach test. One group, designated as the FC group, was composed of subjects whose color responses were primarily of the FC type. The other, called the C/CF group had given color responses which were predominantly of the C and/or CF type. This provided two groups who differed on the variable of emotional maturity, as measured by Rorschach color responses, while being equivalent on other relevant variables.

Both groups were tested on two experimental tasks in which habit-interference served to establish conditions of frustration. The response to these frustrating conditions, then, served as the dependent variable upon which the two groups were compared. The prediction was that the "emotionally mature" group, i.e., those whose color responses were primarily of the FC type, would perform more efficiently under conditions of frustration than the "emotionally immature" group, i.e., those who gave predominantly C and/or CF types of color responses.

SUBJECTS

The sample consisted of forty, white, male, juvenile delinquents. These subjects had been committed to Boys Vocational School, Lansing, Michigan, a cottage-type institution with a population of approximately 350 to 400 boys.

Two groups of twenty subjects each were equated on the factors of age and IQ as well as several Rorschach variables. Table 1 presents the data on age and IQ. In all cases the age reported is the age to the nearest half-year at the time of testing on the experimental tasks. It can be seen from Table 1 that with means of 15.85 and 15.75 years, respectively, the FC and C/CF groups did not differ in age. The estimate of intelligence is reported in the form of IQ's obtained from individually administered Wechsler-Bellvue Intelligence Scales, Form I or II. This test had been given shortly after each boy arrived at the institution.

The range in IQ was from 73 to 128 for the two groups combined with a mean for the FC group of 102.75 and for the C/CF group 101.35. Thus, it appears from the data in Table 1 that the two groups did not differ significantly in intelligence as measured by the scales used.

In addition to age and IQ, the two groups were equated on several Rorschach variables, namely: F/%, number of M, total Y, number of P, and total number of responses. Table 2 presents the data on the Rorschach variables. The independent Rorschach variable was the ratio: Number of FC responses/Number of C/CF responses.

TABLE 1

Comparison of Age and IQ Data for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

	Group			
	FC		C/CF	
	Mean	Range	Mean	Range
Age	15.85	13.0-17.0	15.75	13.5-18.0
IQ	102.75	76-128	101.35	73-125

TABLE 2

Comparison of Rorschach Scores for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

	Group					
	FC		C/CF			
	M	SD	M	SD	diff.	t
Total R	28.60	8.69	28.55	10.13	.05	.02
Number P	7.20	2.29	6.30	1.86	.90	1.36
Number M	1.45	1.12	1.70	1.23	.25	.07
Number Y (Total)	3.20	3.07	2.55	2.48	.65	.72
F%	81.40	8.82	75.75	11.78	5.65	1.11
Number C	.00	.00	1.05	1.43	1.05	3.28*
Number CF	.35	.22	2.50	1.28	2.15	7.41**
Number FC	3.00	1.30	1.00	1.41	2.00	4.65**

* indicates a P of less than .01 (two-tailed test)
** indicates a P of less than .001 (two-tailed test)

As a general rule this ratio had to be at least 1/2 for inclusion in the FC group and 2/1 for the C/CF group. Table 2 also presents the data for the groups on the color responses. The color responses are reported in unweighted form. It can be seen that the two groups were roughly equated in regard to the frequency of all the factors considered with the exception of the color variables. The average ratio of FC/C/CF was 3.0/.35 for the FC group and 1.0/3.55 for the C/CF group. It should be pointed out that the separate types of color response were not assigned weighted scores in arriving at this ratio. The ratio was arrived at by adding the number of each type of color response given by the group and dividing by the number of subjects in the group. For individual subjects the range on this ratio was from 2/0 to 6/0 for the FC group and from 0/2 to 5/8 for the C/CF group. No subject had a ratio which was different in direction from that of his group.

All Rorschach responses were scored by the investigator and the scoring of the color responses was checked by another psychologist. Non-color responses about which there was some scoring question were similarly checked.

Equating groups of this size on the above-mentioned Rorschach variables, in addition to age and IQ, was a difficult task. There were two factors in the situation, however, which made the task less formidable than it first appeared. Each boy had previously been given a group Rorschach test as well as an individual intelligence test as part of the intake procedure of the

Psychological Clinic at the school. These records were available to the investigator. The first step, then, consisted of screening approximately 400 group Rorschach records and selecting those which contained color responses. The next step was to screen this group of potential subjects for age, IQ, and Race. Following this individual Rorschach examinations were given and the final groups selected. To obtain the final two groups approximately 120 individual Rorschachs were given. It is felt that without the screening procedure outlined above this number would have been much higher.

MATERIALS AND APPARATUS

In addition to the group Rorschach and Intelligence tests, which had been previously given, three tests were used. In the selection of subjects the standard Rorschach test was individually administered and scored according to Beck's norms (7). Two tasks were used to compare the performance of the groups under conditions of frustration. One consisted of two forms of a code-substitution test[1] and the other of an electrically wired, six-pointed star design in a mirror-tracing apparatus.

The Code-substitution Task. This consisted of two forms, A and B. Each form contained a code consisting of geometric figures with numbers within each figure. Below the code, on each form, appeared a number of blank figures which were to be filled in according to the code given. The figures were: star, circle, square, cross, and triangle. The same figures appeared on each form. The numbers to be used to fill in the figures were: 1, 2, 3, 4, 5. Thus, the same figures and the same numbers were used on each form but the number to be placed in each figure differed on the two forms. Copies of these forms are presented in Appendix C.

The task of the subject was to put the appropriate number in each figure as rapidly as possible. The instructions were to start at the upper left-hand corner and do each figure in turn until reaching the lower right-hand corner. Performance was scored for time per trial and number of wrong substitutions.

The Mirror-tracing Task involved tracing a six-pointed star design under conditions of mirror-vision. The apparatus is shown in Appendix D. The design was constructed from copper plates and a chronograph, counter, and stylus were connected to these plates so that when contact was made between the stylus and the edges of the pathway, i.e., when the subject

[1] The forms are patterned after those included in The Record Blank for The Revised Examination for the Measurement of Efficiency of Mental Functioning by Babcock-Levy. These record blanks can be obtained from C. H. Stoelting Co., Chicago, Ill.

left the pathway, the circuit was completed. This arrangement provided a measure of the total time spent off the pathway as well as the number of times the subject left the pathway. In addition, a stop-watch was used to measure the total time spent in tracing the design.

PROCEDURE

The Code-substitution Test. On the code-substitution test each subject was given 18 trials on Form A followed by 12 trials on Form B. Eighteen trials on Form A were considered sufficient to develop a strong habit and 12 trials on Form B sufficient to reveal the differences in performance which were expected. The addition of more trials on either form was contra-indicated by two considerations: (a) it was necessary to keep the task from being too long so that the interest of the subject would be maintained, and (b) on the basis of prior experimentation 18 trials on Form A and 12 trials on Form B proved to be sufficient.

When the subjects were required to learn the second form they had to learn to make new responses to old stimuli. This, it was assumed would yield negative transfer or habit-interference. Habit interference, by definition, is a condition of frustration since it interferes with the attainment of the goal of learning the new responses. Since both groups could be shown to have learned the first habit equally well, and since motivation was assumed to be objectively equal for both groups, the frustrating conditions could be considered the same for both groups. Therefore, any difference in decrement of performance between the groups on Form B could be attributed to greater inability of one group to deal with the frustrating conditions in an adaptive manner.

The Mirror-tracing Task. Following the administration of

the code-substitution task each subject was required to make one complete tracing of the star-design pathway under conditions of mirror-vision. The strength of the response tendencies involved in tracing a star-design under ordinary direct vision was assumed to be the same for all subjects since there was no reason to suppose differential amounts of experience in making eye-hand movements in space. Since these previously acquired response tendencies, or habits, were assumed to be of equal strength for the groups no training was given to build up such a habit. This also provided a situation which differed from that in the code-substitution task since the two habits differed on the variable of recency of acquisition. The rationale for this task was that under mirror-tracing conditions, just as on the code-substitution task, the previously learned responses could be expected to interfere with the attainment of the goal and in this way provide another set of frustrating conditions.

Instructions. Each subject was tested individually in a room provided in the psychological clinic of Boys Vocational School. The examiner met each subject, either in the waiting room or in a cottage, and conducted him to the testing room. The examiner had previously been employed at the school and had also had prior acquaintance with the subjects in the cottages so that after a few brief remarks, e.g., "Do you remember me?," "It's a nice day," etc., It was possible to begin by saying:

"I suppose you are wondering what this is all about aren't

you? Well, this is something that has nothing to do with BVS. I am trying to find out how well people can do certain things and that's why I called you up here. This is my own personal business and has nothing to do with BVS. I used to work here a few years ago and because of that Mr. Wisner (the superintendent) gave me permission to test some of you boys.

I would like to have your help but you do not have to do this if you don't want to. Nothing will happen to you if you would rather not do it. In fact, unless you are willing to try, and to do your best, I would rather you didn't do it because it won't help me unless you do your best. It will take about an hour. Do you think you would like to?"

If the subject answered in the affirmative (no subject refused or gave any other indication of not wanting to participate) E continued, "Fine, when we are all through if I think you have done your best, and really tried, I want to give you a candy bar for helping me out." (E pointed to the candy bars which were in plain sight).

Placing a copy of Form A of the code-substitution test in front of the subject E said, "You may have had a test something like this before but this is a different one. Notice the figures at the top. Notice that each has a different number inside it. Here, below, are a lot of the same figures and your job is to see how fast you can put the right number in each figure. You start here (upper left) and end here (lower right). You may not skip any figures and you must fill in every one.

In case you make a mistake I will say 'wrong.' If you make a mistake, do not stop to erase because that will only use up time. If you make a mistake just write the correct number over the wrong one you have put in the figure (E demonstrated). If you make a mistake and I do not see it, but you notice it, correct it in the same way.

When I say 'ready' you are to put your pencil-point inside the first figure. When I say 'go' you are to begin filling in the figures as rapidly as you can without making mistakes. I will time how long it takes you from beginning to end. I will not tell you how long you took each time but when you are all finished you may see your scores if you want to. In case your pencil breaks take another one and I will make allowance for that time. No matter what else happens, if someone comes in, or the telephone rings, keep right on working as fast as you can.

We will do this three times and then rest, three times and rest, three times and rest, and so on. We will keep doing it until I think you have done it as well as you will be able to. Do you have any questions? Remember, if you do your best you get a candy bar. Ready---go."

Each subject was then given 18 trials, in groups of three,

with two minutes between each set of three trials. During the two minutes between sets E engaged the subject in trivial conversation. Approximately 10 seconds elapsed between the time the subject finished one trial, E recorded the time and identified the test sheet, and S was presented with a new sheet and instructed to begin. Before each group of three trials E said, "Let's see how fast you can do these."

Following the rest period after the 15th trial, E said, "Now let's do the last three of this group and then do something different." The subject was then given the last three trials. After 1½ minutes of the rest period following trial number 18 on Form A had elapsed, E placed a copy of form B in front of the subject and said,

> "This is different in two ways. First, we will not do as many of these as we did of the others, and secondly, it's different in that the numbers have been changed around, see? (E pointed to the code). Otherwise it is just like before; if you make a mistake, and I see it, I'll say 'wrong.' If I don't see it, but you do, correct it anyway. Remember to work as fast as you can. Ready---go."

Except for the number of trials the procedure for Form B was exactly the same as in the preceeding 18 trials on Form A. Following 12 trials on Form B the subject was taken across the room to the table on which the mirror-tracing apparatus was standing. Each subject was shown the apparatus and E said,

> "Look at this star (direct vision). Your job will be to start here (upper right-hand point) and trace the pathway as fast as you can without touching the sides. You start here, follow the arrows, and finish at the same place you started from (E demonstrated). Every time you touch the sides this

counter clicks and this clock starts (E demonstrated). You cannot get a shock from this even if you put your hands right on the plate, see? (E demonstrated). If you touch the sides come back into the pathway and keep going. Do not just slide the stylus along the side but if you touch the sides come back to the center and keep going.

Now you take the stylus and place it at the start (direct vision). When I say 'go' you are to follow the arrow from the start around to the finish as fast as you can without touching the sides. After I say 'go' the only place you can look is in the mirror (design was then shielded from direct vision). No matter what happens you cannot look anyplace but in the mirror. Ready---go."

Many subjects reached a point where they apparently could not continue tracing and if they gave any indication of discontinuing E said, "Just keep at it, you'll get on to it."

Following completion of this task E thanked each subject and gave him a candy bar as the reward which had been mentioned in the instructions. Each subject was requested not to discuss the tests with any of the other boys and was excused from the room.

In both of the tasks it was assumed, as it is in most experiments, that the instructions, in combination with the reward, would motivate the subjects. In this experiment the fact that both groups showed improvement in performance on Form A of the code-substitution task tends to support the assumption that the subjects were motivated.

ANALYSIS AND RESULTS

For the code-substitution task four comparisons were made between the groups: (a) performance on Form A, (b) performance on Form B, (c) impairment scores (B-A), and (d) number of wrong substitutions on each form.

In comparing the performance curves for the groups simple, non-parametric statistics were used. Fisher's "t" test (one-tailed) was used to evaluate the differences between groups in impairment scores and number of errors made. The formulas employed were those given by McNemar (44, pp. 79, 226). In addition, the F ratio was utilized to test for homogeneity of variance and where the two groups were found to be significantly different on this factor the correction indicated by Edwards (24, p. 170) was made in applying the "t" test.

The mirror-tracing test yielded three scores: (a) the number of times the stylus left the pathway, (b) the total time spent off the pathway, and (c) the time required to trace the design. The means, medians and standard deviations of the groups were computed for each measure and differences which appeared likely to be significant were evaluated by means of the "t" test.

The results indicate that the code-substitution test reliably differentiated the two groups in the predicted direction as measured by time scores. When compared on the number of errors the trend was for the C/CF group to make fewer wrong substitutions. At first glance this finding would appear to be in the opposite

direction than predicted but since the task was to complete each trial as fast as possible it does not necessarily follow that a greater number of errors indicates poorer performance. This finding is discussed more fully in the following pages.

While the mirror-tracing task revealed differences which were mainly in the predicted direction these differences were not statistically significant.

The Code-substitution task. On the code-substitution task the two groups did not differ significantly on Form A since, as the data in Table 3 indicate, the FC group performed better on 10 trials and the C/CF group on 8 trials. Table 3 also indicates, however, that on form B the FC group obtained better scores on all 12 trials. If there had been no difference in performance between the groups they would have been expected to react on the basis of chance in regard to whether one group or the other was superior on any of the 12 trials. The FC group, however, made superior scores on each of the 12 trials, the probability of this occurring on a chance basis being .0002. With this small a probability it is reasonable to conclude that the two groups were not reacting on a chance basis but actually differed in performance on Form B. This result is taken to support the hypothesis that the C/CF group would perform less efficiently than the FC group under the experimental condition of interference with goal-directed behavior (i.e., conditions of frustration).

The breakdown in performance on Form B was analyzed by

TABLE 3

Mean Scores[1] on Each Trial of Two Forms of a Code-substitution Test for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

	Group			
	FC		C/CF	
	Form		Form	
Trial	A	B	A	B
1.	80.25	94.45	80.50	102.45
2.	70.45	79.35	64.85	86.55
3.	65.35	77.70	61.25	83.55
4.	58.45	75.30	56.30	78.25
5.	59.10	75.10	56.45	80.95
6.	58.10	72.60	56.00	77.55
7.	52.90	69.20	50.35	72.45
8.	53.95	68.05	54.60	73.60
9.	52.80	66.35	52.50	73.60
10.	48.90	60.15	48.75	69.75
11.	51.10	61.50	52.25	67.60
12.	51.40	60.15	50.80	66.20
13.	48.85		49.70	
14.	51.35		50.10	
15.	51.00		51.10	
16.	46.90		48.00	
17.	48.40		48.45	
18.	49.10		48.75	

[1] Scores in seconds

computing impairment scores for each subject. This score was obtained by adding the scores for each series of three trials on Form A and subtracting this sum from that obtained for each of the corresponding series of three trials on Form B. The differences between the groups in the magnitude of these impairment scores were then tested for significance by means of the "t" and F tests. A total impairment score, based upon all 12 trials, was similarly computed and treated.

It can be seen from Table 4 that the mean scores of the groups were significantly different, in the predicted direction, on series I, II, and IV while the difference on series III approached significance. Table 4 also reveals that the groups differed significantly, again in the direction predicted, in variability on series II, III, and IV. These results indicate that on each of the four series the groups differed significantly, in the expected direction, either in mean scores, variability, or both. Table 5 presents the means and standard deviations of the groups on total impairment score. The difference between groups on this score is also statistically significant. These results lend further support to the hypothesis that the C/CF group would show a significantly greater impairment of performance under conditions of frustration.

When the two groups are compared on the number of errors, i.e., placing a wrong number in a figure, it can be seen from Table 6 that there were no significant differences. If anything,

TABLE 4

Comparison of Mean Impairment Scores for Each Series of Three Trials on a Code-substitution Task for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

	Series (trials)							
	I(1,2,3)		II(4,5,6)		III(7,8,9)		IV(10,11,12)	
Group	M	SD	M	SD	M	SD	M	SD
FC	35.45	22.47	47.35	23.67	43.95	25.65	30.40	18.44
C/CF	65.95	35.68	67.45	41.98	62.20	45.32	51.75	41.88
diff.	30.50		20.10		18.25		21.35	
t*	3.23****		1.86**		1.57		2.09***	
F		2.52		3.15***		3.12***		5.16****

* one-tailed t test
** indicates P value of .05
*** indicates P value of .02
**** indicates P value of .01 to .005

TABLE 5

Comparison of Total Impairment Scores[1] on a Code-substitution Test for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

	Mean	SD	diff.	t	F
Group					
FC	157.15	64.12	90.20	2.46*	5.24**
C/CF	247.35	146.76			

* indicates P of <.02>.01 (one-tailed test)
** indicates P of .002
[1] Scores in seconds

TABLE 6

Comparison of Number of Errors Made on Two Forms of a Code-substitution Test for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 20 in each group)

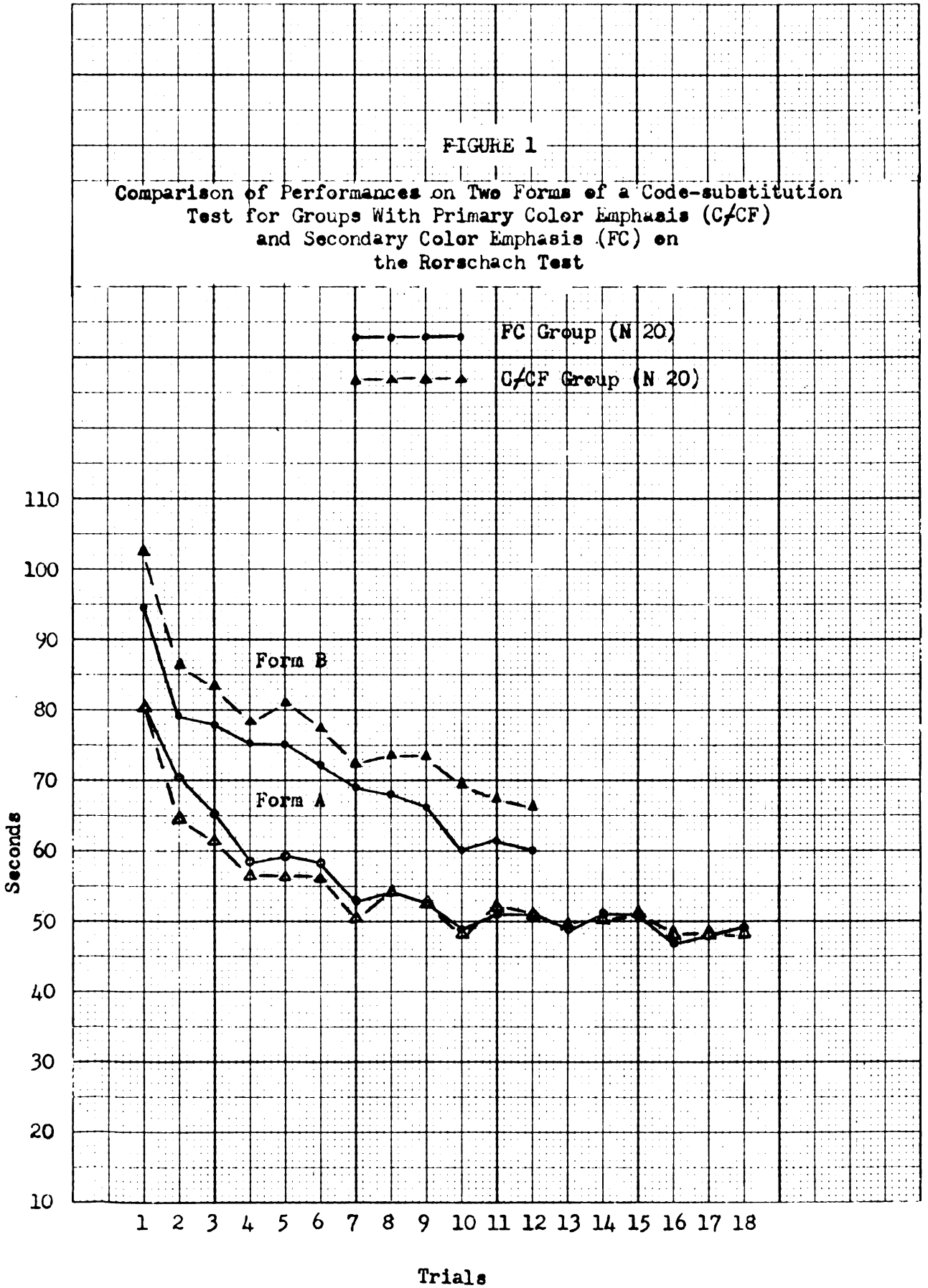
	Form A		Form B	
	M	SD	M	SD
Group				
FC	22.68	14.63	31.26	19.38
C/CF	20.37	13.33	26.26	12.95
diff.	2.31		5.00	
t	.4957		.9107	

the trend was for the C/CF group to make fewer of these errors. This finding is interesting, in conjunction with the fact that the groups differed in impairment scores, since it indicates that while making the same or fewer number of incorrect substitutions the C/CF group either had more difficulty in coping with these errors, as indicated by their longer time scores, or made more errors of a different, more covert type. On an observational level this type of error seemed to consist of vacillating movements towards and away from the blank figures. A similar finding is reported by Siipola (65) who found that in a code-learning problem partial responses in the direction of the first learned response made up more than two-thirds of all errors. Thus, the finding that the C/CF group tended to make fewer wrong substitutions may or may not be explained on the basis that they either took longer to correct their wrong substitutions or made more errors of a different type. Only further experimentation can answer these questions.

It is also interesting, in regard to the hypothesis of the C/CF group performing less efficiently on Form B, to compare the shapes of the performance curves for the two groups shown in Figure 1. It is immediately apparent that the curves for the two groups do not differ in shape but only in amplitude, i.e., the groups did not differ in the rate of learning on this form but in the degree of learning as measured by time scores.

FIGURE 1

Comparison of Performances on Two Forms of a Code-substitution Test for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test



The Mirror-tracing Task. The means, medians, and standard deviations of the groups[1] on the mirror-tracing task are presented in Table 7. While none of the differences between means or medians approaches statistical significance the C/CF group obtained poorer mean scores on two of the three measures used and poorer median scores on all of the measures. When the separate scores were transformed into standard scores and an overall score computed the C/CF group again obtained a poorer score which was, however, not significantly poorer than that of the FC group. On the whole, then, these differences represent trends in the predicted direction but it must be concluded that the two groups could not be reliably differentiated on the basis of their performances on the mirror-tracing task. A rank-order correlation between performance on the code-substitution task and performance on the mirror-tracing task yielded a Rho coefficient of -.06. Evidently the performance on one task cannot be taken as a good indication of performance on the other task.

Why performance on the mirror-tracing task failed to either differentiate the groups at a statistically significant level or to show a significant correlation with performance on the code-substitution task is an interesting question. Although the assumption that there was interference with goal-directed behavior

[1] These figures are based upon an N of 19 in each group. One subject in each group violated the instructions and reverted to direct vision. Consequently, these subjects could not be included in the sample.

TABLE 7

Comparison of Performances on a Mirror-tracing Test for Groups With Primary Color Emphasis (C/CF) and Secondary Color Emphasis (FC) on the Rorschach Test

(N 19 in each group)

	No. Times Off			Total Time*			Time Off*		
Group	M	Mdn.	SD	M	Mdn.	SD	M	Mdn.	SD
FC	101.46	85.00	55.40	109.45	94.50	49.90	23.13	19.00	11.70
C/CF	100.57	91.00	57.70	118.89	110.70	40.10	24.36	21.00	12.30
diff.	.89	6.00		9.44	16.20		1.23	2.00	
t**	—	.2539		1.002	.5339		--	--	

*Time is given in seconds
**The t test was not applied where there was obviously no significant difference

on both tasks seems defensible this does not necessarily imply that the two situations were alike in other ways. It is, for example, possible that different psychological processes were involved in the two tasks. It is also possible that the interference in the mirror-tracing task was easier to overcome. Another possible explanation might be that the habits involved differed on the variables of strength and/or recency of acquisition. A more plausible explanation, however, may be that not enough measures were taken of performance on the mirror-tracing task. It is possible that had more trials been given the effect of the frustrating conditions on performance would have continued to be disruptive for the C/CF group while the FC group would have overcome the disruptive effects more quickly. Regardless of which explanation is considered, however, only further investigation can supply the answer.

DISCUSSION OF RESULTS

Within the limitations imposed by the nature of the sample and the type of activities measured, the results on the code-substitution test are interpreted as lending some support to the hypothesis of the study. Consequently, the Rorschach assumption from which the hypothesis was derived is supported to some degree by this experimental data. The results on the mirror-tracing task, while in the predicted direction, do not support the hypothesis of the study at a statistically significant level.

In this study it proved to be possible to predict, on the basis of Rorschach behavior and in accordance with the assumptions of the test, how persons would react to conditions of frustration. On the code-substitution task this prediction could be made with a high degree of reliability while on the mirror-tracing task the reliability of prediction was low. To the extent that these results can be generalized to include reactions to a variety of frustrating conditions the results increase the confidence with which the clinician can employ the Rorschach test.

The fact that some of the results tend to support the validity of a basic Rorschach assumption is not considered to be the only finding of the study. Methodologically the study would seem to have implications for further work on the test in relation to its use in clinical situations.

In clinical settings the behavior of the subject, about which the Rorschach worker is called upon to make predictions, is

very complex. There is seldom, if ever, any interest in how a person will perform on a code-substitution test but predictions as to how a person will respond to psychotherapy, what he will do when angry, and similar predictions are commonly desired. These predictions involve extremely complex relationships between what the person does on the Rorschach test and his behavior in other situations. Usually, however, in psychology as in other branches of science, the discovery of the laws relating to the prediction of complex events is preceded by the discovery of simpler relationships and the evolving of methods applicable to the study of the more complex events.

Consequently, it is felt that one of the most fruitful results of the present investigation lies in the fact that it has again been demonstrated, apparently, that isolated Rorschach determinants can be dealt with in a carefully controlled, experimental manner. A review of the literature reveals a limited, but increasing, number of such attempts. Taken together they hold forth the promise of being able to circumvent the traditional "global argument" of the Rorschach worker and to allow careful study of the assumptions regarding the specific Rorschach determinants. It is hoped that the present investigation may contribute in some way to the solution of this broad problem.

The "global argument" maintains that the meaning of any determinant cannot be arrived at in isolation but must be interpreted within the total complex of the Rorschach performance, e.g.,

the amount of M in relation to C is supposed to qualify the meaning of C. Few experienced Rorschach workers would dispute the fact that in any individual record the relationships between the various scores are important. What is objected to by some psychologists is not the "global argument" itself but that it has been used to explain away negative results and as an excuse for not subjecting the determinants to rigorous experimental test. More precise definition of the meaning of the determinants should, in fact, make the "global approach" to interpretation more effective since more would be known about the variables which are being interrelated. It would seem, then, that it is time for the determinants to be explicitly defined, in regard to their meaning, and subjected to careful validation rather than to continue the above-mentioned practices. It is logical to assume that an increase in knowledge about the individual determinants will facilitate the discovery of the interaction laws between them. Since the "global approach" is, essentially, an application of interaction laws, either explicitly or implicitly stated, such discoveries should improve the value of this approach.

The present experiment seems to have demonstrated that the individual determinants of the Rorschach are amenable to experimental manipulation. It is hoped that further work will lead to the development of other methods and techniques, as well as the refinement of the present one, which may prove to be applicable to the study of the more complex behavior patterns met with in

clinical situations. Ingram's study involving the use of white space on the Rorschach (32) appears to mark a beginning in this direction. In this study she measured the response to frustration in an interpersonal situation by having several judges observe and rate the responses of the subject when frustrated by another person. The development of suitable techniques will probably not be easy and will probably require the cooperation of workers in other disciplines than psychology. As Cronbach (22) emphasizes, there is a need for more appropriate statistical methods for dealing with the specific problems of the Rorschach and for this the aid of the statistician will be needed.

Despite these difficulties it would seem, however, that with the development of adequate techniques of measurement and computation and the extension of the type of methodology used in the present study, it may be possible to subject the individual determinants of the test to careful study and ultimately to discover their interaction laws. To the extent that these objectives are attained, the interpretation of the test will rest upon a sounder foundation.

In addition to these implications the results seem to be pertinent to the theoretical formulations of Schachtel (61). Schachtel has postulated a relationship between the perception of color and the experience of affect in which a common element is the "passivity" of the experiencing individual. By "passivity" he refers to the degree of control which the subject has over his

reactions. As an illustration he compares the experiences undergone in a fit of rage and in the production of a pure C response on the Rorschach. Schachtel concludes that in both there is a relative lack of conscious control, direction, deliberation, and detachment.

In the present experiment the group which perceived the relatively undifferentiated color on the Rorschach exhibited less control and direction of their behavior on the experimental tasks. Would these "relatively pure-color perceivers" also exhibit what Schachtel calls "passivity" in a variety of situations? If this can be shown to be true under a variety of conditions and for diverse activities then the knowledge of the relationship between perceptual and other modes of behavior will have been advanced to some degree. This may prove to be a fruitful problem for research since the Rorschach test is founded upon the assumption that the activity involved lies primarily in the field of perception. Consequently, sound advances in perceptual theory should have important implications for the theoretical and practical aspects of the test.

SUMMARY AND CONCLUSIONS

The need for adequate experimental validation of Rorschach hypotheses has long been realized by most users of the test. Regardless of the apparent usefulness of these hypotheses in dealing with individuals attempts to test them in clinical use remain subject to errors of observation, judgement and preconceived ideas. While the application of experimental procedures to such problems does not necessarily eliminate these errors experience has shown that they make such errors less likely to occur.

One of the major propositions of the Rorschach test is that the type of response given to color is indicative of the level of emotional development of the subject. Specifically, it is held that the FC responses indicate a higher level of emotional development, i.e., emotional maturity, than do CF and C responses.

This investigation attempted to put this hypothesis to test by controlling a number of other variables and using response to color as the independent variable and reaction to conditions of frustration as the dependent variable. A major assumption underlying the investigation was that there is a positive relationship between emotional maturity and adequacy of reaction to conditions of frustration. This assumption was shown to have empirical as well as formal validity.

The experimental design consisted of selecting two groups of subjects who were equated on several Rorschach variables as well as age and IQ. These groups were selected so that they dif-

fered on the independent variable of type of color emphasis on the Rorschach test. One group, called the FC group, had given color responses which were primarily of the FC or form-dominant type. The other, designated the C/CF group, had given color responses in which the emphasis was predominantly on the color element, i.e., C and/or CF responses. This provided two groups who differed on the variable of emotional maturity, as indicated by color responses on the Rorschach, while being equivalent in regard to other variables.

Each group was subjected to conditions of frustration and measures taken of their responses to these conditions. Habit-interference served as the frustration variable by interfering with the goal-directed behavior of the subjects. The prediction was that the emotionally immature group, i.e., the C/CF group, would show the greatest degree of impairment in performance under conditions of frustration. This prediction was clearly borne out on one of the tasks used (code-substitution) and six of the seven measures taken on the second task (mirror-tracing) were in the predicted direction. It is felt that the Rorschach assumption relating the types of color responses to varying levels of emotional development is supported to some extent by these findings.

It was suggested that the type of methodology used in this study could be extended to deal with more complex types of behavior such as are met with in the clinical use of the Rorschach test.

APPENDIX A

A GENERAL SURVEY OF VALIDITY STUDIES ON THE RORSCHACH TEST

A great many validity studies have been reported in the literature and no attempt will be made here to deal with all of these. Instead, this section is intended to provide the reader with a general orientation as to the types of studies which have been done. Representative examples are provided but for a more comprehensive treatment of the problem of the validity of the Rorschach the reader is referred to reviews by Benton (13), Hertz (30), Rabin (53), and Williams (76).

Types of studies and results. The methods that have been most used in validation studies have been classified by Hertz (30) as being of four main types: (a) direct experimentation with changes in experimental conditions, (b) correlations of Rorschach categories with objective behavioral criteria, (c) comparisons between groups, and (d) clinical case studies.

Rabin (53) points out that recent approaches towards validation have tended to be more strictly experimental and he distinguishes three varieties of such an approach. These three consist of: (a) the molar approach in which the total personality configuration is utilized, (b) the molecular approach which aims to establish the validity of individual Rorschach factors, and (c) the direct experimental approach which varies the experimental or test conditions and/or measures physiological or organismic concomitants within the subject. Rabin emphasizes that these are

not mutually exclusive categories but serve as classification devices.

In dealing with the same problem, Williams (76) classifies recent experimental approaches as: (a) comparison of Rorschach responses with independent behavioral criteria, (b) correlation of Rorschach response variation with variations of conditions during administration of the test, and (c) the relating of Rorschach responses to intervening or prior experiences which have been experimentally controlled.

Among the more widely known validation studies are those of Williams (75) on intellectual control under stress, Baker and Harris (3), who studied the speech of college students under normal and stress conditions in relation to test responses, and Brower (19), on cardio-vascular activity before and after visuo-motor conflict. Other well-known studies are those of Bergman, Graham and Leavit (15), who studied the effects of hypnotic age level regression on Rorschach responses, as well as the work of Lane (40) on the effect of hypnotically induced sets on the Rorschach movement factor, and Wilkins' and Adams' work with patients under hypnosis and sodium amytal (74).

In discussing experimental studies Rabin (53) lists several under the molar approach including that of Benjamin and Ebaugh (12) who compared the psychiatric diagnoses of patients with diagnoses based on the Rorschach. They were able to demonstrate complete agreement in about 85% of the cases. It is of note that in this

study the Rorschach diagnoses demonstrated greater agreement with the final than with the preliminary psychiatric diagnoses. In a similar study by Siegel (64), 26 children referred to a child guidance clinic were given the Rorschach twice with an interval of a year between tests. Whereas initially there was only 61.5% agreement with the psychiatric diagnoses after a years interval, in which the psychiatric diagnoses were reevaluated, there was 88.5% agreement. In another study of the molar type, Young and Higgenbotham (77) observed the behavior of unstable boys in a psychiatric summer camp and were able to demonstrate some correspondence between Rorschach performance and such aspects as intellectual function, emotional factors, and interests.

As early as 1936 Thornton and Guilford (69) carried out a study which has been characterized as molecular. They attempted to correlate various Rorschach factors with scores on other personality measures. As Rabin (53) notes, confusion of definitions and relative inadequacy of criteria were weaknesses of this study in which no significant relationships were found between the variables studied. Ruesch and Finesinger (57), in another molecular type of study, found that color scores, devised on the basis of color type and size in drawings, correlated highly with the number of color responses on the Rorschach. Thus, it was shown that the individual's use of color was somewhat similar in the two situations.

The direct experimental approach has been used by Brosin

and Fromm (18), Kelley, Margulies, and Barrera (36), Kelley and Levine (35), Sarbin (59), Williams (75), and Wallen (73). Sarbin (59) used hypnotically induced sets with a single subject and compared the Rorschach performances under these various conditions with those obtained in a normal, waking state. Results indicated that a number of Rorschach scores changed from one condition to another but the meaning of these changes was not clear. Kelley, Margulies, and Barrera (36) compared the pre- and post-electric shock Rorschach performances of their subjects and concluded that, on the whole, the areas and determinants were essentially stable. The value of this method consisted of utilizing the amnesic state following electric shock in order to compare the performances of the same individual with the memory factor supposedly eliminated.

Another experimental study carried out by Ingram (32) involved the validation of the Rorschach white space as an indicator of oppositional or aggressive tendencies. Taking two groups of subjects, differing on the variable of high or low use of white space on the Rorschach, she placed them in situations of: (a) standardized problem-solving, and (b) interviews. In both situations there was an attempt to frustrate the subjects and judges rated their reactions. She found that the group which was high on white space was significantly more aggressive in the frustrating interview situation but that the use of white space did not differentiate the groups in the problem-solving situation.

In an interesting experiment, Eichler (25) equated two

groups on the Behn-Rorschach test and then, using the standard Rorschach, tested one group in an anxiety-producing laboratory situation and the other group under ordinary conditions. Of the fifteen alleged Rorschach indicators of anxiety evaluated, he found that only decrease in *W*, decreased productivity, increased oligophrenic details, and increased shading differentiated the groups.

Using post-hypnotic suggestion, Counts and Mensch (21) attempted to influence the Rorschach performance of five subjects. They gave the suggestion of hostility and checked its effectiveness by observation and interview. Independently repeated Rorschachs, however, showed only trends in the expected direction.

Summary. In general it can be seen that, although varying in adequacy and in the nature of the results obtained, these studies indicate some degree of validity for the test. Nevertheless, as Benton (13) notes, following a review of the literature on the validity of five major aspects of the Rorschach, although some progress has been made present day Rorschach interpretation is based upon assumptions which have been inadequately validated. One of these five aspects, the color responses, will be discussed more completely in Appendix B.

APPENDIX B

RORSCHACH COLOR RESPONSES: ASSUMPTIONS AND VALIDATION STUDIES

Rorschach's original scoring system classified color responses in one of three primary ways. A response was scored C if the only determinant was the color; a response was scored CF if the color was the primary determinant but form also played a part, and a response was scored FC if the form was the principle determinant but color was also important in the percept. Certain assumptions were made concerning the psychological meaning of these responses.

Rorschach's Assumptions. On the basis of his experiments, Rorschach concluded that the color responses had meaning in relation to the affective life of the individual. As he expressed it, "The symptom value of color interpretations lies in the field of affectivity" (56, p. 193). In the use of the term "affectivity" Rorschach followed Blueler's usage and included the affect, emotions, and feelings. The term "lability" as used by Rorschach meant fluidity of the emotions and could include normal affective adaptability. Also, in addition to the general significance of color responses, Rorschach proposed meanings for the different types of color responses.

Regarding the C responses, Rorschach thought they represented unstable emotionality and the more such responses given, the more likely the individual would be to act impulsively:

"C answers are seen, first, in the irritable and sensitive,

and increase in number in manics where irritability and instability are features. Irritable and impulsive patients show large numbers of C's as does the group of schizophrenics which shows the most emotional and associative scattering; epileptics, also impulsive and irritable fall into this class" (56, p. 31).

The CF responses were also held to be indicative of affective instability but were found to a considerable extent in normal subjects,

"CF answers" wrote Rorschach, "prove to be analogous to pure C answers, but occur in a larger number of subjects. CF's are almost always found when C's are given but the inverse of this does not hold....They have proved to be the representatives of emotional instability, irritability, sensitivity, and suggestibility" (56, p. 33).

For Rorschach, the FC responses represented the capacity for emotional adaptation and he wrote,

"The FC responses" are those interpretations which "represent the capacity for affective rapport and adaptability, a kind of combination of affective and intellectual adaptability. They are, in general, characteristic of the normal individual who is well-adapted and is capable of making new adaptations" (56, p. 199).

Post-Rorschach Assumptions: The C Responses. Most Rorschach workers have proceeded on the basis of the significance attributed to these responses by Rorschach. Hertz and Baker indicate,

"It may be concluded that if form represents conscious experience and reality, hence conscious control, the primary C where no form is included, reveals lack of control over the emotions, no feeling for the environment or reality, hence impulsiveness" (31, p. 10).

Beck states, in discussing the C response,

"It is an infantile response mode and thus not abnormal in the very young child. Occurring in the older child and in the adolescent, it leads to expectation of tantrums or other outbursts. The adult with pure C in his Rorschach record is likely to be given to ungovernable impulses..." (8, pp. 27-28)

For Piotrowski (52) these responses indicate emotional behavior which is impulsive and unsocialized, while Oeser (50) feels that they indicate strong emotionality, distractability, and suggestibility. Similarly, Schachtel and Hartoch (62) consider both C and CF to indicate unstable, unbalanced emotions. Moreover, Schachtel (61) considers that pure C indicates an ego which is less able to exert control over internally originating affective drives. The conclusion reached by Hertz and Baker, regarding C responses, is that, "More than one indicates lack of control over emotional reaction, lack of restraint, and impulsiveness" (31, p. 57).

Thus, the psychological meanings attributed to the pure C response have included impulsivity, suggestibility, lack of rational control over emotional reactions, lack of social adjustment, immaturity of affect, excitability, instability, sensitivity to emotional excitation, and susceptibility to being easily upset.

The CF Response. According to Beck,

> "The CF or color-form response is characteristic for a less impulsive but still highly labile reactivity. Developmentally it marks a phase above that represented by C. In it, the infantile reaction trend is being held in restraint by the F tendency, a force out of another psychic sphere--awareness of reality....The essential state is that of easy irritability" (8, p. 28).

After reviewing several studies on the color responses, Hertz and Baker (31) conclude that CF responses reflect states of emotional instability and excitability in an individual and, likewise, Klopfer and Kelley (38) maintain that these responses re-

flect emotional reactions which are more impulsive than those represented by FC responses.

The FC response. Regarding these responses Klopfer and Kelley (38) indicate that one of the best validated Rorschach assumptions is that they are a measure of emotional adjustment to outer reality. One characteristic of the emotionally healthy individual, according to Beck (8), is that he is able to control his feelings. Beck considers the FC response to be a measure of this attribute. Hertz and Baker point out that, "FC represents emotional stability and adaptability" (31, p. 13), and in the same way Rapaport maintains that the FC responses indicate "....flexible control and careful regulation of the perceptual and associative processes...." (54, p. 236).

Post-Rorschach workers, it can be seen, have carried on Rorschach's original assumptions regarding the meaning of the FC response. This response is held to reflect the emotional maturity, the conscious control over emotions, capacity for affective rapport with the environment, adaptability and stability.

In addition to the individual color responses, Rorschach emphasized the significance of the different amounts and combinations of these in arriving at a description of a personality. This emphasis has persisted in the efforts of later Rorschach workers and can be seen in the statement of Hertz and Baker that,

> "The CF and C together reflect egocentricity and the more primitive, childlike emotions, hence immaturity. Thus, emotional stability and adaptability vary directly with the excess

> of FC over CF and C. The smaller the proportion of FC in relation to CF and C, the more egocentric and unadaptive the emotionality" (31, p. 13).

Conceiving of the stages of emotional growth as ranging from the lowest, at which there is little or no control over the feelings, to the other extreme at which there are only intellectual responses, Beck (8) arranges the color responses in the corresponding order of C, CF, FC, and F/. These representative viewpoints reflect the general assumption that where FC predominates over C and CF, the individual is more emotionally adaptable, less given to childish, immature behavior, is less unstable and in general is able to deal with emotional stimulation in an effective manner. Conversely, the assumption has been that where C and CF predominate over FC, more childish, immature, unstable, and impulsive behavior is expected and the individual is thought to be less able to control the expression of his emotions.

Validation Studies. In addition to the method of individual case study, attempts to demonstrate the validity of the assumptions regarding the color responses have, in general, been of four types: (a) group comparisons, (b) correlational studies, (c) genetic and normative studies, and (d) experimental attempts.

Group Comparisons. Beck (5) compared two groups on the basis of Sum C. One group was described as unstable and excitable, and the other as quiet, stable and adaptable. He reported a difference which, while not statistically significant, was suggestive of the expected results. Hertz (28) found that an ascendent group

gave a greater Sum C than did a submissive group, and Loosli-Usteri (42) found fewer FC and more CF in a poorly adjusted and problem cases than in control groups of normals. These studies, in general, support the Rorschach assumptions involved.

Comparing criminals, Boss (16) found that the more aggressive types gave more C and CF and fewer FC responses. Somewhat divergent results were obtained by Boynton and Walsworth (17) who compared a group of reform-school girls with a group of high-school girls and found that the high-school girls scored higher in all respects in regard to color than did the delinquents. They found that the impulsivity ratio (FC/CF+C) was more in favor of C+CF in the high-school group. Pfister (51) obtained differences between subnormal and clinical groups but was only able to find agreement with other clinical data in about fifty per-cent of the cases. These latter two studies fail to furnish much support for the underlying Rorschach assumptions.

Both Dubitscher (23) and Hertz (28) obtained a higher Sum C with subnormal than with normal groups. Kerr (37) compared normal, clinic, and mentally defective children and agreed that C represents an impulsiveness which is usually pathological. Similarly, Beck (6) and Rickers (55) obtained more C and CF in their schizophrenic groups than in control groups. Wallen (73) used the group Rorschach with stable and unstable men in service and found that the unstable group was more affected by color than was the stable group. The results of these studies involving

group comparisons have been generally in agreement with the Rorschach assumptions regarding color although there have been some exceptions (17, 51).

Correlational approaches. Hertz (28, 29) reported a correlation of -.360 ± .051 between the Woodworth-Mathews Psychoneurotic Inventory and color on the Rorschach. Vernon (72) found a correlation of ±.47 between Rorschach scores and the ascendence-submission test of Allport and also reported a correlation of ±.33 between Sum C and a score indicating general artistic tendencies (71). Also, using a questionaire as a criterion, Vaughn and Krug (70) found that Sum C correlated -.52 ± .08 with Bernreuter's measure of neurotic tendency. Correlating CF and the total neurotic score on the Woodworth-Mathews Psychoneurotic Inventory, Hertz (28, 29) obtained a correlation of -.578 ± .032 and concluded that the greater the emotional instability, the more neurotic involvement, and the less adaptability, the larger the CF score. At the same time she found more FC in subjects who obtained low scores on this inventory.

These correlational studies appear to support the validity of the Rorschach in regard to color responses but it must be remembered that the validity of the criterion measures used remains open to question.

Genetic and Normative Studies. Rorschach's tentative norms were based on 405 men and women. For his normal subjects he reported averages of 3 FC, 1 CF, and 0 C responses. Klopfer and

Margulies (39) studied children aged two through six years and found that by the age of six, FC dominated the types of color responses given as compared to earlier ages at which C or CF responses were predominant.

Using a group of children aged three through seven years Ford (27) obtained results which were somewhat divergent from those reported by Klopfer and Margulies (39). Ford found that at the age of six and seven years CF was the dominant factor whereas Klopfer and Margulies reported that FC was dominant by the age of six. Beck reports, on the basis of the Rorschachs of 131 children, aged six through fourteen years,

> "Pure color declines but color-form and form-color hold steady into the adolescent years. In psychologic language, with learning, with acquisition of character, and of the adaptive personality, uninhibited emotional response diminishes and regard for environment is retained or increases...The personality groups that correspond with C and CF are the not yet mature, the socially maladjusted and the regressed" (9, p. 97).

Ames, et. al., (1) made a study of childhood Rorschach responses using a sample consisting of fifty records at each half-year level from two to five and one-half years and at yearly intervals from six to ten years (650 records in all) and concluded, "The overall trend, though variable, is for there to be a relative increase in FC responses, a decrease in CF and C." One aspect of this study which deserves attention, however, is that the sample cannot be considered as representative of the general population. Over three-fourths of the children came from above average socio-economic levels and a similar proportion were above average

in intelligence.

Hertz and Baker (31) studied the color responses of adolescent boys and girls and provided tentative norms for these groups which indicate a gradual trend toward more FC and less C and CF between the ages of 12 and 15 years. Klopfer and Kelley (38) indicate that the normal adult should give some color responses but the sum C and CF should not exceed Sum FC. In contradiction to this, however, Beck, et. al., (10) found, in a normative study on adults, that CF predominated over FC.

On the whole it can be said that the results of genetic and normative studies on the Rorschach seem to indicate a general tendency for there to be an increase in FC and a corresponding decrease in C and CF responses as a concomitant to increasing age from childhood to adulthood.

Experimental Studies. Experimental studies on the validity of the assumptions regarding color responses on the Rorschach have been few. Williams (75) found only a small and questionably significant relationship between the form-color integration ratio and efficiency of behavior during stress but found a highly significant correlation between this factor and F%. Establishing a basal performance level on the digit-symbol test he measured the decrement in performance which occurred under the stress of physical discomfort, noise, critical observers, etc. The limited number (N 25) and type of subjects used may have been limitations of the study but as a pioneer investigation it showed the fruitfulness of

the application of experimental methods to such problems.

Studying the properties of the cards themselves, Lazarus (41) compared performances on standard and achromatic blots and found no differences in regard to "color shock." Sappenfield and Buker (58) used the same technique to test the assumption that productivity on cards 8-9-10 was related to the color value of the cards. They found no significant differences but it is well to remember that both of these studies used the group Rorschach procedure. In view of the present state of knowledge it is questionable whether such results are directly comparable to those obtained with the standardly administered Rorschach. Canter, however, administered chromatic and achromatic versions of the test individually and also found negative results in regard to "color shock" (20).

Siipola (60) investigated the effects of color upon Rorschach responses and found that color alone did not appear to produce affective disturbance but that color-form incongruity did. That is, the blots which produced such disturbances were those in which the color was incongruous with the usual forms seen in the achromatic series of blots.

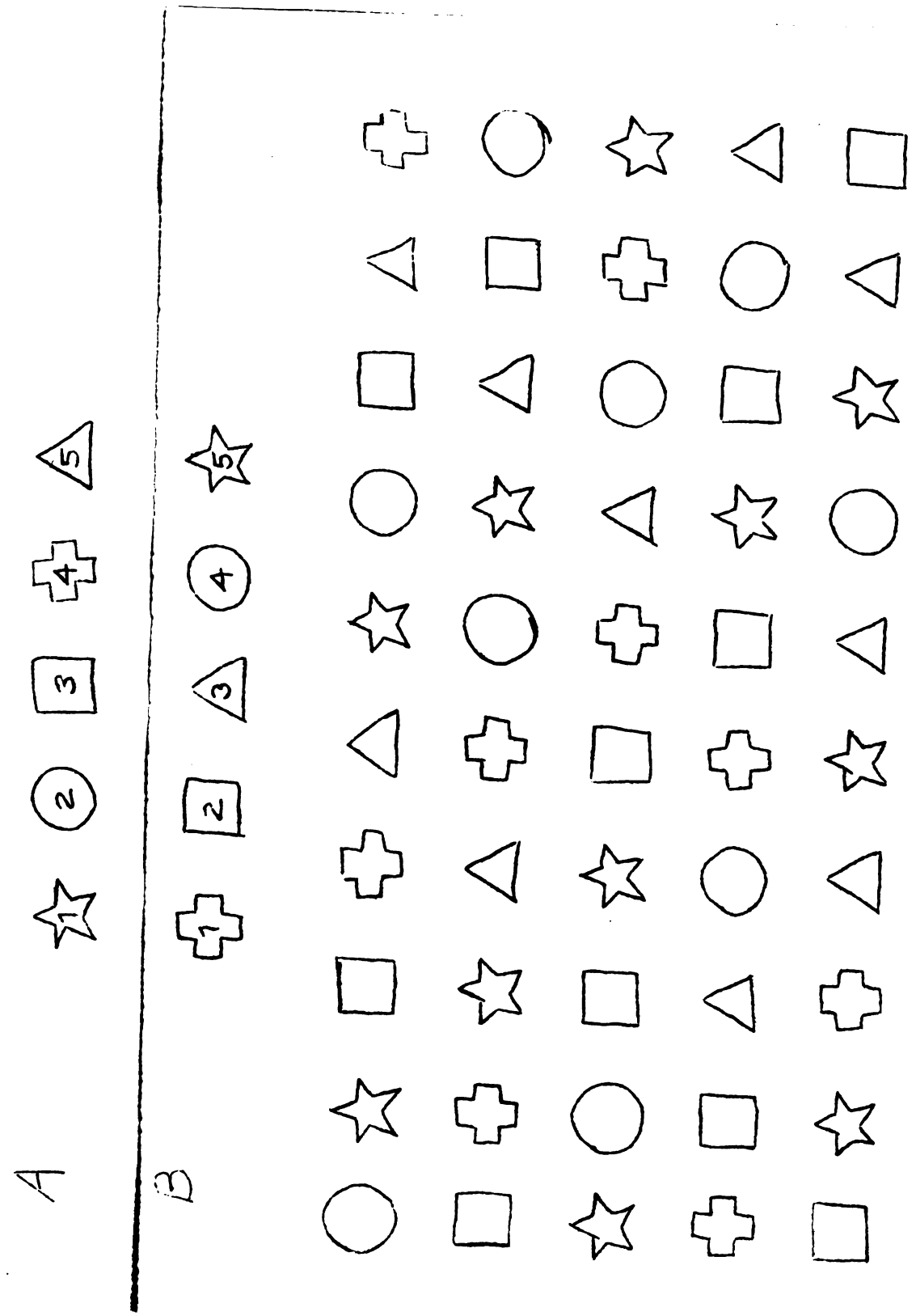
Fitzgerald (26) attempted to relate Rorschach performance to social behavior by correlating the form-color integration ratio with ratings of social adaptability in school children and young adults and found a significant relationship in the predicted direction.

In general, the few experimental studies which have been reported on the validity of the color responses have produced results which are inconclusive. Nevertheless, the results indicate that the experimental method holds forth promise as a means of dealing with the problem.

Summary. In general, the problem of the validity of the assumptions regarding the Rorschach color responses remains unsettled. Benton (14) after reviewing the studies on color responses concludes that while empirical studies show that the FC response is correlated positively with emotional stability, those studies attempting to show the validity of the assumptions by manipulating the color factor have been unsuccessful. Perhaps Beck's statement regarding the problem of demonstrating the validity of these assumptions best summarizes the situation; the statement is, "The ones (factors) which are having the longest wait are M and C, these elusive indicies to the unconscious wish-living and to the emotions. Their day will come too" (11, p. 772).

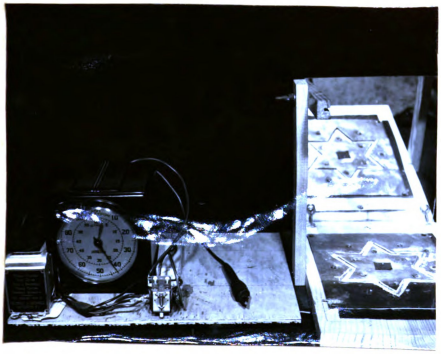
APPENDIX C

COPIES OF TWO FORMS OF THE CODE-SUBSTITUTION TEST



APPENDIX D

PHOTOGRAPH OF THE MIRROR-TRACING APPARATUS[1]



[1] In order to allow a view of the design the cardboard used to prevent direct vision is not shown.

REFERENCES

1. Ames, Louise B., Learned, Janet, Metraux, Ruth & Walker, R. N. Child Rorschach responses: developmental trends from two to ten years. New York: Paul Hoeber Inc., 1952.

2. Anderson, J. E. Changes in emotional response with age. In Feelings and emotions by Reymert, M. L. (Ed.). New York: McGraw-Hill, 1950.

3. Baker, L. M. & Harris, Jane S. The validation of Rorschach test results against laboratory behavior. J. Clin. Psychol., 1949, 5, 161-164.

4. Barker, R. Frustration as an experimental problem. V. The effect of frustration upon the cognitive ability. Character and Pers., 1938, 7, 145-150.

5. Beck, S. J. The Rorschach test as applied to a feeble-minded group. Arch. of Psychol., 1932, No. 136, 84.

6. Beck, S. J. Personality structure in schizophrenia: a Rorschach investigation in 81 patients and 64 controls. Nerv. & Ment. Dis. Monogr., 1938, No. 63.

7. Beck, S. J. Rorschach's test. Vol. I. Basic processes. New York: Grune & Stratton, 1944.

8. Beck, S. J. Rorschach's test. Vol. II. A variety of personality pictures. New York: Grune & Stratton, 1947.

9. Beck, S. J. Emotional experience as a necessary constituent in knowing. In Feelings and emotions by Reymert, M. L. (Ed.). New York: McGraw-Hill, 1950.

10. Beck, S. J., Rabin, A. I., Thiesen, W. G., Molish, H. and Thetford, W. N. The normal personality as projected by the Rorschach test. J. Psychol., 1950, 30, 241-298.

11. Beck, S. J. The experimental validation of the Rorschach test. IV. Discussion and critical evaluation. Amer. J. Orthopsychiat., 1952, 22, 771-775.

12. Benjamin, J. D. & Ebaugh, F. G. The diagnostic validity of the Rorschach test. Amer. J. Psychiat., 1938, 94, 1163-1178.

13. Benton, A. L. The experimental validation of the Rorschach test. Brit. J. Med. Psychol., 1950, 23, 45-58.

14. Benton, A. L. The experimental validation of the Rorschach test. II. The significance of Rorschach color responses. Amer. J. Orthopsychiat., 1952, 22, 755-763.

15. Bergmann, M. S., Graham, H., & Leavitt, H. C. Rorschach explanation of consecutive hypnotic age-level regressions. Psychosom. Med., 1947, 9, 20-28.

16. Boss, M. Psychologisch-charakteroligische untersuchungen bei anti-sozialen psychopathen mit hilfe des Rorschachsehen formdeutversuches. Zsch. f. d. ges. Neur. u. Psychiat., 1931, 133, 544-575. Cited in Hertz, Marguerite & Elizabeth Baker, op. cit.

17. Boynton, P. & Walsworth, B. Emotionality test scores of delinquent and non-delinquent girls. J. abnorm. soc. Psychol., 1943, 38, 87-92.

18. Brosin, H. W. & Fromm, Erika. Rorschach and color blindness. Rorschach Res. Exch., 1940, 4, 39-70.

19. Brower, D. The relation between certain Rorschach factors and cardiovascular activity before and after visuo-motor conflict. J. gen. Psychol., 1947, 37, 93-95.

20. Canter, A. An investigation of the psychological significance of reactions to color on the Rorschach and other tests. Thesis, State University of Iowa, 1950.

21. Counts, R. M. & Mensh, I. N. Personality characteristics in hypnotically induced hostility. J. clin. Psychol., 1950, 6, 325-330.

22. Cronbach, L. J. Statistical methods applied to Rorschach scores: A review. Psychol. Bull., 1949, 46, 393-429.

23. Dubitscher, F. Der Rorschachsche formdeutversuch bei erwachsenen psychopathen sowie psychopathischen und schwachsinningen kindern. Zsch. f. d. ges. Neur. u. Psychiat., 1932, 142, 129-158. Cited in Hertz, Marguerite & Elizabeth Baker, op. cit.

24. Edwards, A. L. Experimental design in psychological research. New York: Rinehart, 1950.

25. Eichler, R. M. Experimental stress and alleged Rorschach indices of anxiety. J. abnorm. soc. Psychol., 1951, 46, 344-355.

26. Fitzgerald, J. C. A study of Rorschach color factors as indicators of social acceptance. Thesis, State University of Iowa, 1949.

27. Ford, Mary. The application of the Rorschach test to young children. Univer. Minn. Child Welf. Monogr., 1946, No. 23.

28. Hertz, Marguerite. The Rorschach ink-blot test. Thesis, Western Reserve University, 1932.

29. Hertz, Marguerite. The Rorschach ink-blot test: Historical summary. Psychol. Bull., 1935, 32, 33-66.

30. Hertz, Marguerite. The validity of the Rorschach method. Amer. J. Orthopsychiat., 1941, 11, 512-550.

31. Hertz, Marguerite & Elizabeth Baker. Personality patterns in adolescence as portrayed by the Rorschach ink-blot method: II. The color factors. J. gen. Psychol., 1943, 28, 3-61.

32. Ingram, Winnifred. Prediction of aggression from the Rorschach test. Thesis, Northwestern University, 1950.

33. Jersild, A. T. Child Psychology. (3rd. ed.) New York: Prentice-Hall, 1947.

34. Kardiner, A. The individual and his society. New York: Columbia University Press, 1939.

35. Kelley, D. M. & Levine, K. Rorschach studies during sodium amytal narcoses (abstract). Rorschach Res. Exch., 1940, 4, 146.

36. Kelley, D. M., Margulies, Helen, & Barrera, S. E. The stability of the Rorschach method as demonstrated in electric convulsive therapy cases. Rorschach Res. Exch., 1941, 5, 35-43.

37. Kerr, M. The Rorschach test applied to children. Brit. J. Psychol., 1934, 25, 170-185.

38. Klopfer, B. & Kelley, D. M. The Rorschach technique. A manual for a projective method of personality diagnosis. New York: World Book, 1942.

39. Klopfer, B. & Margulies, Helen. Rorschach reactions in early childhood. Rorschach Res. Exch., 1941, 5, 1-23.

40. Lane, Barbara M. A validation test of the Rorschach movement interpretation. Amer. J. Orthopsychiat., 1948, 18, 292-296.

41. Lazarus, R. The influence of color on the protocol of the Rorschach test. J. abnorm. soc. Psychol., 1949, 44, 506-516.

42. Loosli-Usteri, Marguerite. Le diagnostic individuel chez l'enfant au moyen du test de Rorschach. Paris: Hermann, 1937. Cited in Hertz, Marguerite & Elizabeth Baker, op.cit.

43. McGeoch, J. A. & Irion, A. L. The psychology of human learning. New York: Longmans, Green, 1952.

44. McNemar, Q. Psychological statistics. New York: Wiley, 1949.

45. Malmo, R. B., Shogass, C., Belanger, D. J. & Smith, A. Motor control in psychiatric patients under experimental stress. J. abnorm. soc. Psychol., 1951, 46, 539-547.

46. Masserman, J. H. Principles of dynamic psychiatry. Philadelphia: Saunders, 1946.

47. Miller, D. R. Responses of psychiatric patients to threat of failure. J. abnorm. soc. Psychol., 1951, 46, 378-387.

48. Morgan, J. B. Child psychology. (3rd. Ed.) New York: Farrar and Rinehart, 1942.

49. Murphy, G. Personality. A biosocial approach to origins and structure. New York: Harper, 1947.

50. Oeser, O. Some experiments on the abstraction of form and colour. II. Rorschach tests. Brit. J. Psychol., 1932, 22, 287-323.

51. Pfister, O. Ergebnisse des Rorschachschen versuches bei oligophrenen. Allg. Zsch. f. Psychiat., 1925, 82, 198-223. Cited in Hertz, Marguerite & Elizabeth Baker, op. cit.

52. Piotrowski, Z. Tentative Rorschach formulae for educational and vocational guidance in adolescence. Rorschach Res. Exch., 1943, 7, 16-27.

53. Rabin, A. I. Validating and experimental studies with the Rorschach method. In An introduction to projective techniques (Anderson, H. H. & Anderson, Gladys, L. Eds.). New York: Prentice-Hall, 1951, Pp. 123-146.

54. Rapaport, D. Diagnostic psychological testing. Vol. II. Chicago: Yearbook, 1946.

55. Rickers-Ovsiankina, Maria. The Rorschach test as applied to normal and schizophrenic subjects. Brit. J. med. Psychol., 1938, 17, 227-257.

56. Rorschach, H. Psychodiagnostics. 2nd. ed. (English translation by P. Lemkau & B. Kronenberg) New York: Grune & Stratton, 1942.

57. Ruesch, J. & Finesinger, J. E. The relation of the Rorschach color response to the use of color in drawings. Psychosom. Med., 1941, 3, 370-388.

58. Sappenfield, B. R. & Buker, S. L. Validity of the Rorschach 8-9-10 percent as an indicator of responsiveness to color. J. consult. Psychol., 1949, 13, 268-271.

59. Sarbin, T. R. Rorschach patterns under hypnosis. Amer. J. Orthopsychiat., 1939, 9, 315-318.

60. Saul, L. J. Emotional Maturity. The development and dynamics of personality. Philadelphia: J. B. Lippincott, 1947.

61. Schachtel, E. On color and affect: contributions to an understanding of Rorschachs test. II. Psychiatry, 1943, 6, 393-409.

62. Schachtel, E. & Hartoch, Anna. The curve of reactions in the Rorschach test. A contribution to the theory and practice of Rorschach's psychodiagnostic ink-blot test. Amer. J. Orthopsychiat., 1937, 7, 320-348.

63. Sherman, M. & Jost, H. Frustration reactions of normal and neurotic persons. J. Psychol., 1942, 13, 3-19.

64. Siegel, M. G. The diagnostic and prognostic validity of the Rorschach test in a child guidance clinic. Amer. J. Orthopsychiat., 1948, 18, 119-133.

65. Siipola, Elsa. Implicit and partial reversion-errors: a technique of measurement and its relation to other measures of transfer. J. exp. Psychol., 1940, 26, 53-73.

66. Siipola, Elsa. The influence of color on reactions to ink-blots. J. Personal., 1950, 18, 358-382.

67. Symonds, P. M. The dynamics of human adjustment. New York: Appleton-Century, 1946.

68. Symonds, P. M. Dynamic psychology. New York: Appleton-Century, 1949.

69. Thornton, G. R. & Guilford, J. P. The reliability and meaning of erlebnistypus scores in the Rorschach test. J. abnorm. soc. Psychol., 1936, 31, 324-330.

70. Vaughn, J. & Othilda Krug. The analytic character of the Rorschach ink-blot test. Amer. J. Orthopsychiat., 1938, 8, 220-229.

71. Vernon, P. E. The Rorschach ink-blot test. Brit. J. med. Psychol., 1933, 13, 89-118, 179-200, 271-291.

72. Vernon, P. E. Recent work on the Rorschach test. J. Ment. Sci., 1935, 81, 894-920.

73. Wallen, R. The nature of color shock. J. abnorm. soc. Psychol., 1948, 43, 346-356.

74. Wilkins, W. L. & Adams, A. J. The use of the Rorschach under hypnosis and under sodium amytal in military psychiatry. J. gen. Psychol., 1947, 36, 131-138.

75. Williams, M. An experimental study of intellectual control under stress and associated Rorschach factors. J. consult. Psychol., 1947, 11, 21-29.

76. Williams, M. The experimental validation of the Rorschach test. I. Experimental correlations. Amer. J. Orthopsychiat., 1952, 22, 749-754.

77. Young, R. A. & Higgenbotham, S. A. Behavior checks on the Rorschach method. Amer. J. Orthopsychiat., 1942, 12, 87-94.

78. Zander, A. F. A study of experimental frustration. Psychol. Monogr., 56, No. 3, Whole No. 256., 1944.