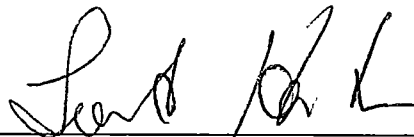


To the Graduate Council:

I am submitting herewith a dissertation written by Justin Randall Padawer entitled "Computer-Modified Rorschach Inkblots: A New Method for Studying Projectives." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.



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Interim Vice Provost and
Dean of The Graduate School

Computer-Modified Rorschach Inkblots:
A New Method for Studying Projectives

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Justin Randall Padawer
May 2001

DEDICATION

This doctoral dissertation in clinical psychology is dedicated to my wife, Sally Gheiman Padawer, whose love, encouragement, and friendship I have treasured for so many years. This is also dedicated to our son, Wolfe Jarod, not quite three years old, who has been a source of great happiness and amusement from the day he was born. Finally, this is dedicated to our daughter, Raine Rhiannon, expected in May, whom we await with so much anticipation and joy.

December 22, 2000

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ABSTRACT

A new method for systematically investigating Rorschach scoring determinants Shading, Texture, and Color is described. Each determinant in the original ten blots is isolated and accentuated using photo-manipulation computer techniques in order to produce an original hyperscripted software program, the "Rorschach Image Presenter" (RIP), which allows subjects to interactively modify each of the inkblots along these dimensions. Pre-computer alterations, including the seminal 1950s work of Earl Baughman, are reviewed in order to contextualize the present work. 110 subjects sat for Rorschach's test, the Fundamental Interpersonal Relations Orientation for Behavior (FIRO-B), and a RIP program session. The hypothesis that subjects would demonstrate with the RIP a preference for the same determinants which manifested during regular Rorschach administrations was confirmed for Shading (Y). However, significant inverse relationships were found for Texture (T). Rorschach Vista (V) and RIP Color (C) were inversely related. A hypothesized "RIP Effect," where subjects diminish on-screen certain determinants according to select aspects of character, is discussed.

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I: INTRODUCTION AND REVIEW OF LITERATURE

Background

Limitations in technology have dictated the terms of Rorschach stimulus value research throughout the test's history. Clearly a methodology has been needed that would permit improved examination of subject interaction with the very building blocks of the inkblot stimulus -- the determinants -- which are universal to all schools of administration and scoring (Rorschach, 1921; Hertz, 1936; Rickers-Ovsiankina, 1943; Beck, 1944; Klopfer, 1946; Rapaport, 1946; Piotrowski, 1957; Exner, 1974). Given the present state of the art in photo-manipulation and imaging techniques, the creative use of computers would allow subjects to interact with one or more determinants, especially Shading, Texture, and Color, in controlled real time; the present study represents a first effort toward this end.

While the literature concerning Rorschach test administration and interpretation is enormous, the debate concerning scoring validity, as well as that of all projective techniques which followed for that matter, remains unfinished. The simple unanswered

question remains: How will we scientifically ascertain the best way of interpreting certain basic aspects of traditional Rorschach scoring, the determinants, irrespective of the various schools of administration and scoring? Such arguments are sometimes reduced to a matter of faith, with believers having relied mostly upon case study, pitting believers against non-believers. The author, like most proponents of the value of projectives, would posit that the projective utility of practically any ambiguous stimulus tells us something of the gazer's psyche. The question, then, has less to do with whether a Rorschach determinant significantly correlates with one external index or another, but rather, how we interpret such a finding. Potkay (1971) noted that experimental failures to validate one interpretive school over another have stood in stark contrast to the instrument's popular clinical usage (p. 4-6). Such disagreements have even resulted in some questioning the validity of the projective technique itself. Exner, in his address to the Society of Personality Assessment accepting their Distinguished Contribution Award, summarized the criticisms in this way (1980):

My experimental colleagues kept harping for proof, often pointing to an increasing number of

publications concerning Rorschach failures. The word was out. The test was neither reliable nor valid, and in the eyes of many, had little more utility in the clinical setting than a set of Tarot Cards. And, unfortunately, many of the criticisms that accumulated concerning the test were quite legitimate. Many clinicians truly believed in the magical x-ray quality of the test and often rendered speculations about people, purportedly from the test data, that would go well beyond the renderings of even the most creative artist (p. 564).

Despite some continued confusion regarding interpretation of determinants, it should be noted here that issues of reliability and validity have been examined with positive results for the Rorschach (Exner, 1978, 1980, 1986a); Exner and Levitt credit the quantity of methods for scoring and interpretation (e.g. Beck, Klopfer, Rapaport, Hertz, Piotrowski, and others) as one source of the persistent validity questions, (Exner, 1978, 1980; Levitt, 1980).

At first glance, the trouble does seem obvious: If one attempts to externally validate a particular scoring factor as being correlated with a particular character trend, for example, whose interpretive method does one use? And how would one defend testing credibility if one method demonstrated one thing but not another, while another method suggested something different? Compounding this, perhaps, is that the two major scoring experts and their respective camps prior to Exner --

Beck and Klopfer -- often chose to emphasize their differences rather than to collaborate. Exner confirms this rift and its negative impact upon test development (1980).

Clearly a sound methodology which would allow investigation of traditional Rorschach determinants, independent of anyone's particular scoring method, would be helpful. The Rorschach must be deconstructed in a way that allows close examination of subject interaction with these determinants, which comprise some of the very building blocks of the stimulus itself. Although Rorschach originally described only Form, Movement, and Color determinants in his original Psychodiagnostics monograph (1921), a fourth, Chiaroscuro (Shading), was briefly described in posthumous writings and a singular score was designated for it (Rickers-Ovsiankina, 1943). Schachtel (1966) elaborates Rorschach's original formulation:

...in his paper on the test of Oberholzer's patient, early in 1922, a few weeks before his death, Rorschach had already formed some impressions about the significance of the shading responses. In this paper, which has been added as Chapter VII to the later editions of his book, he says that the shading responses "have something to do with the capacity for affective adaptability, but an anxious, cautious, unfree type of affective adaption, a self-control in the presence of others and particularly a tendency toward a basic depressive mood and the attempt to control this in

the presence of others." A little later he speaks of the "cautiously adapted and consciously controlled affectivity" indicated by the shading responses. (p. 243)

Klopfer elaborated this determinant, describing several important varieties of shading relating to lightness and darkness. In each of the systems, testing protocols which emphasize such light-dark aspects have been considered to suggest morose personality elements such as anxiety, faulty interpersonal relationships, and painful introspection (Exner, 1974). While such interpretations have been borne out by work across all Rorschach interpretive schools (Levitt, 1980), there is still wide latitude between, for example, anxiety and faulty interpersonal relationships, even though the two may well be symptomatic of, perhaps, yet another underlying commonality. Such differences will require us to effect a more microscopic examination. If only, for example, depressed subjects could literally reach into the cards and change them to their liking, we might be able to frame such formulations from the outside in, so to speak. Surely almost all researchers to date would view such talk as fanciful; the cards are printed and static, unfortunately for research. As Rickers-Ovsiankina has pointed out, "the subject is in the case of the shading response equally, if not more than in the

case of the color response, at the mercy of the environment" (1977). The inkblots have typically been presented to subjects in their standard form, and we are left to make inferences as to what the subject is doing with the stimulus. Largely, this constraint has been a matter of the state of contemporaneous technology. The present author contends that creative use of computer-based photomanipulation technology would allow subjects to interact with one or more determinants, especially shading, texture, and color, in controlled real time.

Rorschach Alterations in Research

Foundations. A literature survey reviewing technologies used in the creation and alteration of the standard Rorschach may be useful at this point in our discussion in order to contextualize the present work. Rorschach himself appropriated an interesting and well-known procedure of his time, the creation of inkblots, for their express stimulus value of provoking creative, non-linear thought (Pichot, 1984). Exner (1969) notes that Justinus Kerner's 1857 publication, Kleksographien, was a popular game book in Germany, had enjoyed several reprints, and was as much a part of intellectual culture as the inkblot game "Blotto" was to popular culture in

late 19th century America. Whipple (1910) noted that Binet and Henri first suggested the use of inkblots in examining mental life in 1895, suggesting that the "fertility of visual imagination might be investigated by means of a series of ink-blots" (p. 430). Soon thereafter, Dearborn (1897) anticipated the mechanics of blot sets and first mentioned what would later be termed determinants:

If the blots be required in series, they are best made on heavy gummed paper squares and stuck upon sheets of the required shape and size. Paper not too smooth is best for the blots, that they may dry quickly and be colored uniformly. If copies larger or smaller than the original are desired they may be made with the pantagraph. Colors, of course, are as easily used as black, and variation in the way of shading is also unlimited (p. 390).

Klopfer (1962) pointed out that although several turn-of-the-century researchers, especially Dearborn (1897, 1898) and Kirkpatrick (1900), used inkblots in their psychological experiments, it was Whipple (1910) who was the first to publish a standardized set of blots and accompanying manual. Interestingly, none of the pre-Rorschach researchers considered the value of inkblots to personality assessment. Rather, their utility was seen in terms of measuring intellectual ability, imagination, and creativity, especially with grade school children. Kirkpatrick (1900) strayed briefly

from this path when he wrote what may well be the first published interpretive inkblot inference, albeit with groups, although he quickly retreated to stark behavioral tallies thereafter:

The smaller number of objects seen in the spots by the children of the fourth, fifth and sixth grades is probably to be explained by the fact that children of those ages have become more critical in their sense perceptions as their ideas have become more definite and as they have learned from life's experiences and from training to be more careful in their judgments. The older pupils of the seventh and eighth grades, on the other hand, have passed into another stage in which they realize that a picture is not necessarily this or that, but may resemble any one of several things, hence they are not afraid to say what it looks like (p. 276).

Pichot (1984) underscores Rorschach's great contribution in extending the use of the blots to a larger examination of overall personality functioning:

The merit of Rorschach was that he was able to synthesize a procedure already known (the inkblots) with the ideas of Jung in his association test and with the insights of Bleuler about using these expressions as "an index of all mental activity" so that "it is only necessary to decipher them in order to know the entire man." (p. 595)

With regard to the technology itself, Rorschach described with intricate detail in the original Psychodiagnostics (1921) how the ink was dropped onto the paper and the paper carefully folded. This simple description was subsequently edited from later revisions; by then, such technological prowess must have

seemed archaically self-explanatory or, at best, quaint. Rorschach's manuscript does not discuss the particulars of the actual production of his blots, including the poundage weight or absorbency factor of the paper used, the type of ink, or if several levels of dilution were used on one or more blots. Such information is still protected by the present publisher, Verlag Hans Huber, although careful steps are taken to ensure the structural integrity of each new printing.

Altered Chromatic and Achromatic Color. The use of altered Rorschach inkblots in research has its genesis in mid-century attempts to explain "color shock," a response delay sometimes observed when subjects encounter chromatic cards rather than achromatic ones, as first described by Rorschach himself (1942):

Some subjects experience an unmistakable shock, an emotional and associative stupor of varying length, when the colored plate VIII appears after the preceding black ones. They find the colored plates more difficult to interpret than the black plates, and they react with astonishment or vexation. Such subjects are always "emotion-suppressors," neurotics of varying grades of severity (p. 35).

By the 1940s, color shock was well integrated within the traditional Rorschach interpretive context (Rabin and Sanderson, 1947). Also known as "neurotic shock," a term which has apparently receded during the decades since, color shock was viewed as diagnostic of

psychopathology. With practically every interpretive school viewing Color as being related to affective life, noticeable response latencies with respect to the chromatic blots were often interpreted as evidencing difficulty dealing with emotion in some way. Still others viewed color shock as evidencing cognitive processing problems with respect to complex stimuli (Levitt, 1980). Regardless, color shock squarely implied neurosis in some form to the Rorschach orthodoxy during the test's first three decades.

In 1940, Brosin and Fromm reported color shock in the protocols of color blind subjects, but Rabin and Sanderson (1947) were apparently the first to follow up this curious finding by questioning the entire construct's underpinnings. Although Rabin and Sanderson did not employ altered inkblots within their research design, unlike the small flurry of researchers who followed them during the next decade, they certainly set the intellectual stage for this line of inquiry:

The Rorschach experiment is based on many premises and assumptions. Most studies with the Rorschach deal with the end results implicitly accepting Rorschach's empiricism. Few critical experimental studies of some of the underlying bases have been made. Such studies would not only give a sounder scientific foundation to the Rorschach test itself, but may illuminate some of the basic psychological dynamisms on which the resulting picture of personality is based.

The number of Rorschach aspects in need of experimental investigation and validation is legion. The experimental approach is frequently rejected by the orthodox Rorschacher on the grounds that the obtainable picture is a function of the configuration or pattern Gestalt; the lifting of any single factor from its context, therefore, may violate Rorschach's basic principle. However the variation of one factor may create a new Gestalt; the new configuration may be compared with the old one and the differences may, consequently, be attributed to the experimental variation of that factor (p. 216-217).

Rabin and Sanderson's technique was to simply alter the presentation order of the inkblots, with the highly colorful Cards 8, 9, and 10 being shown before the rest in reverse order (10...1) down to Card 1 which was shown last. The test-interval-retest procedure used in this study, duplicated in so many similar studies which followed, was to test counterbalanced matched groups of subjects, first with the standard Rorschach administration and, after a period of time, with the experimental procedure, or vice versa. Subjects in the Rabin and Sanderson study likewise took both tests with a two month hiatus between administrations, half beginning with the regularly ordered test and the rest with reverse order. Rabin and Sanderson found that "the reverse order (X-I) of the cards, as such, has no effect upon the production or reduction of color shock" (p. 224). This finding may have surprised those who

believed that the sudden appearance of color, following the presentation of a less-provocative achromatic blot, was so "shocking" to the neurotic patient that his or her characterological problems would be evident. Instead, they surmised that some of the cards are simply more subjectively difficult than others:

Considerable doubt is, therefore, cast upon the validity of the "color shock" which is attributed to the suddenness of the appearance of color in the temporal series. It may as well be due to actually greater difficulty of certain cards and lesser potentiality of others to evoke responses (p. 225).

The next question, at least for some researchers, was a logical one: Is it really the color at all that results in observed latencies on some cards, or is it formal complexity or even something else? In order to answer this obvious next step, the hallowed Rorschach images themselves would need to be fundamentally altered for research.

Prior to World War II, document preparation techniques were not of the quality needed to duplicate and modify complicated, multi-color images like Rorschach inkblots with high fidelity (sans using the original engraving plates, which in the case of Verlag Hans Huber's Rorschach were highly protected and still unavailable) without introducing new confounding variables such as moiré distortions or light-mirroring

gloss. However, by 1948, Wallen photographed the chromatic inkblots with black and white film which he considered good enough for researching the color shock question. It would be interesting to view these original photographs today in order to compare them with the results of contemporary imaging techniques (now most often completed entirely by computer with exceptionally high digital fidelity). Indeed it is likely that today's investigator would deem unacceptable the quality of this first altered set, which were produced by

photographing each plate of the standard printed set on panchromatic film and making enlargements the same size as the standard cards. The resulting photographs gave satisfactory achromatic rendering of the various color brightnesses, but the achromatic cards were not reproduced with the most desirable accuracy. The photograph of card I, for example, was more densely black than the printed blot, while the reproduction of card IV was of a noticeably lighter gray than the original. In addition, the figure-ground contrast in the photographs was less than in the standard cards because of the characteristics of the printing paper and the problems encountered in enlarging. In view of these irregularities we used photographs of all ten plates rather than of the five colored ones only. The reproductions of the achromatic cards could thus provide controls for estimating possible distortion introduced by the quality of the photographs (p. 349-350).

In other words, rather than just presenting the five standard achromatic blots along with the chromatic ones rendered in black-and-white through photography, Wallen controlled for qualitative differences by simply

photographing all ten in black-and-white -- even though those renditions introduced new, and possibly confounding, variances with respect to the originals. Regardless, Wallen's pioneering techniques should be regarded as the seminal event in this investigative line.

Wallen introduced another technique with this pioneering work: rather than test his subjects in accordance with any particular Rorschach school, he simply presented the cards and asked his subjects how well they liked each one. His thinking was that subjects sensitive to color shock would express a preference for those cards which did not cause shock:

To relate our data to shock, we assume that a shock reaction would usually result in expressed dislike of the card. True, other factors, such as purely esthetic preferences, may result in dislike; but if a blot is a source of shock, then disliking should occur more frequently than it would on esthetic grounds alone (p. 347).

Like Rabin and Sanderson, Wallen also investigated the effects of sequence. He furthermore examined the impact of presenting the cards upside-down, and he analyzed variances between groups of subjects deemed stable versus neurotic as well. Ultimately, Wallen found no discernible aversions to the color presentations of those images most usually associated

with color shock -- cards VIII, IX, and X. In fact, "Multi-colored cards are better liked in the standard form than when they are rendered achromatically," and, interestingly, "Cards II, VI, and IX elicit more dislike reactions among unstable men than among stable men, but only for card II does color appear to be important as the source of the dislike" (p. 353-355). Where the effect of color was found to be significant, unstable subjects examining card II often compared the red ink on that card with blood when subsequently asked to describe their responses. Inverting the cards had no impact upon the results. Finally, cards which appeared late in a series, whether the blots were presented in regular order or not, were found to be more popular (p. 355-356). These results prompted Wallen to substitute another construct, "shading shock," as a possible answer to the color shock question:

In the discussion it was pointed out that color [on Card II for unstable subjects] produces shock because it facilitates associations which have a disturbing effect upon the individual. The same principle will explain shading shock. In some instances the shape of the blot makes it hard to develop a meaningful percept, and this difficulty may produce an emotional reaction in the insecure person. These principles operate in other situations than the Rorschach test, but usually there is no way of observing the reactions satisfactorily. The data provide some evidence of the diagnostic validity of the Rorschach method, because they objectively demonstrate that unstable

persons show affective reactions different from those of stable persons (p. 356).

Lazarus (1948; 1949) continued this line of inquiry through improved photographic techniques and the use of a group Rorschach administration to examine the influence of color. While Wallen had posited that unpleasant associations cause shock on certain cards irrespective of their color, and Rabin and Sanderson had emphasized the objective difficulty of certain plates again without regard to color, Lazarus noted that color nonetheless appeared to be linked with a certain response style. Even so,

Because color happens to be present in the cards on which certain behavior is found, is not in itself adequate grounds for assuming that it is responsible for the behavior (p. 506).

Lazarus administered a group Rorschach to one hundred high school seniors split into counterbalanced matched groups. Half the subjects received the regular group administration followed six weeks later by an achromatic retest; half received the achromatic version first. Since latency times associated with color shock cannot be measured directly during a group administration, Lazarus utilized 12 of Beck's 15 indices of shock, specifically 1) number of responses; 2) card rejection; 3) appearance of F-; 4) absence of Z-score; 5) absence

of popular response; 6) sequence deviation (jumping back and adding a response to a blot later); 7) ratio of responses to Cards VIII, IX, and X with responses to Cards I through VII; 8) more M-, M in Dd, M in Hd, and Fm more than M by itself; 9) F more than M or FM; 10) $A\% = 100$; 11) appearance of anatomy; and 12) Hdx or Adx (Beck, 1946, p. 37-39). Three other Beck shock indices were not usable with the group administration -- i.e., first response times, extraneous verbalizations, and regressive shifting of color responses.

Lazarus' major finding was that color shock did not seem to depend upon color, nor did the presence or absence of color seem to impact scoring (1949):

In view of the essentially negative results obtained with respect to the influence of color on the scoring categories and on the presence of "color shock," and the data concerning the relative difficulty of the slides, the conclusion appears warranted that the theoretical framework on which the color concepts have been based must be revised. In the main, color does not seem to affect the scoring categories of the test or the frequency of the indices of "color shock." Since, in many instances, chromatic slides are more difficult than achromatic slides, there appears to be little justification in comparing the subject's performance on the chromatic slides with his performance on the achromatic slides. Only when the stimulus value of each slide is known through careful normative studies can this comparison, which is the basis of "shock" evaluation, be made (p. 512).

Lazarus cited Wallen's hypothesis that issues other than color, including "pre-existing and inflexible sets to organize or analyze, shading, or other factors related to the subject's experience may be involved" (p. 512).

Because the technology was suddenly good enough to allow such alterations, a flurry of altered-Rorschach experiments followed investigating Color as an independent variable. Sappenfield and Buker (1949) investigated the notion, first popularized by Klopfer (1942), that the ratio of responses to color Cards VIII, IX, and X to the number of responses for an examinee's entire protocol was diagnostic of neurosis if that ratio was either too low or too high. This ratio, more commonly known as the 8-9-10 per cent, established 30% as the cutoff for underproduction, signifying affective avoidance, and 40% to 50% as the minimal zone assuming overproduction, or emotional lability. Sappenfield and Buker hypothesized that "if productivity on blots VIII, IX, and X is truly a function of responsiveness to color, then productivity on the last three cards of a completely achromatic series of Rorschach blots should not differ from productivity on the other seven blots, since in this case there would be no color differences among the blots" (p. 268). Toward this end, they

implemented a test-interval-retest protocol with 238 introductory psychology students, about half of whom viewed the standard Harrower-Erickson Rorschach slides first and the experimental achromatic series one week later, with the rest viewing the tests in reverse order. The experimental slides were prepared in this way:

Achromatic slides for cards II, III, VIII, IX, and X were reproduced locally by photographic means. Cards II and III were reproduced on Super XX at f. 1/32 and cards VIII, IX, and X on XF Pan at f. 1/22, and mounted on Kodachrome binders. It was necessary to use the contrast XF Pan for cards VIII, IX, and X because the brightness values of the figures on these cards are very close to the brightness values of the white backgrounds, and normal film will not record the same contrast that is apparent when hue is present (p. 268-269).

No statistically significant differences were found between mean number of responses in the two groups. Moreover, there were no differences between the two groups at every grouped distribution (in three percentile clumpings, with 0-3% at the low end and 56-59% at maximum) for the calculated 8-9-10 per cent metric.

In their study, Sappenfield and Buker mentioned the need for duplication with individually administered Rorschach blots, an experimental objection answered in a study published shortly thereafter by Dubrovner, Von Lackum, and Jost (1950), who used altered inkblots with

individual subjects, 30 female student and graduate nurses, in this manner:

The Rorschach stimulus figures were reproduced photographically in black and white and mounted on cards approximating the standard size. Although the reprints were reasonably exact, several artifacts could not be eliminated. As would be expected in such an achromatic reproduction, precise similarity to the originals was not obtained in certain shading effects, and in the contrast of areas within certain ink blots ordinarily due to multiple colors (p. 332).

Despite the technological limitations, a test-interval-retest technique was applied with counterbalanced groups of 15 nurses in each group as in the previous studies, except that each subject was tested individually during the first and second administrations, with a mean interval between tests of 14 days. Individual administration also allowed direct measurement of first response latency. No differences were found between these counterbalanced groups with respect to either response productivity or speed of reaction time.

Interestingly,

On retest the results show the same tendency of the "color cards" to produce more responses than the "non-color cards" regardless of the presence or absence of color... [In both sets] Card X is consistently and unquestionably the most productive, an observation which is in harmony with general findings. The fact that this superiority occurs during both types of administration indicates that if color does influence productivity on card X, it is not the crucial factor (p. 332-333).

In her direct examination of 8-9-10 per cent with individual subjects, Perlman (1951) improved the technical quality of her altered blot sets through a more complex chemical procedure:

Special efforts were exerted to maintain the brightness relationships of the standard blots in the reproduced set. Photographic negatives of the standard Rorschach blots were made on panchromatic half-tone film (Panatomic-X) and all background and white-space areas on the negatives were opaqued. From these negatives contact prints were made on glossy bromide paper and the prints were dried semi-matte. This procedure was not sufficient, however, to correct minor distortions in the brightness relationships. Therefore, each negative was printed until the lightest area of the print matched that of the original card. Before the prints were dried, a potassium ferricyanide bleach was applied to those areas which appeared too dark. All ten cards were treated in the same manner, although the bleaching technique was not required for the standard noncolored cards (p. 122).

70 subjects sat for the now standard test-interval-retest counterbalanced procedure with standard Klopfer administration and scoring. Perlman used four groups in order to control for confounding variables related to practice effects, testing order, and mental status. Subjects in Group I, with 18 university students, sat for the Achromatic blots first and then the Standard blots one week later. Group II, 10 student subjects, received the tests in the same order but with a six to eight week hiatus between them. Group III, with 8 students, took the Standard chromatic set first and then

the Achromatic one after a week. Finally, Group IV, comprised of 34 inpatient psychiatric patients well enough to cooperate with the experimental protocol, duplicated Group I's testing order and interval. Finding no statistically significant differences between groups for means and variability in the 8-9-10 per cent in either the first or second testing administrations, Perlman hypothesized that perhaps the overall increased productivity on those three cards, irrespective of their chromatic status, provided a measure of overall responsivity to external stimuli. She also noted that retesting resulted in less response variability across all groups, a caveat against the clinical notion that improvement in a Rorschach retest is necessarily a useful diagnostic tool (p. 124).

Although Buker and Williams (1951) found that the absence of color reduced response latency in a group of 21 schizophrenic inpatients, other aspects of subject response remained unaltered, including other indices of shock. Buker and Williams also utilized the test-interval-retest technique with counterbalanced subgroups and a 1 month hiatus between administrations. The conclusion that "even the concept of 'shock' may be the result of little more than a measure of the differences

in difficulty of the separate cards" mirrored earlier findings (p. 201).

One critic of this research line, Siipola (1950), altered the blots by cutting and photographing only blot pieces or "bits." Siipola did not use the test-interval-retest counterbalanced technique previously described with her 132 subjects, all freshmen and sophomore students at a women's college. Instead, she presented one group of 72 matching Rorschach bits, both chromatic and photographically rendered achromatic versions, while the second group of 60 received the same blot bits except all were achromatic. In order to avoid the impact of practice effects, her major criticism of her peers in this research line, no retesting was conducted. Finding that response times for various chromatic bits were longer than for achromatic versions, but mediated by what she termed "hue-form incongruity," i.e. the degree to which the formal stimulus value of a bit matched its color, she offered a cognitive-perceptual explanation which retained the impact of color as an integral factor:

The fact that the presence of color in ink blots induces such affective phenomena as associative blocking, strong emotional reactions, and symptoms of conceptual and behavioral disorganization has commonly been explained by the theory that colored blots are affect-laden because of an intrinsic,

somewhat mysterious, affinity between color and affect. Our results have suggested an alternative hypothesis according to which these symptoms of affective involvement are regarded as an indirect effect of the presence of color rather than a direct effect of hue as such. (p. 381)

In other words, Siipola hypothesized that the commonly observed impact of color upon subject performance had less to do with emotional factors than cognitive ones. The addition of color, especially where color would be unexpected (the "hue-form incongruity" she referenced) basically made the cognitive task more difficult, which might then logically impact reaction times, invite frustrated facial expressions, and other behaviors. Hence, "the mere presence of color in a blot does not endow it automatically with magic affect-arousing properties" (p. 381).

To answer objections that she did not utilize retested counterbalanced groups, Siipola, Kuhns and Taylor (1950) raised serious methodological questions with respect to that procedure by directly studying the impact of memory upon such results. Ninety-eight student subjects sat for a test-interval-retest technique, using the specially prepared Rorschach "bits" cards from the previous Siipola study, with a one month hiatus between testing sessions. Of these subjects, 72 viewed the regular chromatic blot bits and then the

achromatic versions. The other 26 subjects viewed the achromatic versions both times. Yet another 15 subjects were reported from a preliminary experiment, identical to the Chromatic-Achromatic group except that the order of testing was reversed. Siipola, et. al., found that the practice effect was greatest for those who received the achromatic sets first, regardless of whether this was followed by another achromatic presentation or by a chromatic one. When the chromatic set was presented first, the impact was found to be less impactful (p. 160). The implications for other researchers were clear. If the retesting order sequence impacted response behavior, then this introduces yet another confounding variable: results may tell us nothing about the impact of color per se, but instead may serve to illuminate the impact of memory upon the task. Examining the differences in reaction times between the first and second administrations for both groups also emphasized memory, rather than the effect of color, as the driving factor:

The results are conclusive in showing that there are no significant differences between the two groups with regard to the relation of the individual reaction times in Series II to those of Series I. The very slight difference between the groups in the amount by which reaction time decreases in the second series, 1.20 [for the Chromatic-Achromatic group] as compared with 1.28

[for the Achromatic -Achromatic group], is not statistically significant. Since there are no differences between the results for the two groups, one cannot attribute the decrease in reaction time in Series II for Group Col-Bk to the color variable; the decrease may be accounted for by the memory factor common to both groups.

While this seems to contradict the results of the earlier study (Siipola, 1950) where the presence of color increased latency times when identically matched pairs of chromatic/achromatic inkblot "bits" were randomly presented in the same experiment, the difference was explained in cognitive terms once again. Siipola suggested that assessing response latency may have less to do with shifts in mood than with the simple processing delays associated with considering the two types of visual stimuli (p. 162). Concerns that Siipola's cut-out "bits" may have been different enough from a standard Rorschach blot to introduce yet another confound, or that the immediate representation of the stimuli in the first study may fail to provide a useful method of measuring change, are apparently not addressed in her work.

Meyer (1951) desired to answer some of the criticisms leveled by Siipola against group presentations and the test-interval-retest procedure through: 1) testing individuals, as Siipola did; 2)

using traditional experimental and control groups, each sitting for one test, rather than the test-retest format; and 3) analyzing data for individuals as well as for the groups. He furthermore presented the actual blots, in line with other researchers, rather than the excised pieces Siipola advocated. Meyer matched both subject (age, gender, source) and material variables (photographic techniques, image intensity, card weight and size) in order to carefully isolate only color as the experimental variable between each of his two groups of 30 introductory psychology students. Standard Beck administration and scoring were employed. Utilizing Beck's list of color shock indices as well as his own diagnostic heuristic where the presence of two or more indices is said to indicate color shock (1949, p. 39), each protocol was examined for the phenomenon. Interestingly, Meyer found no significant difference between the control [chromatic] and experimental [achromatic] groups with respect to the diagnostically determined presence of color shock. In other words, there were no statistically significant differences in the amount of color shock manifested by the two groups, even though one might expect the group viewing the chromatic blots would evidence a much higher quantity of

such behavior. Moreover, and perhaps even more interesting, was his finding that "color shock appears to a significant degree in the large majority of supposedly normal college students of an introductory psychology course" (p. 370). This led him to question shock's basic diagnostic utility as a neurotic sign. If, he questioned, color shock was so common as to appear almost universally among apparently normal, well-adjusted college students, how could it suggest psychopathology with other populations? Meyer further suggested that "shading shock" be investigated as well, since the criteria for that were observed to be identical to such signs observed irrespective of a card set's chromatic status (p. 370).

To accommodate a group of researchers doing a similar investigation (Allen, Manne & Stiff, 1951; Allen, 1951; Allen, Manne & Stiff, 1952; Allen, Stiff & Rosenzweig, 1953), Verlag Hans Huber, the Swiss publisher of the Rorschach cards, printed the five chromatic cards in black ink using the same presses, pressure, and paper of the originals. By the mid-1950s, Verlag Hans Huber published this set to meet the demands of similarly-interested investigators. Allen, Manne,

and Stiff (1951) detailed the need for and creation of an achromatic set from the test's publisher:

A survey of the published studies concerning the problem of color shock disclosed a need to control the important factor of shading in the achromatic reproductions of the colored cards for the experimental series. Past techniques included reproductions of the colored cards in black and white on photographic paper or slides. For this study cards 2, 3, 8, 9, and 10 were printed in black ink by Verlag Hans Huber of Bern, Switzerland, under these conditions: 1. use the same presses, and 2. the same black ink as in printing the non-color cards, 3. the same pressure to be applied to the plates as in printing the standard color cards (p. 237).

How Verlag Hans Huber was persuaded to produce such a set, or if they decided to do so without such suggestion, is not discussed. Regardless of origin, these researchers were the first to utilize the best achromatic reproductions of the blots yet devised. Only the digital imaging techniques of fifty years later would match such an elegant solution with respect to matching and adjusting subtleties in shading, texture, and hue.

Allen, Manne, and Stiff utilized 25 undergraduate students in a counterbalanced test-interval-retest design, with 13 subjects assigned to the standard chromatic group (Set C) and 12 assigned to the experimental achromatic group (Set A). A six week interval was used between administrations, which were

scored according to Beck for Location, Determinants, use of Populars, and Approach Expectancy, with Klopfer's criteria used for the remaining determinants (p. 237). A literature search by the authors revealed 15 indices of color shock, of which 13 were considered:

1. Exclamations and emotional comments
 2. Refusals in 2, 3, 8, 9, 10
 3. Decline in number of responses to color cards
 4. Response total reduced (between A and C)
 5. Less than 33% responses to 8, 9, 10
 6. Decline in F+ in 2, 3, 8, 9, 10
 7. Decline in 2, 3, 8, 9, 10 W
 8. Decline in 2, 3, 8, 9, 10 D
 9. Decreased popular responses in 2, 3, 8, 9, 10
 10. Long reaction-time in 2, 3, 8, 9, and 10
 11. Very short reaction-time in 2, 3, 8, 9, 10
 12. Impoverished content between groups A and C
 13. Excessive card turning
- (p. 237)

Of these, index 1 was deemed unsuitable for the statistical methods used by the authors, and reaction times (indices 10 and 11) were reported in a subsequent paper (Allen, 1951). Since color was entirely absent from Set A, precluding between-group comparisons, two other identified shock signs were never considered for inclusion -- "absence of color-determined responses, and flight into color-determined concepts in plates 2, 3, 8, 9, and 10" (p. 237). Of the remaining signs of color shock, no statistically significant differences were revealed between the two groups.

Allen (1951) utilized the same data sets to analyze reaction time across the two groups. In doing so, he noted that a popular guideline for diagnosing color shock involved examining the ratio of response reaction times between the color and non-color cards; if average response latencies on the color cards were 1.5 times more than the non-color ones, then shock was indicated (p. 482). Allen, then, compared the response times for each subject as a ratio between mean response time for Cards II, III, VIII, IX, and X to the mean response time for Cards I, IV, V, VI, and VII, with an index equal or greater than 1.5 indicating color shock. No statistically significant differences were noted between the group seeing the standard cards and the group where all ten cards were achromatic. In other words, "color shock" as defined by the latency ratio appeared just as often with Set A's 10 black-and-white inkblots as with Set C's standard ones. Of the 25 subjects, four demonstrated shock on both sets, three showed shock on Set C only, while three others evidenced shock on Set A only. And, of course, some subject protocols manifested no color shock at all (p. 483). Allen, Manne, and Stiff (1952) followed up again, using the same archival data, in analyzing consistency of responses, i.e. similarity

in response wording, location, and card position, across the two administrations. Again, no statistically significant differences were observed. Allen, Stiff, and Rosenzweig (1952) duplicated their work with inpatient VA Hospital patients, including 10 neurotics and 8 psychotics who were well enough to cooperate with the dual administrations. As with the previous work, the groups were counterbalanced (in this case, 5 neurotics and 4 psychotics in each group) and were retested after 6 weeks. Once again, no significant differences were reported for any of the color shock variables examined.

Brody (1953) reported similar results with a much larger sample, 100 white males aged 18-35, half college students, and half clinically diagnosed neurotic outpatients. Each half was again subdivided, so that four groups were tested: 25 controls and 25 neurotics took the standard Rorschach first, followed a week later by a photographically-derived achromatic experimental set; another 25 controls and 25 neurotics viewed the experimental blots first, followed in one week by the standard Rorschach. Standard Klopfer administration and scoring were utilized. Brody found that neither response productivity nor initial response time varied across any of the groups. Moreover, more D responses

were noted with Cards VIII, IX, and X of both the standard and experimental achromatic blot sets; likewise, more W responses were observed with the other blots, postulating that some blots are just inherently more difficult than others. Considering the overall structure of the blots, she posited that, for example, Cards VIII, IX, and X were more structurally complex than earlier achromatic cards, leading to longer observed reaction times irrespective of whether those cards were presented in their usual color format or not. She further observed no statistically significance in reaction times between controls and neurotics on either the regular Rorschach or the experiment achromatic set, leading her to join those who questioned reaction time as diagnostic of either color shock or of psychopathology generally (p. 307).

The need for a more subtle examination evidenced in Brody's work, however, when she noted that neurotic subjects seemed more visibly disturbed when handling the color inkblots than did the controls. She further noted that the order in which the neurotics received the chromatic and achromatic sets impacted their response patterns. If the neurotic subjects were exposed to the achromatic blots first, then they were able to

generalize more normative response patterns to their experience with the chromatic ones. Perhaps, then, something about the presence of color could differentiate psychopathology and researchers were simply paying too much attention to latency times and other arcana (p. 307-308).

Levy and Kurz (1957) utilized photographic slides of the standard color Cards VIII, IX, and X, as well as black and white versions, in their Semantic Differential study of the impact of color on the Rorschach. Using the test-interval-retest procedure, with a two week period between group administrations, 68 introductory psychology students were assigned to one of four experimental groups: Fifteen subjects examined the three standard color cards and then subjectively rated each according to a list of word pairings, followed by the same task with the Achromatic version during the second administration. The second group's 14 subjects saw the Achromatic cards first, followed by the Chromatic cards. Twenty-two subjects took the Chromatic test both times, and 17 sat for the Achromatic version both times. Each subject was also given the Taylor Manifest Anxiety Scale. A significant difference in Semantic Differential ratings between the chromatic and

achromatic slides was reported, lending credence to the notion that the impact of color is more subtly related to the actual nature of the percept, i.e. the connotative meaning of the response. Moreover, like Brody before them, Levy and Kurz noted that maladjusted individuals tended to respond to the presence of color differently. Healthier subjects tended to focus more upon overall structure (p. 623-624).

Using the Hans Huber standard and achromatic sets, Crumpton (1956) suggested that the presence of color does impact the overall content and quality of subject protocols, as evaluated globally by "expert judges" (23 VA Hospital clinical psychology trainees). Thirty hospitalized neuropsychiatric patients were administered the Chromatic version, and 30 others were administered the Achromatic version. Each subject took only one version; once the administration was completed each was asked to identify the blots preferred most and preferred least of the entire set. Finally, each subject was asked to view the matched Chromatic-Achromatic pair for each card and identify which was preferred. The "expert judges" finally evaluated pairs of protocols, one from the Achromatic group alongside one from the Chromatic

group, and answered questions, two of which Crumpton mentioned as examples:

Which of the two shows the greater reaction to color? (Question No. 2), Which record shows more neurotic disturbance? (Question No. 6).

Since both groups were roughly equated with respect to psychopathology, one might expect that the two groups would appear equally so to the judges. However, the Chromatic group appeared more neurotic to judges, while the Achromatic group appeared more psychotic and organically disturbed. Interestingly these results seem to be in opposition to the notion that color encourages a deterioration of response, especially with psychiatric patients. In this case, it was the patients who examined the colorless blots who produced the more disturbed responses. Moreover, signs of color shock were evaluated for each protocol; yet again, none of the observed signs of color shock depended statistically upon the actual presence of color in the blots, with the experimental achromatic versions resulting in comparable incidences of "shock" (p. 152). Crumpton followed several years later with a study utilizing the Hans Huber achromatic and standard blot sets and the Semantic Differential device employed by Levy and Kurz (1956) with 50 hospitalized VA inpatients. In this case, Color

was again supported as impacting the connotative quality of the response content (Crumpton & Groot, 1966).

In a straightforward early Exner study, the counterbalanced test-interval-retest design was rejected. Citing and adopting the approach taken by Meyer (1951), Exner used two matched groups of 20 college students each, one given the achromatic set and the other the standard set. A significantly greater number of responses to chromatic cards than to achromatic versions was found, indicating that perhaps the earlier studies which claimed no differences between such groups were flawed in some undetermined way (Exner, 1962).

Hays and Boardman (1975) returned to the counterbalanced group test-retest design, but without an intervening time interval. Using slide reproductions of the chromatic and achromatic sets shown to 120 introductory psychology students, the Semantic Differential approach was used to once again examine the relevance of connotative factors. Hays and Boardman found that color increased the "positive value" of four of the five cards, decreased the "potency" of four of the five chromatic cards, and caused cards to be rated as "more active" (p. 23). Despite these initial

observations, overall connotative meaning was found to be generally unaffected by the presence of colorful inkblots, "Rorschach tradition notwithstanding" (p. 24). Said differently, through asking subjects to rank cards according to semantically-related word pairs, Hays and Boardman demonstrated that the presence of Color did not appear to directly impact the resultant meaning assigned to the card. As a result, they concluded that the chromatic blots must be more ambiguous than their black-and-white counterparts. That Cards VIII, IX, and X had already been shown to be more ambiguous irrespective of color, rather than because of color, was not addressed by these researchers (p. 24).

During the same period, the first study to use monochromatic card sets (sets of cards printed entirely in shades of blue, for example) demonstrated with 30 undergraduate subjects that it was the "interaction between Form and Color" which was significant in encouraging response productivity, rather than the impact of color or shading alone (Grayson, 1956). The 30 subjects viewed the cards individually in a specially designed "Latin Square" arrangement where each card ended up being viewed by 3 subjects, and each subject viewed 10 cards and noted down their percepts and

judgments within a Harrower-Erickson booklet commonly used with group administrations. Grayson further found that card preference, on the other hand, was significantly related to color and shading, but not to productivity. Given how pioneering were Grayson's attempts to alter both color and shading, especially within the technological restraints of the time, his technique for producing the blots bears mentioning. In order to study the subtleties associated with various levels of shading, he used the Kodak Dye-Transfer process utilizing monochrome dyes to produce ten sets of Rorschach cards, each varying from the other in terms of overall darkness as well as hue (p. 287).

Using monochromatic cards, Exner similarly demonstrated that content quality is determined by various chromatic and achromatic colors in two studies (Exner, 1959; Exner, 1961), supporting the earlier work by Crumpton (1956) and by Crumpton and Groot (1966). In these studies, Exner reproduced Card I in the hues of blue, green, and magenta found in Cards IX and X (1959), and Cards IV and VI in the blue found in Card X (1961). In the first study, 400 undergraduate students were administered Card I in one of its four forms (the standard version, or Exner's blue, green, or magenta) in

standard fashion as if the single card comprised the entire Rorschach sequence. In other words, standard instructions were given, except that only this card was used. As with a regular full administration, free association was followed by an inquiry, response latencies were noted, and the percepts were scored in accordance with both Beck's and Klopfer's systems.

Exner found that the greatest number of responses, the briefest response latency, and greatest number of small detail responses were elicited by the blue version of the blots (1959), indicating that a blot's hue seemed to impact subject behavior in direct opposition to most earlier studies. Shading components were utilized far more with the use of the green version. Magenta and green elicited the lengthiest reaction times.

Connotative results also proved significant, with the use of the whole human figure being more prevalent with the blue card, whole animal figures being more prevalent with the standard achromatic version, and a large number of botany-related percepts manifesting on the magenta and green cards. Exner's research hypothesis that the very presence of color impacted individual response, even when the color was entirely incidental to the card's structure (an all blue Card V, for example), was

therefore supported. Noting that "different chromatic colors have significantly different stimulus characteristics," Exner suggested that improved methods for examining color-influenced responses be developed (p. 425), a task not yet completed some forty years later.

Results for the follow-up 1961 study were not as compelling. Eighty undergraduates were administered Cards IV and VI, with counterbalanced groups receiving either the standard cards or the colorized versions. No significant differences between the two groups were observed, which suggested that

achromatic color does not play a very important role in influencing a subject's response to either of these cards. Certainly it is demonstrated as unimportant in precipitating the popular "skin" responses. This seems to add weight to Baughman's findings that the shading and form of the cards are most influential in precipitating these responses (p. 39).

As with the 1959 Exner study of Card I, there was a significant difference favoring blue for reaction time, suggesting that "the blue color as is used in the D1 area of Card X is much easier to respond to than other colors" (p. 39). Interestingly, in these early studies may be found the origins of his Comprehensive System (Exner, 1974): "This indicates that there may be a need to formulate better methods of inquiry or establish

common interpretations of certain 'perceptual' type responses so as to differentiate them from 'projective' type responses" (Exner, 1959, p. 425); "...it seems more logical than ever to appeal for some agreement between scoring systems so that a distinction can be made between responses determined by achromatic color and responses determined by shading" (Exner, 1961, p. 39).

In a completely different line of research, Gill (1966) utilized altered Rorschach inkblots similar to what Siipola effected, where only bits were presented. In this case, however, those parts of blots thought to elicit FC and CF responses were selected, and "each card was covered by a white cardboard so as to expose only the selected location" (p. 548). In attempting to study the complex interplay between response delay and ego controls, and the ability of color on the Rorschach to evidence such ability to delay or sublimate gratification, Gill presented a series of original problem-solving puzzles (the "Problem-Solving Task") as well as presentation of the modified Rorschach (the "Perceptual Task"). His hypothesis that better FC:CF ratios are indicative of effective ego functioning was confirmed. Results revealed a significant relationship between ability to delay one's response and the

production of FC responses and, similarly, a relationship between more impulsive responding and CF and C responses. With this interesting study, then, Gill altered the Rorschach not to investigate the Rorschach for its own sake, but instead to illuminate possible clinical utility within an ego psychology theoretical frame.

Altered Texture. Balloch (1952) photographed the first seven cards of the Rorschach and two other inkblot sets, the Behn-Rorschach and the Harrower, at "three different contrast levels." Essentially this was achieved in a creative fashion, not by varying the image's effective mathematical amplitude and frequency as this impacts the visual image (as with the contemporary digital technology used in the present work), but instead by altering the type of photographic paper used in printing each contrast level:

These 21 ink blots were photographed on Kodak Commercial film, a film which seemed to give the best rendition of the red coloring on Cards II and III in each series. Each of the resulting negatives was then reproduced by the contact process on Kodak Azo papers No. 0, 2, and 4, making a total of 63 ink blots, 21 of light shading contrast, 21 of medium contrast, and 21 of strong shading contrast. From data supplied by the manufacturer, it appeared that Azo papers No. 0, 2, and 4 would yield approximately equal intervals of shading contrast.

Balloch found that the number of Texture, Achromatic Color, and Vista responses correlated positively with the amount of contrast in blots given to three counterbalanced groups of 25 undergraduate subjects each. Rather than elaborate, as the present study posits, that an image's apparent depth and textural qualities were dependent upon the relative difference between its light and dark areas (i.e., contrast), Balloch simply noted that when contrast is deepened, more stark black and white areas emerge. He further suggested that such delineated areas resemble observable objects far more often than do milder gradations of grey (p. 123). Irrespective of his conclusion, this Balloch study was a pioneer among Rorschach studies to consider how opposing light values, i.e., light and dark areas varied in opposite directions, impact stimulus response.

Marks (1961) also used creative photographic manipulations in order to investigate the impact of Texture upon response productivity on Card VI, which was "selected owing to its demonstrable texture loading" (p. 38). Marks altered Card VI in this way:

The experimental Card VI (E card) was constructed to approximate the standard (C card) in size, weight, and surface quality. In order to eliminate texture, the blot was reproduced in a monotone gray. The reproduction was printed from an engraved plate, processed photographically from an

overdeveloped negative of the standard blot (p. 39).

Subjects were culled from an introductory psychology course and were assigned to two groups, the "E card first" group and the "C card first" group. 33 subjects comprised the E card first group, which received cards in this order: I, II, III, IV, V, E card, VII, C card. Thirty-eight comprised the control group which viewed the blots in this way: I, II, III, IV, V, C card, VII, E card. No significant differences between the total number of responses to the E and C cards emerged. While Texture did not influence overall response productivity, it did significantly encourage the production of the popular "fur" response to that card. Even so, Marks noted that such responses often occurred with the experimental form-only Card VI in any case, an interesting development that seemed to confirm the formal stimulus value imbued within that inkblot.

In another effort to better understand how internal contrast impacts the types of responses given, Eckhardt (1957) adjusted internal content photographically. Like Siipola (1950), he identified parts of blots which interested him, and like Balloch (1952), he modified only Cards I through VII at various levels of alteration using crude photographic manipulations. Three textural

levels of gradient and contrast were produced. Eckhardt's first set retained the same detail as the regular Rorschach inkblots. The second set were reproduced with a "two-toned pattern of brightness.". Finally, the third set was a photographic monotone. Unfortunately, Eckhardt did not detail exactly what constituted the two-toned pattern of brightness, although we are left to surmise that this was simply a silhouette of either black and one shade of grey or two shades of grey. The monotone is similarly unclear but we can safely assume that it was probably either a black or grey silhouette. All three sets were shown, each in sequence, for a total of 21 cards, to 20 student subjects. Standard free response and inquiry for each card was conducted, and standard Klopfer scoring was utilized. Eckhardt found that Texture responses correlated with the regular fully-shaded images or, as he put it, were determined by "brightness gradients, defined as gradual transitions between various degrees of brightness" (p. 172). Transparency responses were correlated with the two-toned images or by "brightness contrasts, defined as abrupt transitions between different degrees of brightness" (p. 172). Moreover, achromatic color responses, were correlated with the

monotone images. "Brightness gradients were perceived as 'life-like,' whereas monotones and contrasts were perceived as 'dead', suggesting that 'gruesome' responses were determined by the darker degrees of overall intensity" (p. 173).

Altered Shading. A doctoral student's unpublished dissertation (Barnett, 1950) provided the first attempt at examining the impact of Shading and Color upon subject perceptual response (described in Baughman, 1958). Without the benefit of contemporary image scanning, the student created an outline series of inkblots by simply tracing the perimeter of each card, preserving the overall form but eliminating any internal Shading or Color. Two groups, equated for age, education, and gender, were administered an outline series of blots as well as the regular cards, one month apart, in counterbalanced order. Interestingly, extended response latencies -- i.e., "shock" -- occurred with equal frequency with the outline series administrations as with the standard set. Determinants traditionally considered to be central to such latencies, especially Color, were found to have no statistically significant impact. Also, in line with what we would intuitively expect, Texture responses were

more commonly generated with the regular set on some cards, especially Card IV. However no differences in Texture production were found between the regular and outline sets on others, such as Card VI, suggesting that even the verbalization of Texture responses was sometimes more dependent upon blot outlines than internal characteristics.

Baughman is probably the most interesting of those researchers who utilized alterations in examining the stimulus value of Rorschach inkblots (1954, 1958a, 1958b, 1959). In an earlier article (Baughman, 1951), he demonstrated that personality variables of the scorer significantly impacted the actual scoring of Rorschach protocols. Specifically, he identified two impactful factors, first, the quality of the examiner-subject interaction created by the examiner, and second, differences in scoring conceptualization. He soon set out to examine the test using another novel method, by creating several sets of Rorschach cards with staggered levels of internal content (Baughman, 1954). The first set, Series P, was constructed as follows:

Series P (Peripheral Form Series). Series P was created by placing a sheet of transparent paper over each of the standard Rorschach figures and tracing in ink along each contour formed by the juxtaposition of white ground with shaded or colored areas. This simple line drawing was then

photographed and the print was mounted on cardboard of a weight and size comparable to that of the standard Rorschach cards. It is to be noted that each card in Series P is a solid white except for the irregular thin line corresponding to the peripheral form of the standard Rorschach figures. (p. 151)

As with Balloch's work previously described, Baughman's first level was a simple outline. However it appears that Baughman was not aware of Balloch's work at the time because Balloch isn't mentioned until Baughman's 1958 literature review. Baughman's second set, Series I (Internal Form Series), resembled the first set but with lines added delineating internal major areas. The third set, Series S (Silhouette Series), was constructed by simply filling in the outline created as in Series P with black India ink. Finally, a high-quality achromatic set was created by photographing all blots with panchromatic black and white film, and "thus, color was eliminated but differential light values were maintained as closely as possible to those found in the standard series" (p. 151-152). Another set, Series A, a photographically derived achromatic series, was also produced; and Series C, the regular chromatic Rorschach blots, were also utilized. The interrelationships between these series was described as in this way:

An overview of the five series may be achieved by beginning with Series C, the most complex. It

contains not only color and shading but also a complexity of form due to internal highlights and contrasts. Series A maintains the same complexity of form and shading but eliminates color. Series I maintains complexity of form but eliminates both color and shading. Series S eliminates complexity of form, differential shading, and color but gives the subject stimuli with accentuated figure-ground contrast with which to work. Series P eliminates all of the above characteristics and presents only a simple line figure. By varying these major characteristics of the stimuli it was believed that it would be possible to evaluate the effects of color, shading, figure-ground contrast, and internal form characteristics upon the perceptual behavior of a group of subjects (p. 152).

In Baughman (1954), 100 inpatient VA Hospital neurotic subjects were randomly assigned to each of the five blot series, and individual standard administrations were conducted. Scoring was done in accordance with the Beck and Klopfer methods combined, and both individual and group scores were computed for 39 scorable indices. Of these, 17 demonstrated statistical significance across group pairings. For example, the outline series (Series P) resulted in the lowest productivity, while the regular inkblots (Series C) evoked the most responses. Baughman noted that since internal aspects like Color and Shading provoked neurotic shock, one might expect the regular series to result in lower productivity than the simple outlines would, but that hypothesis did not hold. Baughman also found that a few individuals produced a very high number of responses no matter which

card set was used, suggesting that those who demonstrated a great need to be productive will do so no matter the obstacles (p. 155). Content-related results included: The largest number of human movement responses (M) occurred in Series P [peripheral outline], while the least occurred in Series S [silhouette]. Groups S and I [internal form] produced the most human percepts. The highest frequency of geography and landscape percepts were noted in Series P. To do justice to the full complement of correlations which emerged, one would need to excerpt the bulk of the report. However, the overriding thematic conclusion was summed up by Baughman this way:

The data are clear and impressive in their demonstration that the major dimensions of perceptual behavior in the Rorschach task remain remarkably constant even though marked alterations are made in the stimulus attributes...

The conclusion which appears to be justified by these findings is that the basic form of the blots is of overwhelming importance in determining perceptual behavior, to the extent that such behavior is determined by properties of the stimulus rather than processes within the perceiver functioning relatively independently of the stimulus situation (p. 161).

A second similar study was published at about the same time by the same author and a colleague (Belden & Baughman, 1954). In this study, seven varieties of Card II were presented, differing from one another in stepped

levels of darkness, ranging from only a peripheral outline (Series P in the original Baughman study) to a jet-black India ink silhouette (originally Series S), and with five stepped levels in between. One hundred and forty subjects were randomly assigned to each of the seven cards, 20 per card, and asked to freely associate to the image presented. As with the first Baughman study in this line of inquiry, results emphasized general form, rather than determinants such as shading and color, as being of primary importance to subject response behavior.

Baughman (1958) followed up with a brief essay suggesting that his various altered blot series be used to facilitate the inquiry phase of standard Rorschach administrations. Baughman surmised that some patients might be better able to utilize the altered blots as a point of comparison in showing, rather than explaining, what stimulus factors encouraged a particular response. Baughman (1958b) summarized the history of experimental Rorschach manipulations beginning with the seminal Lazarus (1948) study.

In a 1959 article, Baughman added two additional card series, a reverse silhouette, created by simply producing a photographic negative of Series S, and a

"Complex Silhouette," which preserved major internal sections of each blot by painting them in varying shades of gray and black and then photographing the result. In this last study, and it was his last in this vein, Baughman modified his original thesis that essentially suggested that Form was the major significant arbiter of subject response behavior to the exclusion of other determinants. His use of the Complex Silhouette, the first intermediate deconstruction (the others had been stark outlines or simple silhouettes) demonstrated the impact of shading. In this study, he compiled extensive tables concerning the impact of the stimulus value, card by card, with 648 subjects (81 in each of 8 counterbalanced card groups). Baughman then suggested that such techniques could be used to "correct" the occasional poor self-perceptual reports sometimes given during Inquiry or actually do away with Inquiry in some cases altogether, viz. (Baughman, 1959):

To give an example of how such a table might work, however, let us say that our S reports the perception of clouds on card VII and he indicates that the whole blot looks like this. Turning to clouds under W in Table XIII we find that 30 Ss gave such a response when the card was shaded, but only 4 Ss gave this response on the modifications. Without inquiring of S we can "bet" that he is responding to shading and score accordingly. Introspection is eliminated! (p. 181)

In other words, less than we might suppose might be lost if we dispensed with the inquiry phase altogether. In a budget-conscious era of managed care and expedient assessment, this interesting idea begs to be verified. Such confirmation could be effected through a careful analysis of archival Rorschach data. Two sets of scoring would be compared using the same protocols -- the pre-Inquiry method described by Baughman here, compared with full traditional scoring.

An unpublished doctoral dissertation utilized techniques similar to Baughman's approach in order to study the impact of stimulus complexity upon subject response. Bleker (1972) found that the presentation of monochromatic blots generally resulted in subjects' responding more quickly. However, no similar linear finding resulted with respect to formal complexity. Instead, Bleker describes a parabolic response where longer response latencies were observed when there was either too little or too much formal complexity. In other words, at the extremes (i.e., almost nothing on the card, as opposed to an extremely busy stimulus presentation), subjects apparently decided to think about what they were seeing. Bleker found that lowest

response latencies were found with moderately-complex stimuli.

Altered Form. Very few researchers have investigated the Rorschach by altering the actual form of the inkblots themselves. An unpublished dissertation (Lenz, 1979) employed varying amounts of formal inkblot complexity to examine responding patterns among schizophrenic subjects. Eighty inpatient schizophrenic patients and 40 non-clinical volunteer subjects were randomly assigned to groups receiving either the standard Rorschach or an experimental version in which simplified forms approximating inkblot popular responses appeared to the exclusion of other interfering stimuli. As expected, more "good" responses were generated by both groups given less complex formal distraction. However, the non-clinical participants still performed much better than the schizophrenics within both testing conditions, leading Lenz to conclude that the inability to exclude irrelevant stimuli constituted only part of the schizophrenic cognitive deficit. That irrelevant stimuli might also include other factors completely beyond the test itself, including the ticking of a wristwatch, a passing automobile, or the distant hum of an air circulation system, was not discussed.

Two other unpublished dissertations studied the impact of inkblot size and three-dimensionality upon subject response. First, Rathouser (1976) investigated an aspect of the group Rorschach presentation, specifically its increased size, upon subject response. Female high school seniors volunteered to participate in Rathouser's counterbalanced test-interval-retest design. It was found that increased blot size yielded less repressed responses defined by more words used, increased number of content categories, and other indices indicating disinhibition. Interestingly, and contrary to one of the author's original hypotheses, the standard-sized blots resulted in higher overall productivity.

Three-dimensional clay forms of the ten Rorschach inkblots were created and presented to 64 community college students, in addition to regular administrations of the standard plates. Using the counterbalanced test-retest format, half received the regular administration first, and half the three-dimensional version first. Additionally, half of each of these groups received "staged" versions of the three-dimensional blots, during which the clay forms could be viewed but not touched, while the other half could freely manipulate the forms

as they would the two-dimensional printed plates. Overall response productivity (R) was significantly higher for the three-dimensional administrations, as was use of color. Additionally, the staged versions resulted in higher productivity across all scoring categories, encouraging the author to suggest that this novel format might well provide an avenue for more intensive personality study. (Petrello, 1977).

New Methods

While most of the studies described above are rigidly linked to examining subject response behavior to a small number of preselected altered blots chosen by the examiner, new computer-based techniques will allow a more in-depth examination of various scoring determinants. Two computer programming mechanisms must be in place in order for this to be carried out -- 1) a created set of multiple inkblot images altered with precision along select dimensions of determinants, and 2) a mechanism to allow these images to be sensibly selected by the subject, giving him or her the illusion of altering the stimulus. That critical new element, a mechanism which allows subjects to choose favored levels of select determinants, may allow us to examine aspects

of the Rorschach in ways heretofore not possible. Would, for example, individuals with strong relatedness needs "create" blots that are higher in Texture? Or perhaps not alter them at all according to any statistically significant algorithm (which in itself would tell us something about traditional scoring and might, in that case, support the idiographic interpretive view)?

Baughman himself concluded, "It is apparent, from the studies reviewed, that the definition of Rorschach stimulus effects is more a task for the future than an accomplishment of the past" (Baughman, 1958). The use of computer-altered inkblots more than forty years later may help us to more effectively accept that challenge.

II: METHOD

Sample

All subjects (N = 110) who volunteered to participate in the study were adult students enrolled in an undergraduate psychology class at the University of Tennessee. Subjects were given academic extra credit for their participation. Subject ages ranged from 19 to 46 with a mean of 21.8 and standard deviation of 3.7; mean years completed education was 15.1 with a standard deviation of 1.1. There were 39 male and 71 female subjects.

Instruments

Rorschach Image Presenter (RIP), hyperscripted software conceived and written by the author, allows subjects to interactively alter each of the ten standard Rorschach inkblots along isolated determinant dimensions -- Texture, Shading, and Color. In contrast to a standard Rorschach administration where the card is the stimulus and the verbalization is the response, with this software the altered inkblot image itself constitutes the response. The images presented by the RIP program were created by first scanning the inkblots

using a state-of-the-art high resolution scanner with line scan and dot-per-inch capabilities that are sufficient for high-end contemporary lithography.

Next, graduated "low condition" and "high condition" versions of each inkblot were prepared along the three determinants discussed here, using a commercial high-end photomanipulation software package. The "middle condition" remained the standard inkblot image for each determinant dimension. The present author could find no precise operationalized descriptions of Texture and Shading and so, like Eckhardt (1957), will attempt to elaborate in a manner that illustrates the method used to prepare the inkblots. The amount of Shading ("lightness" and "darkness" in Exner's terms) is really a measure of overall wave frequency. A small amount of Shading in a portion of a photograph yields smaller spacing between waves, producing a higher frequency, and the resultant image is relatively light. On the other hand, a large amount of Shading nets wider spaces between waves, and the image is darker. (If we think in the photographic terms used by the 1950s researchers previously described, the camera is allowed a longer exposure to light for greater Shading, resulting in a darker overall photograph, as with Balloch's 1952

blots.) Refer to Figures 1 and 2, which serve to illustrate differences between Shading and Texture.

The RIP images have the same high resolution quality as the printed cards. Figure 1 has a small amount of Shading; the spacing between the light waves traveling to the reader's eyes is indeed smaller; the image then has a high frequency (more waves fit in a smaller space) and is lighter. Figure 2 has a high amount of Shading (i.e. lowest frequency light waves) and is darkest.

However, these first two Figures have, to employ a television metaphor, little contrast. The relative overall frequency of the blots changes from Figure 1 to Figure 2, but there is very little sudden variation in frequency within portions of the blot itself. In other words, Figure 1 has practically no detail, and neither does Figure 2. The sudden difference in frequency in a small space is what Rorschach systematizers have termed "Texture" and "Vista," where there are sharp and sudden contrast value variations in the stimulus (Eckhardt, 1957). Figures 3, 4, and 5 are markedly different. One notices that there is more detail in Figures 3 and 4, more sudden variation between light and dark. These blots would likely engender increased Texture and Vista



Figure 1. Card I: Low Texture / Low Shading



Figure 2. Card I: Low Texture / High Shading



Figure 3. Card I: High Texture / Low Shading



Figure 4. Card I: High Texture / High Shading



Figure 5. Card I: High Movement

responses than the first two. However, just as Figure 1 is lighter overall than Figure 2, Figure 3 has less relative overall Shading than does Figure 4. Figure 5, High Movement, is included to illustrate the flexibility elemental to the digital alteration techniques utilized here.

Texture and Vista could be similarly differentiated in terms of space, with textural differences occurring when the light wave frequency varies widely in a relatively small section of the blot, and Vista manifesting when this frequency varies widely along a relatively larger section of the blot. Given that the difference between Texture and Vista from the geometric standpoint described here is only a matter of space, it seems reasonable to posit a geometric hypothesis that both are far more similar to each other than they are to other determinants. As Levitt (1980) states, "The experts not only vary in interpretation of vista and texture but also in the decision to score these determinants. More than half, for instance, do not score texture...It is quite possible that texture and vista...have no unique diagnostic value" (p. 52).

The five chromatic blots prepared by the author add a third dimension -- Color Saturation. Saturation can

be considered, in the terminology of radio wave transmission, as power output measured in watts. The same Color red, for example, can be subtle or can literally scream off the page, even with Shading and Texture being held constant. Using such images on the computer screen may eventually prove to be much more effective in measuring Color shock.

In the RIP program, subjects manipulated the blots on screen according to two instructions for each determinant range presented: First, "Choose the image you prefer the most," then "Choose the image your prefer the least." This yields six raw, unvectorized RIP scores: RIP Best Texture ("preferred most"), RIP Worst Texture ("preferred least"), RIP Best Color Saturation ("preferred most"), RIP Worst Color Saturation ("preferred least"), RIP Best Shading ("preferred most"), and RIP Worst Shading ("preferred least"). The reason for asking both "preferred most" and "preferred least" is that some subjects choose only the middle (standard unmodified) image, so having two choice points yields three final, quantifiable directional vectors to the indicated preferences -- RIP Texture, RIP Color Saturation, and RIP Shading.

FIRO-B. In addition to the RIP and the Rorschach itself, another instrument, the Fundamental Interpersonal Relations Orientation for Behavior (FIRO-B, 1977 Edition) was utilized in order to provide a relatively straightforward measure for relatedness (termed "Inclusion" by Schutz) in both behaviorally acted-out ("expressed") and internally desired ("wanted") dimensions (Schutz, 1958/1966). The FIRO-B also includes scales for "Control" and for "Affection" for both expressed and wanted dimensions.

Sample expressed-Inclusion (eI) items on the FIRO-B include "I try to be with other people" and "I join social groups." A sample wanted-Inclusion (wI) item: "I like people to invite me to things." An expressed-Control (eC) item: "I try to take charge of things when I am with people." A wanted-Control (wC) item: "I let other people decide what to do." An expressed-Affection (eA) item: "I try to be friendly to people." A wanted-Affection (wA) item: "I like people to act friendly toward me" (Schutz, 1978).

The FIRO-B is one of seven Schutz tests labeled "FIRO Awareness Scales," which also include FIRO-F (Feelings), FIRO-BC (FIRO-B for Children), COPE (coping mechanisms), LIPHE (family of origin issues), MATE

(perception of significant other), and VAL-ED (relationships between children and teachers). Of these, "only FIRO-B has been studied enough to be recommended for use in systematic research on the subject of interpersonal needs. The manual points out correctly that the other questionnaires should be regarded as experimental" (Buxom, 1972). Lifton (1985) notes that reliability of the FIRO scales are excellent, yielding reproducibility coefficients (ability to predict item responses from scale scores) of at least .80, and most exceeding .90. The FIRO-B demonstrated good test-retest reliability as well, with subscale coefficients of .71 to .82 (p. 578).

With respect to validity, Lifton noted that most of the work on criterion-related validity has been for the FIRO-B as opposed to other Schutz scales. The FIRO-B has successfully differentiated those who work with others as opposed to working alone; those who have completed Synanon therapy as opposed to those who are about to enter; spouses who are employed outside the home versus those who don't; adolescent self-esteem, and shyness among college students. Lifton states that these findings as well as those mentioned in the Schutz

test manual strongly support the FIRO-B with respect to concurrent validity (p. 578-9).

Buxom (1972) notes that FIRO-B subscales are correlated with nontest interpersonal behavior and other personality tests:

Scale scores have been found to be correlated with: rated effectiveness of supervisors, production of good ideas in brain-storming groups, rated creativity, freshmen grades, and the diagnosis of schizophrenia. The number and strength of these relationships are not great enough to validate the use of the FIRO-B for counseling and guidance, but they indicate it is definitely a worthwhile instrument for research (p. 79).

Although FIRO-B subscales have been found to be significantly related, Buxom suggests that this should not suggest poor test construction "as suggested by the manual" but instead may simply indicate how closely related are the measured characteristics. For example, expressed affection (eA) and wanted affection (wA) may well reflect an overarching need for affection generally and so on (p. 79).

Procedure

Subjects completed a session with the RIP, answered the FIRO-B questionnaire, and sat for a regular Rorschach administration in order to test three initial hypotheses: 1) It was hypothesized that subjects would demonstrate with the RIP program a preference for the

same determinants -- Color, Texture, and Shading -- which manifested during a standard Rorschach test. 2) Given the interpersonal focus of the FIRO-B and the interpretive tradition that regards Rorschach Texture as evidencing relational needs, it was hypothesized that RIP-Texture would correlate with FIRO-B wanted Inclusion (wI) and wanted Affection (wA). 3) With Color on the Rorschach traditionally interpreted as a manifestation of emotional expression, a relationship between RIP-Color and FIRO-B expressed Affection (eA) was expected.

Test administration. Subjects were administered the Rorschach by the present author; regular administration and scoring of the Rorschach followed procedures described by Exner (1986a). Following these standard administrations of Rorschach free association and inquiry, subjects engaged the RIP program, where they were asked to sit before the computer screen and use the mouse to alter the ten inkblots according to their personal preferences. Subjects always took the regular Rorschach first so that their responses would not be confounded by having seen and thought about the blots on the computer screen beforehand. The FIRO-B was given either immediately before or immediately after the Rorschach and RIP, according to random selection.

Rorschach data collection and analysis. Responses incorporating five basic determinants within the regular Rorschach administration -- Color (C), Texture (T), Diffuse Shading (Y), Vista (V), Achromatic Color (C') -- were tallied in order to derive scores for each subject. Responses scored as FC, CF, or C were counted within each subject's raw Rorschach-Color score. Similarly, responses scored as FT, TF, or T were tallied to produce the raw Rorschach-Texture score; FY, YF, and Y responses comprised the raw Rorschach-Shading score; FV, VF, and V for Rorschach-Vista; and FC', C'F, and C' for Rorschach-Achromatic Color. In order to avoid the presence of response productivity (R) as a possible confound (Exner, 1992), each subject's raw determinant-based scores were divided by his overall number of responses to yield final "per capita" Rorschach scores. In this manner, a highly productive subject's Rorschach scores can be fairly compared with scores generated by less productive subjects.

RIP data collection and analysis. For each of the ten inkblots, subjects were asked to select the setting which they "preferred most" and "preferred least" for Texture and Shading determinants on the achromatic images, and for Color, Texture and Shading on the

chromatic images. With each opportunity to make a selection, subjects could either raise, lower, or choose not to alter (i.e. leave as standard) the blot by clicking unlabeled buttons below the image. The RIP program automatically records responses as the subject moves through the sequence of presented tasks.

When the RIP program begins, the subject sees a standard image of Rorschach Card 1, is instructed to click the three buttons at the bottom of the screen to observe changes in the blot, and to select the one he prefers most. Since the determinant presentation order for each blot is randomized, the subject's first task was to select the most favored of three Shading or Texture levels on Card 1. The second task was to select the least favored of that same choice set. Next, he or she made similar most favored and least favored choices for the remaining Card 1 determinant, before moving on to Card 2 where he/she made most and least favored selections for Shading, Texture and Color, and so on through Card X. A total of 50 such tasks were completed by each subject during a RIP administration, with 4 tasks per achromatic card (most and least favored for both Texture and Shading), and with 6 tasks per

chromatic card (most and least favored for Color, Texture, and Shading).

Subjects were placed into two groups, either determinant-attracted or determinant-avoidant, for the three determinants examined by the program -- C, T, and Y -- in the following manner. During a RIP selection task (for example, most preferred Shading level on Card 1), if the subject raised the determinant's intensity, the program recorded a score of 1 for that task; if the subject lowered that determinant's intensity, the program recorded a score of -1; and if the subject chose not to alter the image, selecting the standard unaltered blot, the program recorded a score of 0. Working through the ten inkblots, subjects could accumulate from -10 to +10 for "preferred most" and from -10 to +10 for "preferred least" for Texture and Shading determinants; from -5 to +5 for "preferred most" and from -5 to +5 for "preferred least" for Color. This yielded six raw RIP scores, "preferred most" and "preferred least" for each of the three determinants. Finally, subtracting the raw "preferred least" scores from "preferred most" for each of the determinants resulted in either a positive or negative value for each of the three determinants, which reflected a subject's relative attraction or avoidance

with respect to each determinant. Each subject, then, was classified as determinant-attracted or determinant-avoidant for each of the Color, Texture, and Shading determinants.

Actual scorekeeping is effected in an automated manner as subjects move through the RIP program. Each choice is internally registered and stored as individual data points as each subject proceeds. After a subject's final choice on the last inkblot, the program classifies the subject's relative attraction or avoidance for the three determinants being studied.

FIRO-B data collection and analysis. Each subject completed the standard 1977 FIRO-B 54 item questionnaire. Scoring was conducted in accordance with the FIRO Awareness Scales Manual (Schutz, 1978), yielding six subscale scores, each ranging from 0 to 9, for expressed Inclusion (eI), wanted Inclusion (wI), expressed Control (eC), wanted Control (wC), expressed Affection (eA), and wanted Affection (wA).

III: RESULTS

Analyses of Variance revealed statistically significant relationships for two of the three determinants on the Rorschach Image Presenter with that same determinant on the regular Rorschach test. However, only one of the those two results were in the expected direction -- Shading (Y), $F=5.03$, $p=.027$. Subjects with greater amounts of Y in the regular Rorschach tended to demonstrate a preference for Y when given the opportunity to make those selections in the RIP. However, the relationship for Texture (T) was in the opposite direction with subjects generating greater amounts of T in the standard Rorschach test demonstrating a dislike for T in the RIP, also $F=5.03$, $p=.027$. Subjects with greater amounts of T in the standard Rorschach tended to avoid T in the RIP when selecting the images they preferred. Color (C) on the regular Rorschach was not found to differentiate between the attraction or avoidance groups for C on the RIP. However, Vista (V) on the regular Rorschach did differentiate attraction/avoidance for C in the RIP, $F=4.25$, $p=.042$. Subjects with V on their regular Rorschach test tended to avoid Color on the RIP.

Furthermore, significant relationships were found between RIP-T and FIRO-B wC and wA, which one might expect, but significant relationships were not found with an expected wI. Interestingly, significant relationships were found between RIP-C and FIRO-B wC, as well as between RIP-Y and FIRO-B wC and wA. Individuals with high wanted-Control (wC) scores, i.e. those who the FIRO-B suggests want to be controlled, tended to shy away from high levels of all three determinants T, C, and Y on the RIP. Those with high FIRO-B wA scores, or those who especially desire the affections of others, also do not prefer the highly Shaded (Y) or highly Textured (T) blots on-screen either.

Of the 33 total ANOVAs examined (15 for Rorschach vs. RIP, Table 1; and 18 for FIRO-B vs. RIP, Table 2), six emerged as statistically significant at $p < .05$ with two additional evidencing trends at $p < .10$. If the results were due to chance, we would expect 5% of the correlations, or only one of the 33 cells, to be significant at the $p < .05$ level. Therefore it is useful to note the significant relationships which emerged.

Table 1. Analysis of Variance:
Rorschach Image Presenter vs. Rorschach (N = 110)

RIP Rorschach	RIP Texture	RIP Color	RIP Shading
Rorschach Color (C)	F=.019 p=.890	F=.003 p=.955	F=.852 p=.358
Rorschach Texture (T)	F=5.030 p=.027**	F=.332 p=.566	F=1.932 p=.167
Rorschach Shading (Y)	F=.930 p=.337	F=1.486 p=.226	F=5.031 p=.027**
Rorschach Vista (V)	F=.040 p=.842	F=4.245 p=.042**	F=1.640 p=.203
Rorschach Achr. (C')	F=.511 p=.476	F=.351 p=.555	F=.635 p=.427

*p<.10 **p<.05

Table 2. Analysis of Variance:
Rorschach Image Presenter vs. FIRO-B (N = 110)

RIP FIRO-B	RIP Texture	RIP Color	RIP Shading
eI: expr. Inclusion -- includes others	F=.035 p=.853	F=.348 p=.557	F=.552 p=.459
wI: wanted Inclusion -- desires inclusion	F=1.604 p=.208	F=.000 p=.986	F=1.659 p=.201
eC: expr. Control -- controls others	F=.032 p=.857	F=.016 p=.900	F=.205 p=.652
wC: wanted Control -- wants to be contr.	F=3.304 p=.072*	F=4.747 p=.032**	F=7.838 p=.006***
eA: expr. Affection -- shows affection	F=1.334 p=.251	F=.088 p=.767	F=1.332 p=.251
wA: wanted Affection -- desires affection	F=3.790 p=.054*	F=.001 p=.973	F=7.303 p=.008***

*p<.10 **p<.05 ***p<.01

IV: DISCUSSION

Findings: Rorschach with RIP

Interesting relationships were found between number of Shading as Texture (T) responses in the regular Rorschach administration with the way subjects manipulate Texture on screen with the RIP. However, the relationship was inverse, the opposite of what was predicted. Within the traditional Exner (1978) interpretive context which views Texture based responses as evidencing intense and painful desires for interpersonal affection, we might assume that such needs are painful enough that subjects avoid confronting those issues when given a chance to manipulate their environment within the interactive RIP program. These results might be viewed this way: Individuals with less painful relatedness needs successfully negotiate, perhaps even unconsciously without much effort, anxiety-provoking environmental stimuli. In contrast, high T individuals, those with painful relatedness needs according to Rorschach interpretive tradition, actively work to avoid such stimuli. On the RIP, where the inkblot becomes the response under subject control, such individuals can indicate what they prefer least and "set

right" their perceptions to a less threatening circumstance. The computer screen becomes a sanctioned invitation to engage avoidant behaviors.

A similar inverse relationship was found between Vista (V) on the Rorschach and Color (C) on the RIP. With V traditionally seen as evidencing introspective capabilities, one might infer that those who are able to engage in deep introspective thoughts actually prefer that cognitive activity to the emotionality that C responses have been seen to evidence (Exner, 1979; Levitt, 1980). On the other hand, one might interpret V in a whole new way, given the present evidence. Perhaps V signifies someone who is lacking in affective abilities. Alternatively, perhaps C signifies someone who lacks the ability to engage in serious introspection. Obviously this statistically significant finding raises more questions than it answers, and further work must be undertaken in order to answer the many issues this result raises.

Shading (Y) based responses have traditionally been seen as evidencing anxious affect or ideation (Levitt, 1980), often accompanied by depressive affect (Exner, 1978). Interestingly, the hypothesized positive relationship was found between Y on the RIP and Y in the

regular Rorschach. Depressive, anxious individuals take the opportunity to share those feelings in both tests, if the traditional interpretive context holds.

As for why the significant relationship for Y is in the expected positive direction, while the significant relationship for T is inverse, an answer must await further research. Perhaps it is worth noting that while contemporary society has embraced clinical depression as a treatable phenomena which occurs without respect to gender, race, economic status, or other demographic classification, social alienation has not enjoyed similar acceptance. Interestingly, subjects on the RIP were far more likely to acknowledge a preference for highly-shaded percepts (an accepted index of depression among Rorschach adherents) than for highly-textured ones (a similarly accepted index of alienation, loneliness, or interpersonal deprivation). This significant inverse relationship between those manifesting T within the regular Rorschach administration and the acknowledgement of T on the RIP certainly does not contradict the popular yet dubious notion that aloneness is more shameful than sadness.

Findings: FIRO-B with RIP

Like the high T individuals referenced previously, those who greatly desire the demonstrated affections of others, the high FIRO-B wA scorers, do the same thing with on-screen Shading (RIP-Y) as well, avoiding the most highly Shaded blots ($p=.008$) and highly Textured blots ($p=.054$), effectively "wiping away" the anxiety-provoking Y and T stimuli on the computer screen. This RIP-based effect, essentially a process where a subject diminishes or denies that which is least preferred, might also explain the significant relationships between the high FIRO-B wanted-Control (wC) individuals (those who desire to be controlled) with RIP Texture ($p=.072$), RIP Color ($p=.032$), and RIP Shading ($p=.006$) measures. Externally directed high-wC subjects who shrink away from decision-making and assertive activity may similarly want to shrink away from and deny those types of stimuli traditionally interpreted as highly emotional or threatening (Levitt, 1980). On the other hand, individuals who are comfortable with self-directedness--low wC scorers--are not compelled to diminish or deny such T, C, and Y stimuli. Externally-directed individuals "lower the volume" with these determinants

investigated on-screen, while internally-directed individuals do the opposite.

Future Directions

The author believes that this line of inquiry should obviously be continued with a variety of other measures: Would depression indices, for example, evince similar "RIP effects"? It will also be interesting to examine validated scales internal to the Rorschach itself, such as Urist's scales which provide measures of subjects' object relations (1977) as they may relate to subject interaction with the changeable on-screen inkblots. Alternatives to the traditional Klopfer-Beck determinant interpretive context should be explored. Despite the work to be done, findings thus far would seem to support the author's contention that determinant research can and should be undertaken making better use of the increasingly sophisticated technologies currently available. It is hoped that such techniques will serve to enrich our understanding of stimulus value effects and deepen our field's appreciation for and understanding of Rorschach's test.

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APPENDIX

APPENDIX

Rorschach Image Presenter

Rorschach Image Presenter (RIP) program hyperscripting by Justin Randall Padawer follows. (Only setup and execution scripting for Cards 1 and 2 follows, since scripting for Cards 3 through 10 are identical to Cards 1 and 2.)

```

on openstack
  hide menubar
  global tex,col,sha,wtex,wcol,wsha,subNum,dataCollect,theVar,counter
end openstack

on card1worst
  global theVar
  push cd
  go cd card1w
  if the hilite of cd btn id 3 is true then
    if the hilite of cd btn id 7 is true then put "Card 1 Worst: Light Texture, Light Shading" & return
  after theVar
    if the hilite of cd btn id 8 is true then put "Card 1 Worst: Light Texture, Standard Shading" & return
  after theVar
    if the hilite of cd btn id 9 is true then put "Card 1 Worst: Light Texture, Heavy Shading" & return
  after theVar
  end if
  if the hilite of cd btn id 4 is true then
    if the hilite of cd btn id 7 is true then put "Card 1 Worst: Standard Texture, Light Shading" & return
  after theVar
    if the hilite of cd btn id 8 is true then put "Card 1 Worst: Standard Texture, Standard Shading" &
return after theVar
    if the hilite of cd btn id 9 is true then put "Card 1 Worst: Standard Texture, Heavy Shading" &
return after theVar
  end if
  if the hilite of cd btn id 5 is true then
    if the hilite of cd btn id 7 is true then put "Card 1 Worst: Heavy Texture, Light Shading" & return
  after theVar
    if the hilite of cd btn id 8 is true then put "Card 1 Worst: Heavy Texture, Standard Shading" &
return after theVar
    if the hilite of cd btn id 9 is true then put "Card 1 Worst: Heavy Texture, Heavy Shading" & return
  after theVar
  end if
  pop card

```

```

end card1worst
on card2worst
  global theVar
  push cd
  go cd card2w
  if the hilite of cd btn id 15 is true then

    if the hilite of cd btn id 12 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Worst: Light Texture, Light Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Worst: Light Texture, Standard Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Worst: Light Texture, Heavy Shading, Light
Color" & return after theVar
    end if
    if the hilite of cd btn id 13 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Worst: Standard Texture, Light Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Worst: Standard Texture, Standard Shading,
Light Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Worst: Standard Texture, Light Color, Heavy
Shading" & return after theVar
    end if
    if the hilite of cd btn id 14 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Worst: Heavy Texture, Light Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Worst: Heavy Texture, Standard Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Worst: Heavy Texture, Heavy Shading, Light
Color" & return after theVar
    end if
    end if
    if the hilite of cd btn id 16 is true then
      if the hilite of cd btn id 12 is true then
        if the hilite of cd btn id 24 is true then put "Card 2 Worst: Light Texture, Light Shading, Standard
Color" & return after theVar
        if the hilite of cd btn id 25 is true then put "Card 2 Worst: Light Texture, Standard Shading,
Standard Color" & return after theVar
        if the hilite of cd btn id 26 is true then put "Card 2 Worst: Light Texture, Heavy Shading, Standard
Color" & return after theVar
      end if
      if the hilite of cd btn id 13 is true then
        if the hilite of cd btn id 24 is true then put "Card 2 Worst: Standard Texture, Light Shading,
Standard Color" & return after theVar
        if the hilite of cd btn id 25 is true then put "Card 2 Worst: Standard Texture, Standard Shading,
Standard Color" & return after theVar
        if the hilite of cd btn id 26 is true then put "Card 2 Worst: Standard Texture, Heavy Shading,
Standard Color" & return after theVar
      end if
      if the hilite of cd btn id 14 is true then
        if the hilite of cd btn id 24 is true then put "Card 2 Worst: Heavy Texture, Light Shading, Standard
Color" & return after theVar
        if the hilite of cd btn id 25 is true then put "Card 2 Worst: Heavy Texture, Standard Shading,
Standard Color" & return after theVar
        if the hilite of cd btn id 26 is true then put "Card 2 Worst: Heavy Texture, Heavy Shading,
Standard Color" & return after theVar
      end if
    end if
  end if
end card2worst

```

```

end if
if the hilite of cd btn id 17 is true then
  if the hilite of cd btn id 12 is true then
    if the hilite of cd btn id 24 is true then put "Card 2 Worst: Light Texture, Light Shading, Heavy
Color" & return after theVar
    if the hilite of cd btn id 25 is true then put "Card 2 Worst: Light Texture, Standard Shading, Heavy
Color" & return after theVar
    if the hilite of cd btn id 26 is true then put "Card 2 Worst: Light Texture, Heavy Shading, Heavy
Color" & return after theVar
  end if
  if the hilite of cd btn id 13 is true then
    if the hilite of cd btn id 24 is true then put "Card 2 Worst: Standard Texture, Light Shading, Heavy
Color" & return after theVar
    if the hilite of cd btn id 25 is true then put "Card 2 Worst: Standard Texture, Standard Shading,
Heavy Color" & return after theVar
    if the hilite of cd btn id 26 is true then put "Card 2 Worst: Standard Texture, Heavy Shading,
Heavy Color" & return after theVar
  end if
  if the hilite of cd btn id 14 is true then
    if the hilite of cd btn id 24 is true then put "Card 2 Worst: Heavy Texture, Light Shading, Heavy
Color" & return after theVar
    if the hilite of cd btn id 25 is true then put "Card 2 Worst: Heavy Texture, Standard Shading,
Heavy Color" & return after theVar
    if the hilite of cd btn id 26 is true then put "Card 2 Worst: Heavy Texture, Heavy Shading, Heavy
Color" & return after theVar
  end if
end if
pop card
end card2worst
..... (This repeats for cards 3 through 10.)

```

```

on mouseUp
  visual effect iris open
  go to card "configure"
end mouseUp

```

```

on mouseUp
  answer "Throw the random dice?" with "Cancel" or "OK"
  wait 3
  set cursor to busy
  wait 3
  set cursor to busy
  wait 3
  set cursor to busy
  wait 3
  set cursor to busy
  if it is "Cancel" then exit mouseUp

```

```

put random(2) into rand
if rand is 1 then
  answer "Give the external measure BEFORE the Rorschach & RIP."
end if
if rand is 2 then
  answer "Give the external measure AFTER the Rorschach & RIP."
end if
end mouseUp

```

```

on mouseUp
  doMenu "Compact Stack"
  answer "Quit the RIP to:" ~
  with "Cancel" or "Home" or "Finder"
  if it is "Finder" then doMenu "Quit HyperCard"
  if it is "Home" then go home
  if it is "Cancel" then exit mouseUp
end mouseUp

```

```

on mouseUp
  play "RIP"
  -- hide menubar
  -- set userlevel to 3
  global tex,col,sha,wtex,wcol,wsha,subNum,dataCollect,theVar,counter,protect
  put empty into tex
  put empty into col
  put empty into sha
  put empty into wtex
  put empty into wcol
  put empty into wsha
  put empty into subNum
  put empty into dataCollect
  put empty into theVar
  put 0 into counter
  put 0 into protect
  hide menuBar
  lock screen

```

```

go to card "card1"
set the hilite of card button id 4 to true
set the hilite of card button id 3 to false
set the hilite of card button id 5 to false
set the hilite of card button id 8 to true
set the hilite of card button id 7 to false
set the hilite of card button id 9 to false

```

```

go to card "card2"
set the hilite of card button id 13 to true
set the hilite of card button id 12 to false
set the hilite of card button id 14 to false
set the hilite of card button id 16 to true
set the hilite of card button id 15 to false
set the hilite of card button id 17 to false
set the hilite of card button id 25 to true
set the hilite of card button id 24 to false
set the hilite of card button id 26 to false

```

..... (This repeats for cards 3 through 10.)

```

go to card "card1w"
set the hilite of card button id 4 to true
set the hilite of card button id 3 to false
set the hilite of card button id 5 to false
set the hilite of card button id 8 to true
set the hilite of card button id 7 to false
set the hilite of card button id 9 to false

```

```

go to card "card2w"
set the hilite of card button id 13 to true
set the hilite of card button id 12 to false
set the hilite of card button id 14 to false
set the hilite of card button id 16 to true
set the hilite of card button id 15 to false
set the hilite of card button id 17 to false
set the hilite of card button id 25 to true
set the hilite of card button id 24 to false
set the hilite of card button id 26 to false

```

..... (This repeats for cards 3 through 10.)

```

go to card "card1"

```

```

-- ..... randomization

```

```

put random(2) into rand

```

```

if rand is 1 then

```

```

    put true into tex

```

```

    put true into wtex

```

```

    show card button id 3

```

```

    show card button id 4

```

```

    show card button id 5

```

```

    hide card button id 7

```

```

    hide card button id 8

```

```

    hide card button id 9

```

```

end if

```

```

if rand is 2 then

```

```

    put true into sha

```

```

    put true into wsha

```

```

    hide card button id 3

```

```

    hide card button id 4

```

```

    hide card button id 5

```

```

    show card button id 7

```

```

    show card button id 8

```

```

    show card button id 9

```

```

end if

```

```

-- ..... end randomization

```

```

unlock screen

```

```

ShowPicture "Macintosh HD:blotpics:1221", rect of bkgnd button id 3, file

```

```

wait 1 second

```

```

play "choosmost"

```

```

end mouseUp

```

```

on mouseUp

```

```

    global protect

```

```

    put 1 into protect

```

```

    set the hilite of me to true

```

```

    set the hilite of card button id 8 to false

```

```

    set the hilite of card button id 9 to false

```

```

    ShowPicture "Macintosh HD:blotpics:11osh", rect of bkgnd button id 3, file

```

```

end mouseUp

```

```

on mouseUp

```

```

    global protect

```

```

    put 1 into protect

```

```

    set the hilite of me to true

```

```

set the hilite of card button id 7 to false
set the hilite of card button id 9 to false
ShowPicture "Macintosh HD:blotpicts:1221", rect of bkgnd button id 3, file
end mouseUp

```

```

on mouseUp
  global protect
  put 1 into protect
  set the hilite of me to true
  set the hilite of card button id 7 to false
  set the hilite of card button id 8 to false

```

```

  ShowPicture "Macintosh HD:blotpicts:1hish", rect of bkgnd button id 3, file
end mouseUp

```

```

on mouseUp
  global tex,col,sha,wtex,wcol,wsha,protect
  if protect is not 1 then exit mouseUp
  play "chooseleast"
  if wtex is true then
    lock screen
    go to card "card1w"
    show card button id 3
    show card button id 4
    show card button id 5
    hide card button id 7
    hide card button id 8
    hide card button id 9
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:1221", rect of bkgnd button id 3, file
    exit mouseup
  end if
  if wsha is true then
    lock screen
    go to card "card1w"
    hide card button id 3
    hide card button id 4
    hide card button id 5
    show card button id 7
    show card button id 8
    show card button id 9
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:1221", rect of bkgnd button id 3, file
    exit mouseup
  end if
end mouseUp

```

```

on mouseUp
  global tex,col,sha,wtex,wcol,wsha,dataCollect,subNum,protect
  if protect is not 1 then exit mouseUp
  play "choosemost"

  -- ***** all determinants for this card
  if tex is empty then
    put true into wtex

```

```

put empty into wsha
put true into tex
lock screen
go card card1
show card button id 3
show card button id 4
show card button id 5
hide card button id 7
hide card button id 8
hide card button id 9
unlock screen
put 0 into protect
ShowPicture "Macintosh HD:blotpics:1221", rect of bkgnd button id 3, file
exit mouseup
end if
if sha is empty then
put true into wsha
put empty into wtex
put true into sha
lock screen
go card card1
hide card button id 3
hide card button id 4
hide card button id 5
show card button id 7
show card button id 8
show card button id 9
unlock screen
put 0 into protect
ShowPicture "Macintosh HD:blotpics:1221", rect of bkgnd button id 3, file
exit mouseup
end if

-- ***** data collection
lock screen
go cd card10w
get cd fld subjectnumber
add 1 to it
put it into subNum
put it after dataCollect
go cd card1
put 1 after dataCollect
if the hilite of cd btn id 3 is true then put 0 after dataCollect
if the hilite of cd btn id 4 is true then put 1 after dataCollect
if the hilite of cd btn id 5 is true then put 2 after dataCollect
go cd card1w
if the hilite of cd btn id 3 is true then put 0 after dataCollect
if the hilite of cd btn id 4 is true then put 1 after dataCollect
if the hilite of cd btn id 5 is true then put 2 after dataCollect
put 33 after dataCollect
go cd card1
if the hilite of cd btn id 7 is true then put 0 after dataCollect
if the hilite of cd btn id 8 is true then put 1 after dataCollect
if the hilite of cd btn id 9 is true then put 2 after dataCollect
go cd card1w
if the hilite of cd btn id 7 is true then put 0 after dataCollect
if the hilite of cd btn id 8 is true then put 1 after dataCollect

```

if the hilite of cd btn id 9 is true then put 2 after dataCollect
 put return after dataCollect

-- ***** begin randomization for next card

go to card "card2"

put empty into tex

put empty into col

put empty into sha

put empty into wtex

put empty into wcol

put empty into wsha

put random(3) into rand

if rand is 1 then

put true into wtex

put true into tex

show card button id 12

show card button id 13

show card button id 14

hide card button id 15

hide card button id 16

hide card button id 17

hide card button id 24

hide card button id 25

hide card button id 26

end if

if rand is 2 then

put true into wcol

put true into col

hide card button id 12

hide card button id 13

hide card button id 14

show card button id 15

show card button id 16

show card button id 17

hide card button id 24

hide card button id 25

hide card button id 26

end if

if rand is 3 then

put true into wsha

put true into sha

hide card button id 12

hide card button id 13

hide card button id 14

hide card button id 15

hide card button id 16

hide card button id 17

show card button id 24

show card button id 25

show card button id 26

end if

-- ***** end randomization

unlock screen

put 0 into protect

ShowPicture "Macintosh HD:blotpics:2222", rect of bkgnd button id 3, file
 end mouseUp

```

on mouseUp
  global tex,col,sha,wtex,wcol,wsha,protect
  if protect is not 1 then exit mouseUp
  play "least"
  if wtex is true then
    lock screen
    go to card "card2w"
    show card button id 12
    show card button id 13
    show card button id 14
    hide card button id 15
    hide card button id 16
    hide card button id 17
    hide card button id 24
    hide card button id 25
    hide card button id 26
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
    exit mouseup
  end if
  if wcol is true then
    lock screen
    go to card "card2w"
    hide card button id 12
    hide card button id 13
    hide card button id 14
    show card button id 15
    show card button id 16
    show card button id 17
    hide card button id 24
    hide card button id 25
    hide card button id 26
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
    exit mouseup
  end if
  if wsha is true then
    lock screen
    go to card "card2w"
    hide card button id 12
    hide card button id 13
    hide card button id 14
    hide card button id 15
    hide card button id 16
    hide card button id 17
    show card button id 24
    show card button id 25
    show card button id 26
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
    exit mouseup
  end if
  put 0 into protect

```

end mouseUp

on mouseUp

global tex,col,sha,wtex,wcol,wsha,dataCollect,subNum,protect

if protect is not 1 then exit mouseUp

play "most"

-- ***** all determinants for this card

if tex is true then

if col is empty then

if sha is empty then

put random(2) into rand

if rand is 1 then

put true into col

put true into wcol

put empty into wtex

put empty into wsha

lock screen

go to card "card2"

hide card button id 12

hide card button id 13

hide card button id 14

show card button id 15

show card button id 16

show card button id 17

hide card button id 24

hide card button id 25

hide card button id 26

unlock screen

put 0 into protect

ShowPicture "Macintosh HD:blotpics:2222", rect of bkgnd button id 3, file

exit mouseup

end if

if rand is 2 then

put true into sha

put true into wsha

put empty into wtex

put empty into wcol

lock screen

go to card "card2"

hide card button id 12

hide card button id 13

hide card button id 14

hide card button id 15

hide card button id 16

hide card button id 17

show card button id 24

show card button id 25

show card button id 26

unlock screen

put 0 into protect

ShowPicture "Macintosh HD:blotpics:2222", rect of bkgnd button id 3, file

exit mouseup

end if

end if

end if

end if

if col is true then

```

if tex is empty then
  if sha is empty then
    put random(2) into rand
    if rand is 1 then
      put true into tex
      put true into wtex
      put empty into wcol
      put empty into wsha
      lock screen
      go card "card2"
      show card button id 12
      show card button id 13
      show card button id 14
      hide card button id 15
      hide card button id 16
      hide card button id 17
      hide card button id 24
      hide card button id 25
      hide card button id 26
      unlock screen
      put 0 into protect
      ShowPicture "Macintosh HD:blotpics:2222", rect of bkgnd button id 3, file
      exit mouseup
    end if
    if rand is 2 then
      put true into sha
      put true into wsha
      put empty into wcol
      put empty into wtex
      lock screen
      go card "card2"
      hide card button id 12
      hide card button id 13
      hide card button id 14
      hide card button id 15
      hide card button id 16
      hide card button id 17
      show card button id 24
      show card button id 25
      show card button id 26
      unlock screen
      put 0 into protect
      ShowPicture "Macintosh HD:blotpics:2222", rect of bkgnd button id 3, file
      exit mouseup
    end if
  end if
end if
if sha is true then
  if col is empty then
    if tex is empty then
      put random(2) into rand
      if rand is 1 then
        put true into col
        put true into wcol
        put empty into wsha
        put empty into wtex

```

```

lock screen
go card "card2"
hide card button id 12
hide card button id 13
hide card button id 14
show card button id 15
show card button id 16
show card button id 17
hide card button id 24
hide card button id 25
hide card button id 26
unlock screen
put 0 into protect
ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
exit mouseup
end if
if rand is 2 then
put true into tex
put true into wtex
put empty into wsha
put empty into wcol
lock screen
go card "card2"
show card button id 12
show card button id 13
show card button id 14
hide card button id 15
hide card button id 16
hide card button id 17
hide card button id 24
hide card button id 25
hide card button id 26
unlock screen
put 0 into protect
ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
exit mouseup
end if
end if
end if

if tex is empty then
put true into tex
put true into wtex
put empty into wcol
put empty into wsha
lock screen
go card "card2"
show card button id 12
show card button id 13
show card button id 14
hide card button id 15
hide card button id 16
hide card button id 17
hide card button id 24
hide card button id 25
hide card button id 26

```

```

unlock screen
put 0 into protect
ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
exit mouseup
end if
if col is empty then
    put true into col
    put true into wcol
    put empty into wtex
    put empty into wsha
    lock screen
    go card "card2"
    hide card button id 12
    hide card button id 13
    hide card button id 14
    show card button id 15
    show card button id 16
    show card button id 17
    hide card button id 24
    hide card button id 25
    hide card button id 26
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
    exit mouseup
end if
if sha is empty then
    put true into sha
    put true into wsha
    put empty into wtex
    put empty into wcol
    lock screen
    go card "card2"
    hide card button id 12
    hide card button id 13
    hide card button id 14
    hide card button id 15
    hide card button id 16
    hide card button id 17
    show card button id 24
    show card button id 25
    show card button id 26
    unlock screen
    put 0 into protect
    ShowPicture "Macintosh HD:blotpicts:2222", rect of bkgnd button id 3, file
    exit mouseup
end if

-- ***** data collection
lock screen
get subNum
put it after dataCollect
go cd card2
put 2 after dataCollect
if the hilite of cd btn id 12 is true then put 0 after dataCollect
if the hilite of cd btn id 13 is true then put 1 after dataCollect
if the hilite of cd btn id 14 is true then put 2 after dataCollect

```

```

go cd card2w
if the hilite of cd btn id 12 is true then put 0 after dataCollect
if the hilite of cd btn id 13 is true then put 1 after dataCollect
if the hilite of cd btn id 14 is true then put 2 after dataCollect
go cd card2
if the hilite of cd btn id 15 is true then put 0 after dataCollect
if the hilite of cd btn id 16 is true then put 1 after dataCollect
if the hilite of cd btn id 17 is true then put 2 after dataCollect
go cd card2w
if the hilite of cd btn id 15 is true then put 0 after dataCollect
if the hilite of cd btn id 16 is true then put 1 after dataCollect
if the hilite of cd btn id 17 is true then put 2 after dataCollect
go cd card2
if the hilite of cd btn id 24 is true then put 0 after dataCollect
if the hilite of cd btn id 25 is true then put 1 after dataCollect
if the hilite of cd btn id 26 is true then put 2 after dataCollect
go cd card2w
if the hilite of cd btn id 24 is true then put 0 after dataCollect
if the hilite of cd btn id 25 is true then put 1 after dataCollect
if the hilite of cd btn id 26 is true then put 2 after dataCollect
put return after dataCollect

```

```
-- ***** begin randomization for next card
```

```
go to card "card3"
```

```
***** (This repeats for cards 3 through 10.)
```

```
-- ***** data collection
```

```
lock screen
```

```
get subNum
```

```
put it after dataCollect
```

```
go cd card10
```

```
put 0 after dataCollect
```

```
if the hilite of cd btn id 1 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 2 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 3 is true then put 2 after dataCollect
```

```
go cd card10w
```

```
if the hilite of cd btn id 1 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 2 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 3 is true then put 2 after dataCollect
```

```
go cd card10
```

```
if the hilite of cd btn id 4 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 5 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 6 is true then put 2 after dataCollect
```

```
go cd card10w
```

```
if the hilite of cd btn id 4 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 5 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 6 is true then put 2 after dataCollect
```

```
go cd card10
```

```
if the hilite of cd btn id 9 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 10 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 11 is true then put 2 after dataCollect
```

```
go cd card10w
```

```
if the hilite of cd btn id 9 is true then put 0 after dataCollect
```

```
if the hilite of cd btn id 10 is true then put 1 after dataCollect
```

```
if the hilite of cd btn id 11 is true then put 2 after dataCollect
```

```
put return after dataCollect
```

unlock screen

```
-- ***** scoring
scoring
put 0 into protect
go cd "thankyou"
unlock screen
end mouseUp
```

on scoring

```
global theVar,dataCollect
lock screen
```

```
get cd fld subjectNumber
add 1 to it
put it into cd fld subjectNumber
put "Subject #" & it & return into theVar
```

```
go to card card1
if the hilite of cd btn id 3 is true then
  if the hilite of cd btn id 7 is true then put "Card 1 Best: Light Texture, Light Shading" & return after
theVar
  if the hilite of cd btn id 8 is true then put "Card 1 Best: Light Texture, Standard Shading" & return
after theVar
  if the hilite of cd btn id 9 is true then put "Card 1 Best: Light Texture, Heavy Shading" & return
after theVar
end if
if the hilite of cd btn id 4 is true then
  if the hilite of cd btn id 7 is true then put "Card 1 Best: Standard Texture, Light Shading" & return
after theVar
  if the hilite of cd btn id 8 is true then put "Card 1 Best: Standard Texture, Standard Shading" &
return after theVar
  if the hilite of cd btn id 9 is true then put "Card 1 Best: Standard Texture, Heavy Shading" & return
after theVar
end if
if the hilite of cd btn id 5 is true then
  if the hilite of cd btn id 7 is true then put "Card 1 Best: Heavy Texture, Light Shading" & return
after theVar
  if the hilite of cd btn id 8 is true then put "Card 1 Best: Heavy Texture, Standard Shading" & return
after theVar
  if the hilite of cd btn id 9 is true then put "Card 1 Best: Heavy Texture, Heavy Shading" & return
after theVar
end if
card1worst
```

```
go to card card2
if the hilite of cd btn id 15 is true then
  if the hilite of cd btn id 12 is true then
    if the hilite of cd btn id 24 is true then put "Card 2 Best: Light Texture, Light Shading, Light Color"
& return after theVar
    if the hilite of cd btn id 25 is true then put "Card 2 Best: Light Texture, Standard Shading, Light
Color" & return after theVar
    if the hilite of cd btn id 26 is true then put "Card 2 Best: Light Texture, Heavy Shading, Light
Color" & return after theVar
  end if
```

```

    if the hilite of cd btn id 13 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Standard Texture, Light Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Standard Texture, Standard Shading,
Light Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Standard Texture, Light Color, Heavy
Shading" & return after theVar
    end if
    if the hilite of cd btn id 14 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Heavy Texture, Light Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Heavy Texture, Standard Shading, Light
Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Heavy Texture, Heavy Shading, Light
Color" & return after theVar
    end if
  end if
  if the hilite of cd btn id 16 is true then
    if the hilite of cd btn id 12 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Light Texture, Light Shading, Standard
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Light Texture, Standard Shading,
Standard Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Light Texture, Heavy Shading, Standard
Color" & return after theVar
    end if
    if the hilite of cd btn id 13 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Standard Texture, Light Shading,
Standard Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Standard Texture, Standard Shading,
Standard Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Standard Texture, Heavy Shading,
Standard Color" & return after theVar
    end if
    if the hilite of cd btn id 14 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Heavy Texture, Light Shading, Standard
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Heavy Texture, Standard Shading,
Standard Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Heavy Texture, Heavy Shading,
Standard Color" & return after theVar
    end if
  end if
  if the hilite of cd btn id 17 is true then
    if the hilite of cd btn id 12 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Light Texture, Light Shading, Heavy
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Light Texture, Standard Shading, Heavy
Color" & return after theVar
      if the hilite of cd btn id 26 is true then put "Card 2 Best: Light Texture, Heavy Shading, Heavy
Color" & return after theVar
    end if
    if the hilite of cd btn id 13 is true then
      if the hilite of cd btn id 24 is true then put "Card 2 Best: Standard Texture, Light Shading, Heavy
Color" & return after theVar
      if the hilite of cd btn id 25 is true then put "Card 2 Best: Standard Texture, Standard Shading,
Heavy Color" & return after theVar

```

```

    if the hilite of cd btn id 26 is true then put "Card 2 Best: Standard Texture, Heavy Shading,
Heavy Color" & return after theVar
    end if
    if the hilite of cd btn id 14 is true then
        if the hilite of cd btn id 24 is true then put "Card 2 Best: Heavy Texture, Light Shading, Heavy
Color" & return after theVar
        if the hilite of cd btn id 25 is true then put "Card 2 Best: Heavy Texture, Standard Shading,
Heavy Color" & return after theVar
        if the hilite of cd btn id 26 is true then put "Card 2 Best: Heavy Texture, Heavy Shading, Heavy
Color" & return after theVar
    end if
end if
card2worst

```

```

go to card card3
..... (This repeats for cards 3 through 10.)

```

```

set cursor to busy
go to card "resultscard"
set cursor to busy
put theVar & return & return after cd fld id 1
put dataCollect after cd fld id 8
set cursor to busy
end scoring

```

```

on mouseUp
    set cursor to busy
    put cd fld "results" into theFile
    set cursor to busy
    ask file "Write summary to:" with "Summary " & the short date
    if it is not empty then
        open file it
        write theFile to file it
        close file it
    end if
end mouseUp

```

(End RIP program hyperscript.)

VITA

Justin Randall Padawer was born in Memphis, Tennessee on April 12, 1961. He attended the University of Tennessee, Knoxville as an undergraduate and worked as a substance abuse counselor with disadvantaged youth before being admitted to the doctoral program in clinical psychology.