

RORSCHACH VALIDATION. II: THE VALIDITY OF COLOUR SHOCK  
IN THE DIAGNOSIS OF NEUROTICISM.

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HAVING stated the case for the atomistic approach to Rorschach validation (Keehn, 21), we must now turn to an examination of the methods and results of the application of the approach to a single Rorschach sign.

Of all the various signs obtainable from a Rorschach protocol, one of the most important and most widely discussed is that of the reaction to colour. That Rorschach himself considered it to be of major importance, and to a certain degree separable, can be seen from the following remark (35):

"In view of the extraordinary variability of the experimental records there can be no fixed point from which factor a good and easy start can be made. In general, however, the surest start is that of the color answers which . . . as has been demonstrated in a purely empirical manner . . . represent the 'affectivity'."

This alleged relationship between Rorschach colour responses and 'affectivity' is said to be demonstrated both overtly and covertly. Firstly, upon subtle inquiry the patient may admit to having been influenced by coloured portions in the blot in determining his response. According to whether the response is determined purely by the colour alone, by colour modified by form or by form supplemented by colour, so it is supposed to indicate the degree of emotional control; the more prevalent the colour the less complete the control. This, of course, is not considered in isolation, but balanced by other factors such as the amount of human movement responses given, but by and large a general parallelism between overt colour responses and control of emotionality is hypothesized.

This parallelism is not, moreover, confined only to those responses in which colour is admittedly used as a determinant, but is further extended to cases where no such admission is made. Thus it is posited by Rorschach that in certain cases reaction to colour is repressed, and that such repression can be recognized by particular behavioural signs. This repression of colour he correlated with repression of emotion. To quote Rorschach's own words:

"Some subjects experience an unmistakable shock, an emotional and associative stupor of varying length, when the coloured Plate VIII appears after the preceding black ones. These subjects suddenly become helpless though previously they had been interpreting well. They find the coloured plates more difficult to interpret than the black plates, and they react with astonishment or vexation. Such subjects are always 'emotion repressors,' neurotics of varying degrees of severity" (34, p. 35).

Whereas the overt, direct responses to colour, C, CF and FC are, in conjunction with M, used to establish a typology of extratensiveness-introversiveness in the so-called normal personality—with the qualification that the pure colour response seldom occurs in such a personality—the indirect colour reaction, or colour shock, is said by Rorschach to be most apparent only in neurotics. Being thus recommended as a useful clinical diagnostic tool, it has recently come in for rather more investigation than has the more direct colour response.

Before going on to consider the findings of some of the investigations into this concept it is well to get some of the difficulties clearly in mind. The main sequence of argument is this:

- (1) Colour on the cards is reacted to indirectly by certain persons.
- (2) This reaction results in certain observable behavioural acts.
- (3) Such persons are of a neurotic nature.

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TABLE I.—Synopsis of Major Indices of Colour Shock put forward by Various Workers.

| Criterion of shock.                                   | * Rorschach. | :: Loosli-Usteri. | :: Beck. | :: Klopfer. | :: Brosin and Fromm. | :: Meyer. | Bochner and Halpern. | :: Lazarus. | :: Rapaport. | Miale and H-Erickson. | Allen, Manne and Stiff. |
|---|--------------|-------------------|----------|-------------|----------------------|-----------|----------------------|-------------|--------------|-----------------------|-------------------------|
| 1. Long R/T to Card VIII                              | *            | ::                | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | ::                      |
| 2. Emotional reaction or comments                     | *            | *                 | ::       | *           | *                    | *         | *                    | ::          | ::           | *                     | *                       |
| 3. First colour response eccentric                    | ::           | *                 | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | ::                      |
| 4. Only pale colour interpreted                       | ::           | *                 | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | ::                      |
| 5. Colour answers to II and III not to VIII, IX and X | ::           | *                 | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | ::                      |
| 6. VIII, IX, X per cent. less than about 33           | ::           | *                 | *        | *           | *                    | *         | ::                   | *           | ::           | ::                    | *                       |
| 7. Longer average R/T to colour than to other cards   | ::           | ::                | *        | *           | ::                   | ::        | ::                   | ::          | ::           | ::                    | *                       |
| 8. Reduction of responses on II, III, VIII, IX and X  | *            | ::                | *        | ::          | ::                   | ::        | ::                   | *           | ::           | ::                    | ::                      |
| 9. Rejection of colour card                           | ::           | ::                | *        | *           | *                    | *         | *                    | *           | *            | *                     | *                       |
| 10. Decline in form quality                           | ::           | ::                | *        | *           | *                    | *         | *                    | *           | *            | *                     | *                       |
| 11. Decrease in Z                                     | ::           | ::                | *        | ::          | ::                   | *         | ::                   | *           | ::           | ::                    | ::                      |
| 12. Decrease or delay in populars                     | ::           | ::                | *        | *           | *                    | *         | *                    | *           | ::           | ::                    | *                       |
| 13. Sequence upset                                    | ::           | ::                | *        | *           | *                    | *         | *                    | *           | ::           | ::                    | ::                      |
| 14. Regression in colour responses                    | ::           | ::                | *        | ::          | ::                   | ::        | ::                   | *           | ::           | ::                    | ::                      |
| 15. M responses shift to autistic                     | ::           | ::                | *        | ::          | ::                   | *         | ::                   | *           | ::           | ::                    | ::                      |
| 16. Increased A per cent.                             | ::           | ::                | *        | ::          | ::                   | *         | ::                   | *           | ::           | ::                    | ::                      |
| 17. More anat. responses on C cards                   | ::           | ::                | *        | ::          | ::                   | *         | ::                   | *           | ::           | ::                    | ::                      |
| 18. Appearance of oligophrenic details                | ::           | ::                | *        | ::          | ::                   | ::        | ::                   | *           | ::           | ::                    | ::                      |
| 19. Long R/T on any C card                            | ::           | ::                | ::       | *           | *                    | ::        | *                    | ::          | *            | *                     | ::                      |
| 20. Greater banality of F responses                   | ::           | ::                | ::       | *           | *                    | *         | ::                   | ::          | ::           | ::                    | *                       |
| 21. Any irrelevant comments to C cards                | ::           | ::                | ::       | ::          | ::                   | ::        | *                    | ::          | ::           | ::                    | ::                      |
| 22. Numerous C and CF responses                       | ::           | ::                | ::       | ::          | ::                   | ::        | *                    | ::          | ::           | ::                    | ::                      |
| 23. Excessive turning of cards                        | ::           | ::                | ::       | ::          | ::                   | ::        | *                    | ::          | ::           | ::                    | *                       |
| 24. Reduced productivity or rejection of Card IX      | ::           | ::                | ::       | ::          | ::                   | ::        | ::                   | *           | ::           | ::                    | ::                      |
| 25. Few responses to C cards                          | ::           | ::                | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | *                       |
| 26. Decline in W's on C cards                         | ::           | ::                | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | *                       |
| 27. Decline in D's on C cards                         | ::           | ::                | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | *                       |
| 28. Very short R/T on II, III, VIII, IX and X         | ::           | ::                | ::       | ::          | ::                   | ::        | ::                   | ::          | ::           | ::                    | *                       |

Even in this long and diverse list some attempt has been made at abbreviation by regarding statements which resemble each other as identical, despite ambiguity and implicit differences. In this way a certain amount of specificity has been sacrificed, but on the whole it should be evident that many of these signs depend upon quite subjective interpretations, and so themselves are dependent upon yet other indices.

All three of these points have been subjected to various experimental investigations, but owing to the failure to treat each hypothesis separately, a good deal of confusion and contradictory evidence has arisen.

Firstly, point (3) involves a whole theory of neurosis. Rorschach evidently regards the neurotic as an "emotion repressor"; others may not. Psychologists and psychiatrists are fast becoming notorious for their failure to agree on what constitutes a neurosis (although current researches by Eysenck (15, 16) and his co-workers seem to show some progress in this direction), so that any large measure of agreement in diagnosis by independent workers is hardly to be expected yet. Thus contradictory results could be obtained because different types of persons were being called by the same name, so that Rorschach's neurotic may show colour-shock whilst Loosli-Usteri's do not, because they both have different views as to what constitutes a neurosis. Thus Rorschach's statement that "Such subjects are always . . . neurotics," and Hertz's (19) report that Loosli-Usteri found signs of colour shock in 61 per cent. of a normal group of one hundred successful business men could be reconciled if Loosli-Usteri were found to be much more cautious about making a diagnosis of neuroticism than was Rorschach.

But this is not all. Considering point (2) above, we can see from Rorschach's quoted statement that he had certain definite ideas as to which behavioural acts to expect. He stated, in other words, the criteria for recognizing colour shock. That the dramatic nature of such criteria is not so definite and unambiguous as Rorschach would lead us to expect can be seen by reference to the number of subsequent studies which have been attempted to give sure signs by which colour shock may be recognized. These signs are summarized in Table I.

In Hertz's short report of Loosli-Usteri's study no such criteria of colour shock are given. In another publication (26) where such criteria are given, not only do we find more inclusive criteria than those suggested by Rorschach, but also a distinction between such shock to Cards II and III and between shock to Cards VIII, IX and X. Rorschach makes it perfectly clear that shock only occurs on Card VIII.

Not only, then, may the two workers (and I am only using these as specific examples) be using entirely different groups of subjects, but they may also be using different criteria to designate the same phenomenon. It may be argued, of course, that this is partly an exaggeration, and that the actual situation is not nearly as bad as it can be made to appear on paper. This may be true although there is no evidence to support it, but the fact remains that in all the studies used to "validate" colour shock, different populations have been used and different criteria have been put forward as evidence or signs of colour shock. Small wonder, then, that little agreement has been reached either on the relevant and fruitful criteria to be employed or on the ability of such criteria to differentiate between certain clinical groups.

Really the studies listed below as attempts at validation of colour shock are more properly concerned with modification and specification. In no instances are Rorschach's own criteria interpreted and employed explicitly, but always certain modifications and additions are made. This is quite proper so long as we remember that we are investigating certain criteria of, and not an abstract concept of, colour shock.

For experimental investigation Rorschach's own statements are not so definite as might be hoped. How, for instance, is one to set the limits of an "emotional and associative stupor of varying length"? And certainly the author has never met anything that he would call a stupor, nor anyone who has become "helpless, though previously . . . interpreting well" in his experience with this test. How, again, are we to determine that the patient is finding the coloured plates more difficult to interpret, and how can we be sure of recognizing astonishment or vexation from the patient's expression?

With these problems in mind, then, it is reasonable that different observers should have set up their own more definite and objective criteria of colour shock, as set out in Table I, and set about testing the validity of such new criteria. Providing we remember that such criteria are not duplicated absolutely from study to study we shall not fall into the error of comparing and evaluating results from studies which are, strictly speaking, in no way comparable.

The study by Miale and Harrower-Erickson (28) goes some way towards overcoming the difficulties discussed above. Not only do they clearly state their view of neuroticism, but they also specify fairly definitely their criteria of colour shock.

As a definition of neurosis they offer a modified version of the definition by O. Spurgeon English that—

“ A neurosis is a clinical condition in which the manifestations may be symptoms of physical dysfunction, recurring thoughts, acts or effects which serve no useful purpose, but which nevertheless cannot be modified by the subject, and in which the manifestations are accompanied by a subtle but definite disturbance of the integration of personality and in the ability to adapt to reality.”

For their criteria of colour shock they list four signs which may be summarized as—

- (a) Long R/T before first response on colour card.
- (b) Exclamations indicating arousal of new emotions.
- (c) Decline in quality of form responses.
- (d) Rejection of the card.

Of these, it will be seen, only the second is taken direct from Rorschach, and while the first and last are merely extensions of Rorschach's remarks about Card VIII to all the coloured cards, the last criterion seems to be quite original. Using, apparently, the appearance of any one of these signs to indicate colour shock, Miale and Harrower-Erickson claimed to have found such shock in 98 per cent. of a group of 43 neurotics, whilst only 20 per cent. of a group of 20 normals exhibited it.

This figure of 20 for the percentage of normals showing colour shock is also proposed by Klopfer and Kelley (22), who regard colour shock as a major index in the diagnosis of neurosis as is indicated by their statement that—

“ Probably the most important single sign of a neurotic reaction is colour shock; all students of the method have found that neurotics invariably show such shock, and only a small percentage of normals and other types of psychopathy display it ” (p. 385).

They also admit the presence of signs of colour shock in certain organic cases and dementia praecox. Bochner and Halpern (9), however, whilst agreeing that early schizophrenics may show signs of colour shock, certainly do not admit of its occurrence in the protocols of organics. As to the value of colour shock as an indicator of neurosis they state in a footnote (p. 140) that—

“ Color shock as a neurotic indicator is a much over-rated symptom. Almost every subject shows some deviation in the form of his reaction when confronted with the color cards.”

Using 21 ten to fifteen years old psychiatric cases at a summer camp, Young and Higginbotham (42) reached much the same conclusion; nearly all their subjects, whether suspected neurotics or not, exhibiting some of the Miale and Harrower-Erickson signs of shock. Until a unitary theory of neurosis develops and until a standard set of colour shock signs become recognized such divergences of opinion must remain, and no satisfactory solution can be offered.

Other, isolated, signs of colour shock have been put forward by various writers, notably Allen (1), Sanderson (36), and Wallen (41). Allen (1) advocates a comparison of the ratio

$$\frac{\text{Total time for coloured cards}}{\text{Total responses for these cards}}$$

with the corresponding ratio for the non-coloured cards to see if any impoverishment has occurred. He recommends this as a useful check on the more usual procedure of comparing the average reaction times to both groups of cards in order to obviate the spurious effect in the latter which may be determined by “ intellectual ” shock [Coyne (12)] to Card IX.

Sanderson (36), however, makes the point that comparison of means or totals is a dangerous procedure anyway, as any kind of specific reaction to any of the cards could contribute disproportionately to the result. He gives instead a set of norms obtained from protocols of 50 normal subjects setting the limits of the normal reaction time for each of the ten cards. Shock to any one of the cards could then be determined by comparison of the obtained reaction time with the norm. As an error occurred in the original printing of his table these norms are reproduced below with minor alterations and incorporating the subsequent correction. The bracketed

figures are similar norms obtained from 150 normal subjects tested by the author. The wide discrepancy between these two sets of figures serves not only to emphasize the dangers of such an approach, but also to lend support to Crown's (13) contention that widely different results can be obtained from different samples of so-called normal populations.

TABLE II.—Norms for Reaction Times to the Rorschach Cards.

| Card.  | (1)<br>Mean R/T<br>normals. |        | (2)<br>Mean R/T<br>neurotics. | (3)<br>Approximate<br>normal limits.<br>(Seconds). |
|--------|-----------------------------|--------|-------------------------------|--|
|        |                             |        |                               |  |
| I .    | 7.76                        | (15.0) | . 12.7                        | . 5 to 11  |
| II .   | 11.66                       | (25.1) | . 22.7                        | . 5 ,, 18  |
| III .  | 9.22                        | (16.5) | . 15.0                        | . 5 ,, 14  |
| IV .   | 13.02                       | (22.0) | . 18.5                        | . 8 ,, 18  |
| V .    | 9.66                        | (16.1) | . 19.6                        | . 4 ,, 15  |
| VI .   | 14.70                       | (33.1) | . 40.6                        | . 4 ,, 25  |
| VII .  | 14.26                       | (33.8) | . 37.8                        | . 7 ,, 22  |
| VIII . | 11.46                       | (20.9) | . 26.2                        | . 4 ,, 19  |
| IX .   | 15.56                       | (34.8) | . 43.9                        | . 5 ,, 27  |
| X .    | 13.54                       | (28.5) | . 32.1                        | . 5 ,, 22  |

The normal limits of initial reaction times to the various cards as obtained by Sanderson are shown in column (3). The figures are shown to the nearest second as the usual method of collecting such data would allow of no greater practical accuracy. Column (1) shows the mean R/T of Sanderson's subjects to each card; the bracketed figures are those collected by the author on a miscellaneous group of 150 normal soldiers and students. Despite the discrepancies between the individual card norms, possibly dependent upon cultural influences, the ratio of the reaction time to Card VIII to the mean reaction time to Cards I to VII is very nearly unity in both sets of figures. This ratio also holds for the group of 25 neurotics whose mean R/T's are shown in Column (2).

In this particular case a better procedure would seem to be to use each patient as his own control, and present, say, the distribution of the ratio of the reaction time to Card VIII to the mean of the reaction times to the first seven cards. That such a procedure may reconcile the two sets of figures is evinced by the fact that, assuming Sanderson used 50 cases for each of his means, the mean reaction times for Cards I to VII are 11.47 and 21.1 for each set of figures respectively. In each case this is very nearly equal to the mean reaction time to Card VIII. Thus we may tentatively conclude that the ratio of the reaction time to Card VIII to the mean reaction time to Cards I to VII is very nearly unity for normal subjects.

This ratio, when calculated for a mixed group of 25 diagnosed neurotic cases attending the Maudsley Hospital, also deviated insignificantly from unity, showing the sign not to be indicative of neuroticism. It may, however, be diagnostic for certain neurotic sub-groups, such as hysteria; but this point has not yet been tested.

As his criterion of colour shock Wallen (41) used expressed preference for chromatic or achromatic versions of the cards by normal and unstable subjects. His assumption was that colour shock would result in an expressed dislike of the card. The most relevant of his findings were that the coloured cards were most often preferred to their achromatic counterparts by the normals, but that unstable men showed more preference for the achromatic versions of three of the five "coloured cards."

Another form of attack on the colour shock question has been not to examine statements (2) and (3) above, but to question the first premise, namely that it is the colour on the cards which is responsible for the behavioural differences exhibited by some subjects to Cards II, III, VIII, IX and X. The first of such studies was a rather novel one by Brosin and Fromm (10). They examined the Rorschach protocols of twelve subjects of varying degrees of colour defect as indicated by the Ishihara, Stilling and Holmgren tests, and showing various types of clinical syndromes. Despite their colour defects the neurotic subjects in this rather small group still showed signs of colour shock, in such a way that the more clinically severe cases of neurosis exhibited the greatest amount of shock reaction. Rather than completely reject the idea of colour shock, Brosin and Fromm proposed three alternative hypotheses to account for their results, namely,

- (1) That their subjects may have had sufficient colour vision for the purposes of the test.
- (2) That the physical stimuli may have caused certain physiological consequences without awareness. Or—
- (3) That the responses may have been due to shades of grey in the cards.

Certainly the concept of shock to colour cannot be rejected summarily on the evidence of this experiment, but at least the results have served to direct attention to its rather tenuous nature.

Following an idea from Baumgarten-Tramer (5), Rabin and Sanderson (30) tried reversing the order of presentation of the cards. Baumgarten-Tramer argued that the shock shown to the first coloured card could be explained in terms of perseveration and resistance to shift, and that consequently, if the order of the cards was reversed so that the coloured cards preceded rather than followed the non-coloured cards, similar signs of shock would still be exhibited in neurotic subjects. The explanation of the appearance of the signs of shock would then have to incorporate the concept of resistance to shift instead of, or perhaps in addition to, the presence or absence of colour.

In testing this hypothesis, Rabin and Sanderson used 34 normal subjects, half of whom were given a Rorschach in the usual manner and the other half of whom received the cards in the reverse order. However, Rabin and Sanderson found little difference in productivity or reaction time for the two groups, and so gave no support to the "resistance to shift" hypothesis, yet they did suggest that their results were consistent with the colour shock phenomenon being due to differential difficulties within the ten cards. Some cards they found to be objectively more difficult to interpret than others, and this could give rise to the indices alleged to depend upon the colour alone.

The point that colour may not be solely responsible for some of the responses attributed to it has also been made by Benjamin (8), who states that—

" . . . while some responses to the coloured plates may be identified with colour shock and associated with neurotics, colour *alone* may not be responsible for this . . . there may be other test factors such as the shading of the colour cards and their unique form."

To test the effect of removing colour from the cards, several writers have constructed parallel sets of cards to the normal Rorschach sets, but excluding colour from Cards II, III, VIII, IX and X. Usually this is done by using achromatic photographs of the originals. The standard procedure, as introduced by Lazarus (23), (24), consists of testing two groups of subjects, one with the achromatic cards and one with coloured photographs of the originals, and then re-testing each group after an interval of a few weeks on the other set of cards. In this way, using 100 adolescents as subjects, Lazarus concluded that presence or absence of colour made no major difference to the responses, and that colour shock signs occurred in protocols from both the chromatic and achromatic cards.

However, Lazarus, as did Sappenfield and Buker (37), who found that the percentage of the responses to the last three cards (8-9-10 per cent.) was unaltered by presence or absence of colour, used the Group method of administering the Rorschach, and it is highly doubtful if results from such a procedure can be generalized to include the more standard method of giving the test. To overcome this difficulty Perlman (29) repeated the Sappenfield and Buker study with standard Rorschach procedure on three rather small groups (N 18, 10 and 8) of students and a group of 34 mixed patients. Again no difference between the groups either on test or re-test of the means or distribution of the 8-9-10 per cent. was found, irrespective of whether the chromatic or achromatic cards were used.

Using this technique and individual administration, Dubrovner, Von Lackum and Jost (14) found that colour influenced neither the productivity nor the reaction times of a group of 30 student-nurses, and with a group of 21 male schizophrenics Buker and Williams (11) concluded that although the removal of colour did yield a significant decrease in reaction time, colour as a discrete variable did not materially influence the responses.

Despite the criticism by Siipola, Kuhns and Taylor (39) of the method of counter-balanced groups put forward as a result of their discovery that if the achromatic cards are presented first the memory carry-over is sufficient to mask any effect of

colour on re-test with the chromatic series, this method continues to be used. Allen, Manne and Stiff (3), using a carefully prepared set of achromatic cards supplied by Huber of Berne, the official Rorschach printers, individually tested a small group of 25 normal students with both these and the usual cards. Whereas the achromatic sets used by earlier workers differed from the chromatic ones with respect to light and shade effects as well as in colour, Allen, Manne and Stiff contended that their two sets of cards differed only in colour. As they used a test-re-test interval of six weeks, they might also have overcome the objection of Siipola, Kuhns and Taylor who used only a four-week interval in their study. Of the signs of colour shock examined by them, as listed in Table I, they found that in the cases which they examined, viz., 6, 7, 8, 9, 12, 20, 26 and 27, they could find no evidence of the influence of colour. They also found that the removal of colour had no effect on the total number of responses to all ten cards. Allen (2) subsequently reported that he could find no significant differences between the chromatic and achromatic cards with respect to reaction time as exhibited by 25 normal subjects. In fact, in seven of the cases he obtained values greater than 1.5 for the ratio of the Mean RT to Cards II, III, VIII, IX and X to the Mean RT to Cards I, IV, V, VI and VII (Beck's criteria of colour shock) on the achromatic cards. In both these latter studies the authors have been careful to note that they have not disproved the hypothesis that colour has some influence on the interpretations made to the plates, but only that such influence is not usually found in normals. It still remains to be shown that similar results will obtain for neurotic subjects, although Buker and Williams's (11) study suggests that it is so for schizophrenics. Allen, Manne and Stiff (4) have also, again using only a small group of 25 normal subjects, demonstrated that the absence of colour from the usually coloured cards does not affect the consistency of responses to them, meaning by a consistent response one where the re-test was similar in both location and card orientation as well as descriptive content, to the one given on the original test. Not only does a study by Meyer (27) support the earlier view of the almost universal reaction of shock in response to colour, but it also shows that such reaction occurs just as frequently with an achromatic series of cards as it does with the normal ones. In a straightforward comparison of two groups each of 30 students he showed that 24 gave more than 2 of Beck's signs of shock with the standard cards, as did 25 of the group given the achromatic series.

The experimental evidence, then, seems to offer little or no support either for the continued use of colour shock in the diagnosis of neuroticism, or for the supposition that the signs of such shock are due to the presence of colour. However, if we revert to the original hypothesis that the colour causes an emotional disturbance, without necessarily equating this disturbance with neuroticism, and at the same time replace the concept of colour shock by the behavioural response of delay of reaction, some support will be found in the investigation of Siipola (38). Instead of using the whole Rorschach cards, she cut parts from them, both coloured and uncoloured. To one group of student subjects she gave the coloured pieces and to another group she gave the uncoloured ones and compared their reaction times and initial responses. She, like Buker and Williams (11), found the reaction times significantly longer to the coloured pieces, and concluded that this was a normal and not a deviant sign. She further posited that were this delay due to colour alone the recurrence of a particular hue from blot to blot would result in a correspondence between this and the reaction times to those blots. Her results, however, showed this not to be so.

By asking her subjects to rate each of the blots as pleasant, unpleasant or neutral, she found that more of the coloured ones were rated as pleasant or unpleasant and more of the uncoloured ones were rated as neutral. Thus a correlation, though not necessarily a causal one, between increased reaction time and emotional blockage is indicated. Noticing that when the colour and form of the blot were harmonious the reaction time was decreased, and that when each suggested a different interpretation an increase in reaction time occurred, Siipola posited a conflict on the part of the subject as the determining factor in this latter case. In this way she criticized the normal F, FC, CF and C Rorschach interpretations by regarding them simply as signs of the individual's resolution of such conflicts.

If it is to be maintained that delayed reaction to colour is indicative of neuroticism, very indirect evidence against conflict being the full explanation is available

from Thurstone (40) and Eysenck (15), where the former shows no correlation between a speed of decision test and one of dark adaptation, whilst the latter finds dark adaptation to be a good index of neuroticism. One might suppose, then, an absence of correlation between neuroticism and speed of decision. However, this only suggests that delayed reaction to Card VIII would not be an index of neuroticism if Siipola's hypothesis were correct, and as Siipola believes in the universality of delay in reacting to colour there is no conflict here. It is possible for the sign to be non-diagnostic but still occur via the mechanism that she postulates. Evidence from an experiment carried out by the author but not designed to test this particular point may be relevant. One hundred normal subjects were given a choice reaction type test whereby they had to press one key when the stimulus was a triangle and another when the stimulus figure was coloured blue. Ten trials were given, half with triangles and half with blue stimulus figures presented in random order, before a blue triangle appeared as stimulus on the eleventh exposure. All subjects pressed one or other of the keys to this figure, and only a few mentioned afterwards that they should have pressed both. This situation can be thought of as analogous to the Rorschach situation, where a series of grey cards is presented and their formal aspects reacted to, followed by a coloured card which can be interpreted either by colour or form. If, as according to Siipola, the delayed reaction to Card VIII is due to the conflict between separate tendencies to react to colour and form, a correlation between the amount of this delay and a similar delay to the last exposure in the choice reaction time test might be expected. The correlation of the difference between the reaction time to Card VIII and the mean reaction time to Cards I to VII and the difference between the reaction time to the blue triangle and the mean of the previous ten reaction times was, however, found to be only .1. If the two situations do have the suggested features in common, then Siipola's explanation must be regarded as incomplete, but it may well be that the low correlation arises because the tests are, in fact, really quite unlike. Further evidence specific to this question is required.

Other attempts at linking the signs of colour shock with emotional reactions have been made using known physiological correlates of emotional disturbance as external criteria of such reaction to the cards. In one such study, Rockwell *et al.* (32) took a continuous graphic recording of the palmar skin resistance of their subjects during administration of the Rorschach. Deploring the disregard of precision and recognition of colour shock introduced by workers subsequent to Rorschach, they reverted to the use of Rorschach's original indices. By also interpreting Rorschach as meaning by shock "the neurophysiological condition called 'shock,' which is defined as 'a sudden depression of the nervous system' or 'a condition of lowered excitability,'" they justified their procedure of looking for concomitant variations between the psychological signs of shock as indicated by the Rorschach and the neurophysiological signs of shock as shown by changes in palmar skin resistance. They used 30 subjects, 20 normal and 10 neurotic, with the rather unorthodox Rorschach procedure of presenting the plates on a screen in a darkened room for only 90 seconds each, with the subjects encumbered by the various electrical recording devices for measuring the PGR. They equated indices of shock and instability apparently quite subjectively, by saying that ten of their normal group (group A) "showed no color shock, and who, clinically, appeared to be relaxed and, in general, emotionally stable," whilst the other ten (group B) "showed clear-cut evidence of color shock, and who, clinically, appeared to be more tense and, in general, emotionally less stable. . . ." All their neurotics (group C), they claimed, showed definite signs of colour shock.

Apart from this correlation between shock indices and overt emotionality, they also looked for a relationship between the indices and disturbance as measured by the PGR. On Card VIII they did find a significant decline in the PGR reaction from group B, as compared with group A, but no such decline was found in the neurotic group, due, according to the authors, to a general inhibition of the PGR response of this group throughout the ten cards. Although their results are consistent, then, within the normal groups in showing the co-variation of instability, appearance of Rorschach's indices of colour shock and changes in PGR recordings to Card VIII, they show no such correlation with the neurotic subjects. Goodman (17), using a similar technique but with standard Rorschach administration on 23 normal and 27 neurotic subjects, reported that—



" Within the limits of this experiment the assumption that color on the Rorschach is an emotional stimulus and is reacted to as such is not valid."

In his very brief report he states that no one card consistently had more affective value than the others, but that the relative affective values of the cards varied from subject to subject and that neither colour shock nor colour productivity were related to this affective value.

Similarly, Levy (25) postulated that a change in palmar skin resistance would accompany affective experiences to the cards, although she preferred to measure conductance rather than its reciprocal, resistance. Even more liberties were taken with the Rorschach administration in this experiment than heretofore. To eliminate position effects the cards were presented in serial order, the subjects were restricted to one response per card and the cards were presented by machine to prevent the subjects from handling them. No significant differences in affective values of the cards were found, though Card VIII did show a tendency to rate highest. This failure to corroborate Rorschach hypotheses with physiological criteria was confirmed by Hughes, Epstein and Jost (20), using such measures as respiration, heart rate and blood-pressure as well as the PGR.

Rockwell *et al.* (33), emphasizing that in their previous study "evidence was presented in favor of the hypothesis that inhibition of associations during color shock is accompanied by an inhibition of autonomic responsiveness as measured by the skin resistance method," determined to examine the effect with the colour removed from the cards. They constructed a parallel achromatic set by the usual photographic method, but reported no special precautions taken to equalize the other effects inevitably introduced by such a technique, and presented the cards in the same manner as in their previous study (32). Finding, as had Siipola, Kuhns and Taylor (39), a pronounced memory effect when the grey cards were presented prior to the coloured ones, they dispensed with the method of counter-balanced groups and gave all their subjects the coloured series first. On re-test a week later their achromatic version was given to both their groups of subjects, the first comprising 15 students who gave no signs of colour shock on the initial test, and the second rather smaller group of 8 students who had shown such shock. Their findings did enable them to put forward some interesting hypotheses about their subjects' approaches to the test, but no evidence to show that removal of the colour had any significant effect on the appearance of psychological or physiological shock emerged. Thus confirmation of the lack of correlation between colour and emotional disturbance as found by the other physiological experiments is offered.

Reducing this confused mass of data to order presents a difficult, though not impossible, task, for so inconclusive are most of the results that many contradictions may be attributable to experimental error. With this in mind certain general trends can be detected.

From the studies by Meyer (27), Loosli-Usteri (19) and Young and Higginbottom (42) and the opinions of Bochner and Halpern (9) it seems that most of the signs of shock listed in Table I are not restricted to the protocols of neurotic subjects, and so cannot be diagnostic. Even though the criticism has already been made of the lack of specificity by various writers of the meaning of neuroticism, there is probably sufficient agreement in general to justify this conclusion. The further evidence from numerous studies that similar reactions occur with or without colour on the usually coloured cards suggests that the appearance of shock is due to some other variable. It is a pity that nearly all of these studies have been restricted to the use of student and other normal groups as subjects, for without the doubtful evidence demonstrating that signs of colour shock appear in most protocols, this absence of differential reaction to the coloured cards by normals would be expected. The point could be clinched by showing that diagnosed neurotic subjects exhibited signs of colour shock even in the absence of colour. This tendency on the part of American psychologists to concentrate their researches upon student populations when studying personality variables is as lamentable as is the recent limitation of their comparative counterparts to experiments on the albino rat (Beach, 6).

Bearing in mind the seeming irrelevance of colour, the contention of Siipola (38) relating delay to conflict between interpreting according to colour or form seems unwarranted, the more probable explanation being in terms of difficulty of interpretation. This view is supported by Benjamin (8), Rabin and Sanderson (30) and the norms presented by Sanderson (36) and the author, each showing Card IX to

have the longest reaction time of all the cards. Following, as it does, two difficult cards, VI and VII, and an easier one, VIII, it is evident why some writers have tended to stress its importance in the elicitation of colour shock, although their explanation in terms of a carry-over effect from shock to Card VIII is unsubstantiated.

The fact that colour shock is not due to colour need be no cause for dismay, for as is amply demonstrated by Granger (18), there are many unexplained perceptual phenomena showing individual differences which may link up with temperament. By eliminating the abstract concept of colour shock and substituting instead the various indices which do show individual differences on the Rorschach we may yet find some which also correlate with personality variables.

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