COLOUR-FORM RESPONSE AS A FUNCTION OF MENTAL DISORDER*

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ALTHOUGH Külpe (14) used only three subjects in his original experiment on tachistoscopic memory in 1904 his classification of them into colour, form and intermediate types has initiated a substantial amount of psychological research all over the world. Thus investigations into both normal and abnormal personality correlates of reaction to colour and form have been carried out in France (8), Poland (1), Italy (5), (18), Japan (17), Britain (6), (9), (16), America (4), (23), Sweden (2), (15), and Germany (20), (21) to quote but a representative sample.

In general two major findings emerged from the earlier experiments: that reaction to colour decreases with age after the first year or two and that colour and form reactivity tended to go with pyknic and leptosomatic body build respectively. However a survey of the literature indicated that a wide variety of different types of colour-form tests had been used by various workers, and that the evidence available (Eysenck (9), Clarke (6), Thurstone (23)) suggested that these tests were not all measuring the same function. Consequently a number of colour-form tests were constructed and factor analysed showing that a single factor of reaction to colour could be isolated but that any single test would not be a good measure of it, Keehn (13).

A battery of colour-form tests based on this analysis was constructed and administered to small groups of psychotic and neurotic patients (12). Results from this study confirmed previous reports by Eysenck (9) and Clarke (6) that neurotics did not perform significantly differently from normals on these tests, thus indirectly refuting the hypothesis of Schachtel (19) and others linking reaction to colour with emotionality. In addition the schizophrenic group showed more reaction to colour than the manic-depressive patients in contradiction to Kretschmer's typological system which would require the schizophrenics to be form dominant. Similar findings of schizophrenic reaction to colour have also been reported by Campailla (5) and Rubino and Scoppa (18).

As single tests of colour-form dominance have also been used with other clinical groups like epileptics, spastics, mental defectives and organics by Blomqvist (2), Cotton (7), Bolles (3) and Goldstein and Scheerer (10), it seemed worthwhile to investigate the differentiating ability of the colour-form battery between such groups. For a test to have any validity clinically it must be able to separate clinical groups from each other and not just from normal populations. Theoretically the point is important too, for if we are to discover, for instance, the psychological dimensions of schizophrenia it is not sufficient just to show

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how this group differs from normals, but also how it differs from other groups of subjects. We have already demonstrated that schizophrenics are significantly more colour reactive than normal and neurotic groups suggesting that colour reactivity is a function of schizophrenia. It is now pertinent to investigate whether colour reaction is a function of schizophrenia alone or whether similar reactivity is also shown in other groups.

Procedure

Groups of 35 schizophrenic, 10 epileptic and 9 defective patients of average ages 27, 24 and 18 years; respectively were given a battery of colour-form tests based upon that described by Keehn (11, 13). Specifically the tests were:*

4. *Memory: Paired associates.* Four letters had to be associated with four coloured shapes. Colours and shapes were later interchanged to see which category had been associated with the letters which were in the Arabic script.†

10. *Odd one out.* Of nine coloured figures on a card only one was green and only one was a square. The subject was asked to pick out the odd figure.

13. *Common elements.* Three similar figures had to be chosen from eight and could be selected either on the basis of colour or form.

8. *Grouping.* Twelve squares set out on a background could be grouped either by colour or by their disposition on the background.

12. *Stepping Stones.* The subject had to pick his way across a set of coloured figures from one point to another. Two correct paths were available, one based upon continuity of colour and the other on similarity of shape.

22. *Card Sorting.* A pack of cards with coloured symbols on them had to be sorted into four groups. Most of the cards could be sorted by colour and shape combined but four cards could be sorted in one way only.

19. *Weigl Sorting.* Nine coloured wooden blocks, three square, three triangular and three circular could be sorted by colour or shape.

Two tests in the original battery were omitted, the tachistoscope test for technical reasons and the tossing test because its procedure was not found suitable for Arab subjects. In addition neither of these tests had shown significant differences between the original normal and schizophrenic groups in the earlier study.

Results

Table II shows the mean scores and variances of the respective groups. Scores were obtained by weighting each test as shown in Table I, colour and form responses being scored positive and negative respectively. These weights were obtained from a factor analysis of the responses of 200 normals to the battery (13) and were calculated from the factor loadings by the Ledermann method described by Thomson (22). The reported mean of 43·5 of the original schizophrenic group (12) was hardly affected when recalculated without the tests omitted from the present study. The mean of the present schizophrenic group does not differ significantly from this. Furthermore turning to the percentage of subjects giving the colour responses to the individual tests, Table III, it is clear that on tests 4, 8, 10 and 12 the two schizophrenic groups are highly

* Complete descriptions and administration instructions for the tests have been reported elsewhere (11) and will not be repeated here. The numbers by the tests are carried over from the earlier investigation; the tests are listed here in the order given in this study.

† Testing was carried out by Miss Sabbagh. The Arabic language, the native language of the patients, was used throughout.

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TABLE I

Test Weights: Positive and Negative Scores are Given for Colour and Form Responses Respectively. Failure to Respond is Scored Zero

Test	4	8	10	12	13	19	22
Weight	30	06	21	19	18	15	31

TABLE II

*Group Means and Variances of the Weighted Battery Scores**

Group	N	Mean	V
Schizophrenic	35	30·11	4294·84
Epileptic	10	32·90	2307·70
Defective	9	86·11	2522·10

* Positive scores indicate a preponderance of colour responses. The epileptic scores are to be treated with caution as 7 and 4 subjects failed on the two most highly weighted tests respectively.

TABLE III

Percentage of the Various Groups Failing or Giving the Colour Response to the Individual Tests. Schizophrenic A is the Original Schizophrenic Group (12). Schizophrenic B is the Present Sample

	Percentage of S's giving the Colour Response				Percentage of S's Failing to Respond		
Test	Schizophrenic A	Schizophrenic B	Epileptic	Defective	Schizophrenic B	Epileptic	Defective
4	56	51	30	67	26	70	33
8	68	74	90	78	3	0	0
10	60	66	80	67	0	0	11
12	72	54	50	89	23	30	0
13	80	71	60	100	6	20	0
19	68	40	50	78	3	20	0
22	64	46	10	56	11	40	22

similar. On tests 12, 22 and 19, where the percentage of schizophrenics responding to colour have fallen appreciably, tests 12 and 22 did not differentiate between normals and schizophrenics previously and still do not do so. On test 19 the combined schizophrenic group is still significantly different from the original normals at the 0·001 level and the new group alone borders on the 0·05 level of significance. All in all, then, the second schizophrenic group responded to the tests in similar fashion to the first group and thus we may take the original finding that schizophrenics are significantly more colour reactive than normals as confirmed.

However turning to the epileptic and defective groups we find reaction to colour not restricted to the schizophrenics, Table II. The figures for the epileptic group are suspect owing to the large number of failures on the individual tests as shown in Table III. On the only tests which this group managed to perform satisfactorily, the grouping and odd one out tests, they reacted more to colour than either of the other groups but not significantly so. Using a large group of epileptics Blomqvist (2) found a high proportion of colour reactors among them. However he used Lindberg's Ring test (15) which has since been shown to be a measure of whole-part rather than of colour-form attitude (11). As for the defectives in all instances a greater percentage than the

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schizophrenics responded to colour, significantly so at the 0·05 level on tests 12 and 19. However these differences may be artifacts as in both tests the schizophrenics scored lower than the previous schizophrenic group and on test 12 in particular the failure of eight schizophrenics to complete this test may have seriously disturbed the results. Neglecting these subjects the difference between the groups on the tests does not attain statistical significance. Furthermore on combining the two schizophrenic groups on test 19 the difference between these and the defectives becomes non-significant.

Despite the fact that we cannot be sure that differences between defectives and schizophrenics on any of the individual tests are significant the mean scores on the battery as a whole do differ significantly beyond the 0·05 level, Table II. Although with such a small defective group we cannot be sure of the stability of this difference it is very unlikely that further cases would reverse these findings and lower the defective mean significantly below that of the schizophrenics.

Our results show, then, that reaction to colour rather than form on a battery of colour-form tests is not specific to schizophrenia but is also a function of mental deficiency. Inasmuch as earlier workers on colour and form attitudes have shown that children also react more to colour than to form, our results support the findings of many other clinical tests that both schizophrenics and mental defectives respond more like children than like normal adults. That this is not due to intelligence alone is suggested by Keehn (11) whose results show the average correlation between the present tests and the Raven Matrices Test to be only −0·04. The largest single correlations of −0·27 and −0·22 between response to colour on the card sorting and memory tests and intelligence respectively are reflected by the relative failure of the defectives on these tests.

Summary and Conclusions

A battery of colour-form tests developed in previous investigations had shown schizophrenics to be significantly more colour reactive than normal or neurotic subjects. The present study was designed to see whether response to colour in this sense was restricted to schizophrenics or whether other abnormal groups would behave likewise. Inasmuch as the majority of the earlier work with single colour-form tests had suggested that schizophrenics would be form reactive it was also imperative to cross-validate the original findings.

The present results clearly confirmed the original findings both with respect to the test battery and with respect to the individual tests. However mental defectives responded, if anything, even more to colour than did the present schizophrenic group. A group of epileptics experienced more difficulty with the tests than the other two groups but on the two tests which they were able to do they responded more to colour than the other groups.

Inasmuch as earlier workers had also shown colour reaction to decrease with age the present study confirmed previous clinical findings that schizophrenic and defective patients respond more like children than normal adults. As the present tests showed little correlation with intelligence it was concluded that this similarity did not depend upon cognitive factors.

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