DIMENSIONAL THEORY APPLIED TO SCHIZOPHRENIC PATIENTS

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Problem

Psychoticism, neuroticism, and extraversion are the dimensions of personality resulting from the statistical analysis of a number of psychological tests. Those working in this field state that the "isolation of three main dimensions—neuroticism, psychoticism, extraversion—may be said to have been accomplished at a reasonably high level of confidence" (Eysenck, 1952, p. 293). It has been stated also that these dimensions are relatively independent of one another and all independent of intelligence. In developing the dimensional picture of personality, tests which discriminated between a group of neurotic patients and a group of normals were found to inter-correlate positively and to generate a factor of neuroticism. Similarly tests were developed which distinguished between psychotic patients and normals, and between extraverts and introverts. To the writers' knowledge however there is no study available which applies the tests for all four dimensions to the same group of people. The four orthogonal dimensions should be identifiable, and would confirm the dimensional theory.

At Banstead Hospital we have been developing various methods of assessing schizophrenic patients, and have described the use of various rating scales and standard interviews. In one research project we had the opportunity to assess the value of the dimensional approach described above, in a group of schizophrenic patients. We hoped to discover if the four dimensions described could be isolated in our patients and if, when isolated, they could be related to clinical findings or prognosis. The first aim of this paper is therefore the test of the four-dimensional theory.

Secondly, the degree to which a test will discriminate between psychiatric and normal groups depends as much upon the groups as on the test itself. As the psychiatric groups, particularly the psychotic ones, in these studies were generally less severely disturbed than is usually found in mental hospitals, the question of how mental hospital patients would perform on the various tests is of obvious importance. The second aim of this paper is to provide data for these comparisons.

Thirdly, we have shown elsewhere (Baker, Game and Thorpe, 1957) that schizophrenic patients, after three months' physical treatment, show marked improvement in behaviour and loss of their schizophrenic symptoms. It would therefore be instructive to determine the changes (if any) in the dimensional positions of these patients after such treatment. In this connection we may

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draw attention to the work of Petrie (1952) who demonstrated that neurotic patients after leucotomy showed a decrease in neuroticism together with an increase in extraversion, and a decrease in intelligence. These findings were confirmation of three separate hypotheses, and the investigation followed the lines of the hypothetico-deductive method. In our case, however, we have not found it easy to predict the dimensional outcome following treatment and have had to resort to the null hypothesis for each dimension, that is, we have tested, for each dimension, the hypothesis that *no* significant change would appear after treatment.

Finally, we can investigate the prognostic value of the dimensional positions occupied by our patients before treatment was started. An investigation along these lines was carried out in 1955 by Keehn using psychotic patients and the single dimension of psychoticism. Keehn concluded that "no consistent relationship between pre-treatment scores and degree of recovery was found; on half the (psychoticism) tests the recovered group were less psychotic than the non-recovered group and on the other half more so" (*idem*, p. 877). In the present study, all four dimensions are included.

METHOD

(*a*) SUBJECTS

Thirty-five female patients were included in the study. All were:

(*i*) Under 40 years of age with no evidence of previous physical treatment for schizophrenia.

(*ii*) Considered to be schizophrenic by three doctors including two consultants.

(*iii*) Sufficiently co-operative before treatment to do all the tests.

(*iv*) Sufficiently co-operative after treatment to do all the tests.

(*b*) TESTS

The following tests were given individually by one of the authors (J.G.T.). The scoring units are given in parentheses.

(i) *Intelligence*

1. Raven's Progressive Matrices (I.Q.).
2. The synonym version of the Mill Hill Vocabulary Scale (I.Q.).
3. The Nufferno Level Test. Two cycles only were given. (Total number of correct responses.)
4. The Nufferno Speed Test. Form AA normal speed. Form AB stressed, individual timing. (Mean log time for correct responses.)

(ii) *Neuroticism*

1. The Body Sway Test of Primary Suggestibility. The suggestion was given verbally and the score was the maximum displacement from the vertical in the forward or backward direction, whichever was larger. ($\frac{1}{4}$-inch units.)
2. The Static Ataxia Test. The score was the sum of the maximum displacements in the forward and backward directions. ($\frac{1}{4}$-inch units.)
3. Track Tracer. Six trials were given and timed. (Mean time per trial in seconds.)

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4. Track Tracer. The number of errors made was counted for each trial. (Mean error per trial.)
5. Personal Tempo. Triangles were drawn at preferred speed for three trials of 15 seconds each. (Mean number per trial.)

(iii) *Introversion-Extraversion*

1. Speed/Accuracy. Scores were derived from the Time and Error scores of the Track Tracer in order to measure the Speed/Accuracy ratio.
2. Humour. The patient was required to arrange six cartoons in order of humour value, three of which were sexual and three non-sexual. A score was derived which was a measure of preference for sexual humour.
3. Verbal/non-Verbal Intelligence Ratio. This was obtained from the Mill Hill and the Progressive Matrices I.Q.s above.
4. Leg Persistence. (Seconds.)

(iv) *Psychoticism*

1. Measuring distances. Distances of 8 inches, 1 foot, and 2 feet were estimated. The total error was assessed. (Inches.)
2. Writing "Year". The length of writing was measured. (Millimetres.)
3. Three Circles. The largest diameter was measured. (Millimetres.)
4. Three Squares. Ditto for the diagonal. (Millimetres.)
5. Tapping. Normal tempo. One trial of 15 seconds.
6. Waves. Four sets of waves were drawn. The average length of each set was the score. (Millimetres.)
7. Half-crown. The largest diameter was measured. (Millimetres.)

Detailed descriptions of all these tests have been given elsewhere (Eysenck, 1947, 1952). The tests were given in the ward clinic and most of the patients completed them all in about two hours. There was no break during testing. None of the patients had been given any drugs on the day of testing.

(*c*) Treatment and Retesting

When testing was completed, the patients were given one of three courses of physical treatment—20 electric convulsions, 30 insulin comas, or 8 weeks' treatment with chlorpromazine, based on a random selection procedure (Baker, Game and Thorpe, 1957). One week after completion of treatment all patients were retested on all the tests. They were also seen by one of us (A.A.B.) who decided whether they could be discharged home, or whether further treatment was necessary.

Results

We will first of all consider the inter-correlations of the above tests. Table I gives the tetrachoric correlations between the scores obtained both before and after treatment, and in future Tables each test will be represented by the number given to it here.

The mean scores in all the tests have been adjusted so that higher scores represent more intelligence, more neuroticism, more psychoticism and more

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TABLE I

Tetrachoric Correlations Between Scores Before Treatment (above diagonal) and After Treatment (below diagonal) (N=35). Decimal Points Omitted

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Static Ataxia		48	10	60	−04	−72	−38	−03	20	−23	−60	−18	10	−58	03	26	42	10	28	−44	27
2. Body Sway	48		04	53	67	−35	−56	−33	−00	−22	−30	−27	−03	−38	02	13	25	30	19	−30	30
3. Tr. Tr. Time ..	−43	10		−43	32	−32	−48	−29	−13	−19	77	−27	53	−40	02	−26	−05	05	08	−26	−18
4. Tr. Tr. Error ..	37	00	−16		30	−47	−26	−02	54	−03	−55	−70	−22	−38	00	33	19	30	58	−12	48
5. Triangles	10	−14	−10	00		−40	−26	−24	65	−10	20	−26	−05	−24	10	12	−40	08	27	−10	00
6. Mill Hill	34	14	11	−47	14		67	−07	−32	45	30	20	38	10	10	00	−22	22	−30	−24	−46
7. P. Matrices	12	09	−33	−37	−04	54		−58	−63	70	08	30	−40	−03	−20	26	20	48	−17	05	−12
8. Speed AA	−05	00	−15	−30	30	78	−10		48	−30	33	41	−40	56	25	52	30	−30	−34	40	30
9. Speed AB	−10	−40	−34	14	72	46	−23	92		−20	−24	17	29	30	−29	−18	−40	−24	24	46	18
10. Level	26	19	40	−61	−20	91	75	80	34		−18	20	−10	05	13	10	42	53	−40	−12	36
11. Speed/Accuracy ..	−53	01	70	−80	17	08	00	12	−35	14		43	05	18	−03	10	−12	−12	−38	−12	−43
12. Humour	51	03	−17	30	50	−07	−10	−46	−24	−14	−10		02	37	−20	28	−12	−20	−65	27	12
13. Vbl./N.Vbl. ..	10	−16	−10	−11	12	20	−63	56	64	−03	18	00		−30	30	00	03	−22	−32	−20	−22
14. Leg. Persist. ..	42	50	−33	37	30	−21	15	−30	−14	−48	−37	14	−38		19	−33	−07	−17	−32	60	05
15. Distances	−26	−70	−33	−08	08	−20	−49	28	00	−48	22	−30	46	24		−10	33	−40	00	−10	03
16. Year	20	20	−48	−30	09	04	15	00	−10	00	09	14	30	24	24		30	30	−03	10	34
17. Circles	42	10	−18	−48	51	10	34	14	10	42	24	36	30	10	−16	30		82	−23	07	82
18. Squares	23	−20	−38	−27	30	14	−06	05	12	02	00	56	50	10	10	30	90		20	−07	48
19. Tapping	17	−48	−16	−25	39	07	00	57	−10	00	31	−22	−05	02	54	−32	−18	03		−03	−48
20. Waves	−54	−28	−04	−38	58	−28	26	60	44	12	30	25	−24	07	−07	40	−20	−20	22		05
21. 2/6d.	−13	−50	−43	18	30	−60	−20	−83	−80	−63	22	54	−10	21	60	40	24	43	−07	−06	

introversion. Table II shows the average of these correlations for both within and between the dimensions for the pre- and post-treatment scores separately.

TABLE II

Average Correlations Within and Between Dimensions

	Pre-treatment				Post-treatment			
	Neurotic-ism	Intelli-gence	Intro-version	Psychotic-ism	Neurotic-ism	Intelli-gence	Intro-version	Psychotic-ism
Neuroticism ..	(·26)	−·18	−·20	·10	(−·008)	−·02	·09	−·09
Intelligence ..	−·18	(·02)	·12	·04	−·02	(·52)	−·06	−·02
Introversion ..	−·20	·12	(·13)	−·08	·09	−·06	(−·09)	·17
Psychoticism ..	·10	·04	−·08	(·11)	−·09	−·02	·17	(·16)

The factorial picture is given in Table III which shows the loadings on the four centroid factors which were extracted from the pre-treatment correlation matrix given in Table I. The fourth factor residuals appear in Table IV.

TABLE III

Centroid Solution for Pre-Treatment Correlation Matrix Given in Table I
(Decimal points omitted)

Test No.	Factor I	Factor II	Factor III	Factor IV
1	769	102	−261	−002
2	811	056	−223	−121
3	282	061	522	−721
4	713	139	−404	392
5	359	424	−048	−218
6	−626	−296	497	199
7	−289	−525	288	528
8	−198	−281	−718	−326
9	−042	484	−684	−228
10	−102	−604	064	307
11	−377	−001	−251	611
12	−680	−115	−259	−204
13	−026	121	330	−347
14	−623	−106	−401	−002
15	034	−160	126	−008
16	140	−271	−149	−002
17	391	−908	−222	−100
18	399	−551	−011	024
19	513	517	101	241
20	−357	−016	−497	−157
21	388	−493	−632	137

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TABLE IV

Fourth Factor Residuals
(Decimal points omitted)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1.		−238	014	067	−329	079	029	−036	−011	073	−232	287	018	−193	−055	141	154	−152	142	−293	086
2.			−166	102	318	−310	172	−342	−173	052	−012	205	029	052	−029	−002	−080	002	170	−140	128
3.				145	063	241	136	123	045	−164	305	−089	125	−010	040	−205	036	−040	−024	−013	−171
4.					−051	−051	−072	002	−316	−056	−060	225	−096	081	046	−206	015	−098	189	001	−037
5.						−017	−196	−155	372	−386	214	−024	−043	011	−166	178	−191	166	076	−023	−070
6.							106	−145	−192	114	−060	071	−133	122	009	−082	115	−317	075	188	−076
7.								406	004	074	−202	−010	384	150	−314	−212	047	−332	093	−003	−141
8.									053	344	236	−010	−214	118	−305	364	−070	−392	−057	−083	169
9.										−212	−212	−026	496	051	124	−145	−132	012	−136	107	−034
10.											047	−141	087	051	023	039	043	−274	−116	086	086
11.												115	−255	044	044	189	022	018	068	−226	031
12.													003	−170	155	−444	−035	000	165	−136	−194
13.														−198	−241	019	−032	−281	223	−100	013
14.															−244	−332	−011	017	−096	176	013
15.																129	−201	500	054	027	018
16.																	−033	093	−053	062	204
17.																		162	−085	074	−094
18.																			−292	053	−039
19.																				−249	−393
20.																					211
21.																					

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Table V gives the projections of the extended centroid factors on the Landahl axes L M N O.

TABLE V

Projections of the Extended Centroid Factors on the Landahl Axes

Test No.	L	M	N	O
1	·391	·738	·266	·602
2	·322	·747	·403	·429
3	2·182	−·596	·039	·745
4	·589	·606	−·156	·961
5	·720	1·461	·146	·327
6	·181	1·293	·026	·501
7	−·003	2·820	·007	·824
8	3·846	−·426	·781	−1·200
9	10·595	−16·119	11·691	·834
10	1·643	5·280	−1·269	−4·152
11	·024	·979	1·642	−·645
12	·925	·244	·456	·375
13	−1·500	−2·154	−10·192	15·846
14	·909	·262	·734	·095
15	−·118	−4·589	4·824	·883
16	−1·007	·071	·943	1·993
17	−1·073	−·249	1·505	1·817
18	−·174	−·206	1·147	1·234
19	1·338	·671	−·140	·133
20	1·438	−·393	·954	·001
21	−·773	·503	·144	2·127

The means and standard deviations obtained by our patients on all the tests are given in Table VI (page 808) together with the means and standard deviations obtained by Eysenck's groups on similar tests.

The changes in test scores following treatment are summarized in Table VII together with the statistical significance of these changes.

TABLE VII

Changes in Test Scores Following Treatment

	Intelligence				Neuroticism				
	Change	"t" (related means)	"p"			Change	"t" (related means)	"p"
Mill Hill	+	3·97	·01		S. Ataxia	−	1·93	Near·05
P. Matrix	+	5·91	·01		B. Sway	−	3·29	<·01
Speed AA	+	1·53	NS*		Tr. Tracer Time	−	3·61	<·01
Speed AB	+	·25	NS		Tr. Tracer Error	+	1·40	NS
Level	+	4·44	·01		Triangles	−	2·91	<·01
	Introversion				**Psychoticism**			
S/Acc.	+	·61	NS		Distances	−	·01	NS
Humour	+	·38	NS		Year	−	·17	NS
V/N.V.	−	·35	NS		Circles	+	·42	NS
Leg.	−	·12	NS		Squares	−	·86	NS
					Tap	+	1·7	NS
					Waves	+	1·4	NS
					2/6	+	·57	NS

* NS = Not significant.
\+ = More intelligence, more introversion, etc.
− = Less intelligence, less introversion, etc.

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TABLE VI

Means and Variances

	Present Study (N=35)				Eysenck's Study[1]				Eysenck's Study[2]			
	Pre-Treatment		Post-Treatment		100 Neurotics		200 Normals		100 Normals		50 Schizophrenics	
	Means	Variances	Means	Variances	Means	Variances	Means	Variances	Means	Variances	Means	Variances
Static Ataxia ..	6·1	41	3·4	7	7·5	18	5·6	7	3·2		4·0	
Body Sway ..	6·7	28	5·4	19	22·3	784	14·6	376				
Tr. Tr. Time ..	277·3	8,783	238·9	4,114								
Tr. Tr. Errors	27·6	301	27·2	409								
Triangles ..	9·4	36	12·7	63								
Mill Hill ..	89·6	276	91·7	287								
Matrices ..	81·6	169	95·2	900								
Speed AA ..	1·336	·038	1·212	·047								
Speed AB ..	1·186	·042	1·101	·117								
Level	3·1	6	5·0	7								
Speed/Accuracy	1·5	·3	2·8	·3								
Humour ..	6·3	4	6·4	3								
Vbl./N.Vbl. ..	1·2	3	·9	·8								
Leg Persistence	47·1	2,734	43·5	906	48·8	1,302	60·2	1,184	112·7	4,558	104·1*	7,266
Distances ..	5·3	7	5·1	7	5·8		5·1		4·1	9	6·6	32
Year	24·6	244	24·0	114					29·0	204	39·3	915
Circles ..	37·0	412	36·2	462	42·1	502	41·5	703	19·7	182	29·5	553
Squares ..	45·2	637	38·5	436	49·6	828	46·1	838	26·9	324	40·9	1,026
Taps	38·6	500	35·8	286	71·1	332	69·8	37	75·7	184	66·7*	261
Waves ..	100·1	1,271	108·0	1,924	95·9	641	100·2	509	89·0	441	100·0	744
2/6	35·6	44	35·4	69	35·9	33	35·1	36	32·3	26	36·9	65

[1] Reported in the *Scientific Study of Personality*, p. 124.
[2] Reported in the *Scientific Study of Personality*, p. 216.
* These means are significantly different ($p < ·01$) from the present study schizophrenic means for both before and after treatment.
The omissions in this Table are due to differences in equipment, etc., from study to study.

Lastly, the pre-treatment scores of two groups of patients are compared. The two groups are made up of those of the thirty-five patients who were able to be discharged following treatment and who have not since relapsed to hospital either as out-patients or in-patients, and those who needed further treatment and/or have since relapsed. These scores are given in Table VIII together with the statistical significance of the differences in means.

TABLE VIII

Means and Standard Deviations for Pre-treatment Scores of Two Groups of Patients

	"Recovered" (N=11)		Not Recovered (N=13)		"P"
Test No.	Mean	Variance	Mean	Variance	
1 ..	3·82	22·1	7·91	60·7	NS*
2 ..	5·20	33·6	8·15	27·1	NS
3 ..	270·15	1,8951·7	317·92	1,5867·2	NS
4 ..	26·09	250·6	27·72	279·1	NS
5 ..	10·61	35·6	7·75	15·7	NS
6 ..	79·02	165·8	82·50	194·5	NS
7 ..	76·59	1,943·2	79·08	253·4	NS
8 ..	1·303	·044	1·309	·056	NS
9 ..	1·081	·041	1·148	·069	NS
10 ..	2·47	4·8	3·00	5·7	NS
11 ..	1·55	·201	1·46	·279	NS
12 ..	5·48	5·9	6·47	4·4	NS
13 ..	1·09	·742	0·93	·821	NS
14 ..	56·25	858·51	32·26	894·02	Near ·05
15 ..	4·64	114·7	5·52	213·1	NS
16 ..	24·57	98·6	20·23	81·7	NS
17 ..	33·71	525·1	35·02	579·2	NS
18 ..	43·68	609·5	38·53	503·1	NS
19 ..	36·82	109·5	33·06	425·9	NS
20 ..	105·00	1,140·0	91·87	983·1	NS
21 ..	34·34	69·5	36·24	85·4	NS

* NS=Not significant.

DISCUSSION OF RESULTS

(i) *The Existence of the Personality Dimensions*

As the mean scores in all the tests were adjusted to measure more intelligence, more neuroticism, more psychoticism and more introversion, and as Eysenck claims that these dimensions have independent reality, it follows that the correlations between the tests, both before and after treatment, should show the following pattern (Fig. 1).

FIG. 1

	Neuroticism	Intelligence	Introversion	Psychoticism
Neuroticism	+ve	Zero	Zero	Zero
Intelligence	Zero	+ve	Zero	Zero
Introversion	Zero	Zero	+ve	Zero
Psychoticism	Zero	Zero	Zero	+ve

If we compare our actual findings in Table II with this, we find that our expectation is not borne out. The pre-treatment matrix shows average correlations between the various groups of tests which are in some cases higher than the average correlations within some of the groups. This suggests that the existence of the four independent dimensions is at least in some doubt. The same conclusion is suggested by the pattern of correlations formed by the

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scores after treatment, also shown in Table II. Although the intelligence tests now show a clear-cut cluster with an average inter-correlation of over ·5, it will be seen that the average for the neuroticism cluster has dropped from +·26 to a negative value, which does little to support the concept whose label it bears. Again, there are numerous instances of the correlations between the dimensions being greater than those within the dimensions.

The possibility exists, of course, that the dimensions can be isolated from these data if departure from strict orthogonality is permitted. In order to test this possibility, the pre-treatment correlation matrix was factored by the centroid method, and four factors were extracted. The factor solution appears in Table III. An attempt to reach simple structure was made by the method of extended vectors, and Landahl projections, The table of projections on the Landahl axes (Table V) is given for those readers requiring the diagrams for plotting these projections. A study of these diagrams indicated quite clearly that no unique simple structure solution could be achieved. The post-treatment matrix was treated in the same way with the same result.

We may therefore conclude that our data lend no support to the four-dimensional theory. We can find no evidence supporting the existence of these four dimensions even if we disregard the claim for orthogonality. This conclusion must not be considered definitive—there are too many shortcomings in the present data for that, among them the nature and size of our sample, and our use of an initial correlation coefficient which is comparatively easily calculated, though some accuracy has inevitably been sacrificed. The present study has shown the need for a similar study, testing all four dimensions on the same group of subjects, with a better selection of tests for the various dimensions than we, with our limited laboratory equipment, have been able to achieve.

(ii) *The Scores of Schizophrenic Patients*

We come now to our second problem—that of comparing the scores of our own schizophrenic patients with those of the schizophrenic and other patients reported by Eysenck, though the main comparisons will, of course, be between the schizophrenic groups. The scores are given in Table VI.

First of all, however, we should point out that the five groups concerned in the Table have not been equated on sex, age, and intelligence, which would seem to be an important requirement before these comparisons are made. Fortunately, however, as Eysenck points out, correlations of most of these tests with age, sex, and I.Q., are known from previous work to be small or non-existent. The main comparison between the two schizophrenic groups in this Table is facilitated by equality in the ages of these two groups (present study—mean age—29 years; Eysenck's study—mean age—28 years) and approximate equality in I.Q. (present study—mean I.Q.=94; Eysenck's study —mean I.Q.="slightly below average"). There remains a sex difference (present study—all female; Eysenck's study 50 per cent. male, 50 per cent. female). It is not considered, for the above reason, that this difference will appreciably affect the results.

On the psychoticism battery, our patients are more psychotic on the tests of drawing circles and squares, on waves, and on tapping, whereas they are less psychotic on the tests of distance measurement, writing "year", and drawing a half-crown. Only one of these differences is statistically significant, which would suggest that the two groups are not differentiated in respect of this dimension.

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With regard to the other tests in the battery, our patients show significantly less persistence, and probably more static ataxia. Although these findings are too few to enable a definitive conclusion to be drawn, they are at least suggestive that the two groups of schizophrenics occupy different dimensional positions, but not with regard to psychoticism.

Table VI also brings out quite clearly that there are very marked differences between Eysenck's two "normal" groups on the majority of these tests and we must, therefore, be extremely careful in dealing with the difficult problem of selecting normal controls.

In conclusion of this section of our discussion, the evidence does not suggest that schizophrenic patients who find themselves in mental hospitals are any more psychotic than those in the teaching hospital, though they may occupy different positions on the other dimensions.

(iii) *Changes after Treatment*

The relevant data are given in Table VII. The Mill Hill, Progressive Matrices and Nufferno Level tests of cognitive ability all show statistically significant improvements after treatment. On the Nufferno Speed tests, the improvements do not reach statistical significance.

Four of the five tests of neuroticism show statistically acceptable changes in the direction of less neuroticism. The fifth is not significant.

None of the Introversion-Extraversion tests shows a significant change after treatment, nor do any of the Psychoticism tests. It appears therefore that our patients as a group have changed in the direction of becoming more intelligent and less neurotic than they were before treatment.

(iv) *The Prognostic Value of the Tests*

It can be seen from Table VIII that if we compare the pre-treatment scores of a group of "recovered" patients with the scores of a group of patients who have required further treatment, or who have relapsed after discharge, the following difference emerges. On the test of Leg Persistence, those patients who were placed in the "fail" group were found to have had inferior scores on admission. This difference is almost significant at the 5 per cent. level on the two-tailed test. Conversely, those patients who had "recovered" had a high score on Leg Persistence on admission to hospital. On these data if we use a cut-off point of 40 seconds, we find that only six patients out of the twenty-four are mis-classified. This finding would, of course, require independent confirmation before it was regarded as established. If persistence is usually part of a "good personality", this finding is in keeping with clinical evidence for a good prognosis.

With regard to the psychoticism battery alone, the "recovered" group were more psychotic on admission on the tests of writing "year", three squares and waves. The "failed" group were more psychotic on admission on the tests of distance measurement, circles, tapping, and drawing a half-crown. There would therefore appear to be no relationship between psychoticism and prognosis.

With regard to the Neuroticism battery alone, the "failed" group had higher scores before treatment on all five measures of neuroticism. This is suggestive that response to physical treatment is better the higher the degree of neuroticism. It is not possible to test this finding statistically as the tests are not independent.

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There is no apparent relationship between introversion or intelligence and prognosis.

Conclusions

We may conclude that our study provides no evidence for the existence of the personality dimensions, though these conclusions are by no means definitive. In this connection we should bear in mind that we have utilized schizophrenic patients only. We are further restricted by our choice of tests for the various personality dimensions, and our choice had to fall upon those tests requiring simple apparatus. What our results would have been if we had been in possession of such items of equipment as a conditioning laboratory, psychogalvanometers, pursuitmeters, and high fidelity tape recorders, it is difficult to say, but the need for such a study would appear to have been demonstrated.

Our data provide no evidence that acute schizophrenic patients occupy a different position on the so-called psychoticism dimension from the schizophrenic patients at the teaching hospital. There is slight evidence pointing towards differences on the other dimensions of neuroticism and introversion-extraversion, and marked differences between the two normal groups have been noted.

With regard to the changes following treatment, our patients changed in the direction of having more intelligence (or being able to apply themselves better to the tests) though their speed was not affected significantly. They scored significantly less on the tests of Neuroticism, but showed no significant changes in respect of Introversion and Psychoticism.

Finally, from the point of view of response to physical treatment, the Leg Persistence test shows the smallest amount of misclassification between the groups of successfully and unsuccessfully treated patients. Using a cut-off point of 40 seconds, only six out of twenty-four patients were mis-classified in this respect. This finding would require further corroboration before being considered for practical application. There appears to be no relationship between degree of psychoticism before treatment and prognosis, between intelligence and prognosis, or between introversion and prognosis, although a good prognosis does seem to be related to degree of neuroticism.

Summary

The analysis of the test scores of thirty-five schizophrenic patients provides no evidence for the independent existence of the personality dimensions isolated by Eysenck. The psychoticism scores of these patients appears to bear no relationship either to the clinical state or to prognosis, the main change following treatment being a decrease in the neuroticism measures.

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