AN INVESTIGATION INTO THE VALUE OF "OBJECTIVE TEST PSYCHOTICISM" IN PREDICTING RESPONSE TO INSULIN COMA THERAPY*

By

J. D. KEEHN, Ph.D.

Psychology Department
American University of Beirut, Lebanon

IN spite of more than twenty years experience with insulin coma therapy psychiatric opinion as to its efficacy is by no means unanimous. While some recent large scale studies (Polonio and Slater, 1954; Paster and Holtzman, 1949; Barres, Ey and Laboucarie, 1953) point to a significant rise over the spontaneous recovery rate with the use of insulin, others (Jensen, 1952) do not find more than an acceleration of recovery already in process. Inasmuch as most investigators acknowledge an increased number of relapses in treated patients this latter view has some support. However the strongest case for insulin is that, if nothing else, it greatly reduces the patient's stay in hospital (Sargant and Slater, 1948; Hughes, 1951). If one remembers, however, the extra administrative and medical staff required to run an insulin ward this point is largely negated. In fact there are some (Bourne, 1953; Notkin *et al.*, 1939) who would claim that any improvement shown in insulin treated patients arises from the extra care and individual attention given them.

It would be possible then, as Bourne (1953) has in fact already done, to gather a formidable array of evidence from the literature suggesting that mental hospitals might well dispense with insulin treatment. However, until some objective method of selecting patients for insulin therapy becomes available we can never be sure whether the treatment itself is ineffective or whether it is simply being applied to the wrong patients. As Sargant (1949) has pointed out the initial success of Weir Mitchell's relaxation therapy led first to its wide adoption for many patients for whom it was unsuited and then to its rejection because it failed to cure them. Inasmuch as insulin therapy has suffered a similar rise in popularity it is possible that it too is being abused and that many of its failures are primarily the result of misapplication.

One would imagine that selection of patients for treatment would come through the medium of diagnosis and the statements that young early schizophrenics, perhaps with a certain amount of exogenous precipitatory stress, are most likely to respond to insulin summarizes the opinion of most texts on the subject. Yet, as Mayer-Gross (1951) and others point out, even with careful selection still around 40 per cent. of patients do not respond positively to treatment.

More important seems to be the diminishing confidence held in the traditional diagnostic classification system. For instance Harris (1950), Dorcus and Shaffer (1950), Sargant and Slater (1948), Cameron, Freeman and Stewart (1954) have all indicated the futility of diagnosis in determining the type of

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therapy a patient should receive. Perhaps the most pointed comment comes from Rees (1951), who, in discussing specifically the validity of diagnosis in selecting cases for insulin treatment remarks that,

> "I doubt very much whether the concept of schizophrenia has done anything to help us in choosing our cases. A diagnosis to have any value should give us (*a*) a clinical picture of the patient, (*b*) an indication of the course of the illness which would be helpful in giving a prognosis, and (*c*) some guidance as to the appropriate treatment for a particular patient. Most clinical psychiatrists will agree that the diagnostic label schizophrenia fails us in all these respects."

In this view, then, it is small wonder that insulin treatment has so many failures when it is given nowadays in many hospitals to patients who, somehow or other, have come to have the label of schizophrenia attached to them.

In addition to psychiatric opinion perhaps the most convincing evidence for the redundancy of diagnosis comes from the recent findings of Funkenstein *et al.* (1950) that successful response to E.C.T. can be predicted from blood pressure changes following epinephrine and mecholyl injections *independently of diagnosis* and that these changes are correlated with changes in abstract thinking ability, Meadow and Funkenstein (1952), Meadow *et al.* (1953). Other isolated findings showing predictive factors cutting across diagnosis can be found in the literature. Although there is not always agreement between them (cf. Kline and Tenney, 1951; Freudenberg, 1941, on body build) this only serves to emphasize the unreliability of psychiatric diagnosis, a point demonstrated by Ash (1949). It would seem clear then, that in choosing patients most likely to benefit from insulin therapy diagnosis is not a very satisfactory criterion.

Studies specifically designed to predict the outcome of insulin therapy are not hard to find. Recently Pascal and his students (1953, 1954a, 1954b, 1954c, 1954d) have examined exhaustively case history criteria correlated with prognosis but these studies have yet to be related specifically to any kind of treatment. Even so it is difficult to see how their findings can improve upon diagnosis for many of the factors under investigation like affective expression, orientation, direction of aggression, precipitatory stress, etc., are themselves subjective and are taken into account in arriving at a diagnosis. Of more concern to us are the investigations into the prognostic value of psychological tests and these fall into three major categories: studies of the Rorschach, the MMPI and miscellaneous objective cognitive tests.

The most prolific writer on the efficacy of the Rorschach in predicting response to insulin has been Piotrowski who, in a series of papers including (1938, 1941, 1952) has claimed success in predicting the outcome of insulin therapy from Rorschach signs. However, as Windle (1952) has already indicated, Piotrowski's signs change from paper to paper and serve mainly to show the failure of the empirically determined signs to stand up on cross validation. Other studies by Halpern (1940), Filmer Bennett (1952), and Rees and Jones (1951) also fail to point conclusively to any great prognostic value of the Rorschach. Of the MMPI studies Carp (1950b) has shown that patients who improved after insulin had higher pre-treatment scores on the F, Pt and Sc scales and lower scores on the K scale and Feldman (1951) has constructed an *ad hoc* scale predicting response to shock therapy in general. However it is difficult to obtain any theoretical lead from scales constructed from miscellaneous MMPI items although Carpenter (1953) has made such an attempt with the Feldman scale.

Studies using objective tests for prognostic purposes have been few and,

for the most part, unsystematic. The earliest of these, Bolles, Rosen and Landis (1938) found inferior performance on concept formation and sorting tests like those of Vigotsky and Weigl to suggest a poor prognosis with insulin therapy but this finding seems not to have been confirmed (Graham, 1940). Despite Carp's (1950a) indication that high pre-treatment Weschler IQ is favourable, in general intelligence test scores have not been found to have any consistent relation to response to insulin. However this and other inconsistencies may be due, as Zubin and Windle (1954) have pointed out to different degrees of chronicity in the patients examined. Windle and Hamwi (1953) taking this factor into account when attempting to predict response to surgical treatment did find that whereas superior performance on a complex reaction time test suggested good prognosis in illnesses of short duration the reverse was so for long standing illnesses.

Apart from the study by Pullen and Stagner (1953) on changes in rigidity following shock treatment little systematic work seems to have been done using objective tests either for predicting response to or measuring changes due to insulin therapy. Studies on lobotomy have been done by Crown (1952, 1953) and Petrie (1952) using objective test batteries factorially developed by Eysenck (1947, 1952a, 1952b) and it is with this type of test that we are concerned here.

Factor analysing a large battery of tests differentiating between normal and psychotic subjects Eysenck (1952a) claims to have established a personality factor of psychoticism. As insulin therapy has generally been thought to be applicable to patients recognized as psychotic subjectively it seems probable that selection of patients for insulin treatment on the more objective criterion of psychoticism as discovered by Eysenck would lead to improvement in the recovery rate. Thus we would predict that abnormal patients scoring within the normal range would not show recovery after insulin, and that the amount of recovery shown by patients scoring mildly psychotic would be greater than those shown to be severely so.

As our purpose is to attempt to rescue insulin treatment from rejection due to misapplication the distinction between spontaneous remission and that due to the effects of insulin is not important for the present. If we can succeed in first eliminating unsuitable patients from the treatment group then we may turn to the specific effects of insulin. Prior to this condition we can conclude nothing about the value of the therapy for if any group under investigation contains many unsuitable patients inevitably results will be poor. Only in well selected groups is it legitimate for the specific effects of insulin to be studied.

The Test Battery

From the tests described by Eysenck (1952a) differentiating significantly between normal and psychotic subjects the following tests were administered.

I. Expressive Movements

(a) *Waves*

The material consisted of a piece of squared paper with four V's, 1·5 cm. high on it. The V's were placed one above the other about 8 cm. apart. S was shown the first V and asked to trace over it. Then, with his eyes closed and arm and hand off the table S was asked to continue drawing six more V's along the same line. After finishing the first line S was guided to the next V and so on

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until all four series were finished. In all cases the V's were covered as S drew them in case he should open his eyes.

Scores

1. Average amplitude in millimetres of the four first and four last waves.
2. Average length in millimetres of all the waves measured parallel to the edge of the paper.

(b) *Circles and Squares*

S was asked to draw first three circles and then three squares on plain sheets of paper.

Scores

3. Time in seconds to draw the circles.
4. Time in seconds to draw the squares.
5. Largest circle diameter in millimetres.
6. Largest square diagonal in millimetres.

II. Fluency

S was asked first to name as many birds as he could and then as many flowers as he could in 30 seconds. In this test Eysenck allowed 60 seconds but as on preliminary trials we found this time too long only half this time was given in this experiment.

Scores

7. Number of birds mentioned.
8. Number of flowers mentioned.

III. Mirror Drawing

The mirror drawing apparatus was placed in front of S and he was shown the paper with the numbers 1, 2, 3, 4 on it forming the corners of a diamond. After demonstrating that he must join the points 1 2 3 and 4 consecutively the paper was placed in the apparatus and S told that he must now join the points by looking through the mirror and that he must not remove his pencil from the paper until he had finished. The instructions were repeated until S was clear as to what his task was. We found, as did Eysenck, that constant re-assurance was necessary. The time to complete the task was recorded and reported to S. He was then asked to *estimate* his time for the second trial. On completion of the second trial S was asked to *judge* the time he had taken and to estimate his time for the third trial but no indication of the actual time taken was given. Altogether five trials were given, this is only half the number given by Eysenck but the task proved so difficult for our patients that it was found impracticable to continue beyond five trials.

Scores

9. Average time in seconds to complete one trial.
10. Average of the four judgments.
11. Average of the four estimates.

IV. Tapping

S was asked to tap with a pencil on a piece of paper. No reference was made to speed and in response to questions S was told that it was up to him.

Score

12. Number of taps in 15 seconds.

V. Reversal of Perspective

Our S's were shown the Necker cube and informed of the reversal phenomena. We did not, however, succeed in getting any of our earlier patients to experience the reversal. On replacing the cube by the more interesting Rubens vase we were still unable to demonstrate the ambiguity to the S's, and so the test was dropped from the battery.

Subjects and Administration

All patients other than re-admissions and recognized organics entering the Lebanon Hospital for Nervous and Mental Disorders during the early part of the summer of 1954 were tested within their first few days at the hospital. Testing was carried out without knowledge of and very often prior to psychiatric diagnosis. Similarly diagnosis and decisions for treatment were made in ignorance of the test results. Consequently test data was available on groups of patients (*a*) who were considered by the psychiatrists to benefit from insulin or shock treatment and (*b*) who were considered not likely to benefit from such treatment. Ideally we would have preferred both groups to undergo treatment in order to compare psychiatric judgment with test results. However in a practising hospital such a procedure is not feasible and consequently it is only possible to see if differences exist on the test battery between patients who responded and patients who did not respond to treatment after prior selection.

Altogether 25 patients who were tested were subsequently selected for insulin treatment and 9 of these received E.C.T. in addition. The patients' ages range from 15 to 45 years with a mean of 29 years and the group included 5 females. The battery of tests was usually completed in one session lasting about one hour.

Results

At the termination of therapy the patients were assessed by the staff psychiatrists to be either socially recovered, recovered, improved, unchanged or worse. Of these only the socially recovered patients were considered able to return to their pre-hospitalization position in society. Consequently it was decided to compare pre-treatment test scores of this group with the remaining patients. Nine patients were treated with E.C.T. as well as insulin and in order to avoid ambiguity the four patients recovering with the combined treatment were excluded from further analysis. The remaining five patients were included in the non-recovered group. This was considered justifiable for these patients received 37, 35, 18 and 26 insulin comas respectively and so could reasonably be judged as not having recovered with this treatment. The recovered and non-recovered groups had means of 30 comas and 25·8 comas respectively and their average ages were 29·2 and 30·2 years respectively. Neither of these differences is significant.

Table I shows the means and variances of the groups on the separate tests.

TABLE I

Pre-treatment Means and Variances of the Patients Rated Recovered and Non-recovered Immediately After the Termination of Treatment

		Recovered with Insulin			Not Recovered			
	Score	N	M	V	N	M	V	t
1	.. ..	9	19·77	28·17	12	17·17	13·31	NS
2	.. ..	9	102·4	1162·24	12	99·83	1010·14	NS
3	.. ..	9	24·22	237·50	10	39·20	2995·36	NS
4	.. ..	9	33·22	1218·16	10	35·20	2109·56	NS
5	.. ..	9	45·55	875·0	10	39·30	497·61	NS
6	.. ..	9	38·0	657·11	10	41·91	482·69	NS
7	.. ..	9	8·0	23·11	12	5·58	18·91	NS
8	.. ..	9	4·44	6·25	12	4·25	11·69	NS
9	.. ..	8	48·87	597·36	11	54·45	2932·79	NS
10	.. ..	8	69·13	3188·36	9	46·11	2950·99	NS
11	.. ..	8	83·87	2850·43	9	31·00	733·10	·05
12	.. ..	8	39·87	248·85	8	38·75	389·14	NS

On all scores except the first both groups scored as psychotic as Eysenck's (1952a) original patients and so may be regarded as being psychotic before treatment in this sense. Score number 11, the average of the estimated times for the four mirror drawing trials after the first is the only one to differentiate between the groups even at the ·05 level and may be regarded as a chance finding. None of the other scores even approaches significance.

As the battery as a whole is taken as a measure of psychoticism results on individual tests are subsidiary to those on the total battery. However the expected consistency in direction through all the test is not found for whereas scores 3, 4, 6, 7, 8, 9 and 12 show the recovered group to have been less psychotic before treatment than the non-recovered group scores 1, 2, 5, 10 and 11 show the reverse of this. Although it is probable that by weighting the individual tests according to their differentiating powers in the present analysis an *ad hoc* prognostic battery could be obtained it is equally likely that such a battery would not stand up to cross validation. Furthermore as it was our purpose to examine the prognostic ability of a battery of tests developed within a particular theoretical framework such *ad hoc* manipulation is inadmissible. We must conclude, then, that degree of psychoticism as objectively defined by Eysenck is no criterion against which to select patients for insulin therapy irrespective of whether our particular battery can be adjusted to be predictive or not. Whether this failure points to the non-specificity of insulin therapy or to the lack of validity of Eysenck's tests we are not at present able to say. In view of the general uncertainty as to the value of insulin treatment and the weight of evidence presented by Eysenck (1952b) in support of his tests as measures of psychoticism the more likely conclusion is that the effect of insulin therapy is not dependent upon the initial degree of psychoticism as used in the present sense.

SUMMARY

It was pointed out that before the effect of insulin shock treatment could be gauged effectively a method of selecting those patients to whom the treatment was appropriate needed to be devised. The common criterion for therapy, that of diagnosis, was shown to be inappropriate and the relative value of a few psychological tests was discussed. However the need was felt for a theoretically determined battery of tests to predict recovery with insulin rather than the generally unsystematic studies heretofore. The battery of tests used by Eysenck (1952b) to identify a factor of psychoticism was chosen as most promising and administered to a group of patients about to undergo insulin therapy. It was predicted that non-psychotic patients would show no improvement with insulin and that mild psychotics would improve more than severe cases. All the patients obtained high scores before treatment and so were

regarded as psychotic on this objective basis. However no consistent relationship between pre-treatment scores and degree of recovery was found; on half the tests the recovered group scored as less psychotic than the non-recovered group and on the other half more so.

It was concluded that either Eysenck's tests are not valid measures of psychoticism or that pre-treatment degree of psychosis is not predictive of response to insulin coma therapy.

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