Validity and Clinical Utility of the Grid Test of Schizophrenic Thought Disorder

By A. B. HILL

Summary. It is suggested that a clearer distinction should be made between the statistical validity and the clinical utility of the Grid Test of schizophrenic thought disorder. The results of three published studies are examined, and in each case the Grid Test is found to have appreciable statistical validity in terms of correlations between grid predictions and clinical judgements of thought disorder.

Two criteria are proposed for assessing the usefulness of the Grid Test as a diagnostic instrument, and from an examination of the results of three published studies it is concluded that, despite its statistical validity, the test, at least in its present form, has no appreciable clinical utility.

The Grid Test devised by Bannister and Fransella (1966) has been claimed to possess appreciable statistical validity as a predictor of schizophrenic thought disorder, and apparently because of this validity some writers, for example Radley (1974), have considered it clinically useful as a diagnostic instrument. There seems to be some risk of confusion here, since the concepts of statistical validity and clinical utility are by no means identical and it does not necessarily follow that a statistically valid test will be clinically useful. The purpose of the present note is to attempt a clarification of the issue by considering separately these questions of validity and utility.

Large scale retrospective clinical studies by Bannister, Fransella and Agnew (1971), and by Frith and Lillie (1972), classified a wide range of psychiatric patients into "Thought Disordered" and "Non-Thought-Disordered" in two ways: on the basis of performance on the Grid Test, and on the basis of conventional clinical diagnoses. In both studies contingency tables were presented comparing grid predictions with clinical diagnoses. These have been re-analysed by the author to give three types of validity coefficient: tetrachoric correlations, phi coefficients and the Kappa statistic (Cohen, 1960, 1968).

The results of this re-analysis are shown in Table I, from which it is clear that the Grid Test has substantial statistical validity in the sense of correlating beyond chance level with clinical judgements of schizophrenic thought disorder.

For two reasons the clinical utility of the test is a more difficult matter to assess. Firstly, it is an ill-defined concept; and secondly, because utility is closely tied to the base rate for schizophrenic thought disorder it is, to a degree, context-specific. In other words, a change in base rate, say from one hospital to another, will bring about a change in the utility of the test. However, assuming that the test is to be used as Bannister et al. (1966, 1971) and Frith and Lillie (1972) have used it—that is, for determining whether or not a given patient shows schizophrenic thought disorder—two minimal conditions of usefulness may be suggested, as follows:

1. To be considered "useful" the test should misclassify fewer patients than would be misclassified if no diagnosis of schizophrenic thought disorder were attempted (misclassifi-
Tetrachoric Standard Phi Standard@ Standard

Investigation correlation error for coeffi- error for ppa error for
r, rt = 0 cient cD= o K =o Bannister
and Fransella (g66) . . .935 •¿i66 . 728 085 . 724085Bannister,
Fransella and Agnew •¿492 •¿ 148 . 248 .075 . 242O69Frith and Lillie (1972)
(Predictions based on Intensity
and Consistency measures)
Frith and Lillie (1972) . . . . 720 258 .393 •¿ico 390 @IO9
(Predictions based on Element
Consistency measure)

2. Misclassifications produced by the test utility of the Grid Test in that condition i is met
should not be predominantly of the false though condition 2 is not. Unfortunately it is
positive type. difficult to know what weight can be accorded
this means the misclassification rate obtained when using the test should be less
than the base rate.

The first condition seems reasonable because if it is not met the diagnostician would actually
make more correct diagnostic decisions by ignoring the test. The second condition also
seems reasonable because the consequences of false positive errors may be quite serious for
the patient.

Table II shows the results obtained by applying these two conditions to the data obtained in the original study by Bannister and Fransella (1966) and the retrospective
clinical investigations of Bannister et al. (1971) and Frith and Lillie (1972). As can be seen,
the results of the retrospective clinical studies fail to meet either of the proposed conditions
for clinical utility. The data from Bannister and Fransella (1966) partially support the clinical
utility of the Grid Test in that condition i is met
though condition 2 is not. Unfortunately it is
difficult to know what weight can be accorded
this study, because the patients considered were
very carefully selected and were only included
in the sample if three independent judges agreed
on the diagnosis. Because of this stringent re
qurement for perfect inter-judge agreement it
seems probable that many of the patients in the
sample were clear-cut cases, perhaps more
clear-cut than the general run of those likely
to be met in clinical practice.

Perhaps the best estimate of the classificatory
accuracy of the Grid Test when judged against

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Base rate for schizophrenic thought disorder</th>
<th>% misdiagnoses produced by Grid Test</th>
<th>Ratio of false positive to false negative diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Bannister and Fransella (1966)</td>
<td>...</td>
<td>21.4%</td>
<td>9.3%</td>
</tr>
<tr>
<td>2. Bannister, Fransella and Agnew (1971)</td>
<td>...</td>
<td>16.0%</td>
<td>24.0%</td>
</tr>
<tr>
<td>3. Frith and Lillie (1972)</td>
<td>...</td>
<td>13.2%</td>
<td>15.7%</td>
</tr>
<tr>
<td>Pooled data from 2 and 3</td>
<td>...</td>
<td>15.2%</td>
<td>21.6%</td>
</tr>
</tbody>
</table>
normal clinical criteria may be gained by pooling the data from the studies by Bannister et al. (1971) and Frith and Lillie (1972). This seems justifiable because the difference between the proportion of individuals misclassified in the two studies is not statistically significant, even at the rather liberal 10 per cent level of confidence (difference = 0.83, S.E. = 0.54).

The pooled data are shown in Table III, from which it can be seen that for a base rate of 15.2 per cent the test still fails to meet the proposed conditions for clinical utility.

At this point it is appropriate to ask whether the base rate in the pooled data accurately reflects that to be expected in general clinical practice. Although the base rate is likely to vary somewhat from hospital to hospital, some reasonable approximation of the figure to be expected can be obtained from official statistics. Table 9.6 of the Health and Personal Social Services Statistics for England (1973) allows one to calculate that for the year 1970 the base rate for Schizophrenia, Schizo-Affective Disorders and Paranoia, taken together and estimated from all psychiatric admissions in England and Wales, was 20.5 per cent. For first admissions only, the rate was 11.3 per cent. As it has been claimed that approximately half of all patients diagnosed as schizophrenic show thought process disorder (Bannister and Fransella, 1966), the expected base rate for this condition may be estimated as in the region of 10 per cent (6 per cent for first admissions).

Applying the percentage figures of Table III to a situation where the base rate is 10 per cent gives the following results. Some 19.8 per cent of patients would be expected to be misclassified, with a false positive/false negative ratio of 2.9:1. For the base rate of 6 per cent the corresponding figures would be 18.4 per cent and 5:1. In the light of these results it is difficult to see how the Grid Test, at least in its present form, can be considered clinically useful as a diagnostic instrument.

Of course it might be objected that the analyses given above are rather severe on the test because: (a) clinical judgement has been used as a criterion when it is known that this is far from infallible; and (b) considerable emphasis has been placed on the use of conventional base rates, although in practice the test may not be routinely given to all admissions but administered only to those patients who display signs or symptoms of thought process disorder. Little can be said on the first point other than that it is difficult to find an alternative and more acceptable criterion. However, it is encouraging to observe that there are now signs from the work of Ley (1972) that psychiatric diagnoses may be rather more reliable than has traditionally been thought. As regards the question of base rate, if one considers only those individuals diagnosed clinically as thought disordered (i.e. the people most likely to be tested in practice), it can be seen from Table III that there is a slightly worse than evens chance...
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that this diagnosis will be confirmed by the Grid Test; that is, the conditional probability of the Grid suggesting thought disorder when this is the prior clinical diagnosis is $21/43 = 0.49$. Thus, even ignoring the base rate argument, the test has little claim to be a useful instrument.

Although the results presented here have argued against the usefulness of the Grid Test, the author would not wish to see it abandoned. It is an instrument firmly embedded in a coherent psychological framework and has a clear and appealing rationale. It may be that the information it generates is capable of being used in a different way and to better advantage. Further research may well reveal that when appropriately combined with other sorts of information, perhaps even simple biographical factors, grid data can be diagnostically useful.

REFERENCES


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