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# Difficulties in a Dimensional Description of Symptomatology

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## Introduction

Torgerson (1968) has suggested that the most appropriate form of classification of functional mental illnesses may prove to be partly categorical and partly dimensional. Everitt, Gourlay and Kendell (1971) have tended to agree with this conclusion since their attempt at validating existing diagnostic categories by means of cluster analysis proved to be only partially successful. In the present paper the dimensional approach is considered in some detail and it is shown that it has limitations which are due in part to the distributional properties of the data which research psychiatrists record for their patients, and in part to the fact that some key symptoms occur only rarely. In the final paragraphs of the paper an attempt is made to clarify the dimensional and categorical roles in the description of functional illnesses. In doing so it becomes clear that some difficulties remain unresolved.

## Statistical Considerations

In our discussion a brief review of a few statistical points is necessary and we commence with it. We recall that a pair of variables is distributed in a bivariate normal manner when the scores on each are normally distributed and the scattergram for the scores on the two is circular or elliptical in shape. When these conditions hold for each pair in a set of p variables, the variables are said to follow a multivariate normal distribution. The convenience of multivariate normality in statistical work lies in part in the fact that the correlation coefficients between pairs of variables can be estimated independently of the variate means, so that they are unaffected by the magnitudes of these means. Frequently in psychiatric work the variables are not distributed in a normal manner. For example, a psychiatrist may use a rating scale for measuring a variable such as 'worry', but in the case of any individual patient he is likely to be interested only in 'worry' of a pathological kind. Consequently a considerable percentage of the patients in a sample may be given zero scores (see Tables II and IV) on that variable, so that the distribution of scores will not be normal. More extreme examples of non-normality occur in the case of variables which measure relatively rare aspects of abnormal behaviour. The score distribution for the variable 'phobic anxiety' (number 6 in Table II) illustrates this point.

Table I

*Variables with their means and standard deviations*

| Variables | Schizophrenics | | Affective psychoses | |
|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. |
| 1. Worry | 0·356 | 0·377 | 0·591 | 0·435 |
| 2. Muscular tension | 0·422 | 0·360 | 0·620 | 0·361 |
| 3. General anxiety | 0·297 | 0·353 | 0·433 | 0·374 |
| 4. Anxiety on examination | 0·418 | 0·246 | 0·424 | 0·281 |
| 5. Situational anxiety | 0·087 | 0·221 | 0·188 | 0·290 |
| 6. Phobic avoidance | 0·083 | 0·213 | 0·187 | 0·302 |
| 7. Specific autonomic symptoms | 0·155 | 0·301 | 0·295 | 0·364 |
| 8. Slowed thought | 0·415 | 0·351 | 0·609 | 0·405 |
| 9. Retardation | 0·243 | 0·287 | 0·435 | 0·327 |
| 10. Shyness and sensitivity | 0·392 | 0·328 | 0·421 | 0·327 |
| 11. Low self-opinion | 0·354 | 0·296 | 0·537 | 0·334 |
| 12. Depressed mood | 0·506 | 0·383 | 0·783 | 0·346 |
| 13. Signs of depression | 0·209 | 0·275 | 0·418 | 0·343 |
| 14. Somatic symptoms | 0·309 | 0·281 | 0·512 | 0·257 |
| 15. Irritability | 0·309 | 0·257 | 0·387 | 0·270 |
| 16. Hypomania | 0·119 | 0·242 | 0·179 | 0·326 |
| 17. Obsessions | 0·093 | 0·217 | 0·142 | 0·255 |
| 18. Fading interests | 0·242 | 0·263 | 0·371 | 0·299 |
| 19. Lack of concentration | 0·209 | 0·278 | 0·386 | 0·305 |
| 20. Depersonalization | 0·187 | 0·292 | 0·166 | 0·283 |
| 21. Perceptual disturbances | 0·214 | 0·235 | 0·137 | 0·254 |

| | | | | |
|---|---|---|---|---|
| 22. Complaints of poor memory .. .. | 0·158 | 0·285 | 0·228 | 0·246 |
| 23. Lack of insight .. | 0·428 | 0·306 | 0·256 | 0·285 |
| 24. Motor symptoms .. | 0·118 | 0·218 | 0·170 | 0·247 |
| 25. Frequency of voices | 0·178 | 0·302 | 0·046 | 0·164 |
| 26. Subjective thought disorder .. .. | 0·185 | 0·310 | 0·020 | 0·110 |
| 27. Delusions of control | 0·085 | 0·200 | 0·010 | 0·068 |
| 28. Delusions of reference .. .. | 0·137 | 0·255 | 0·071 | 0·207 |
| 29. Delusions of persecution .. .. | 0·286 | 0·364 | 0·067 | 0·204 |
| 30. Delusions of grandeur .. .. | 0·059 | 0·150 | 0·030 | 0·122 |
| 31. Religious delusions | 0·044 | 0·137 | 0·018 | 0·090 |
| 32. Fantastic delusions | 0·007 | 0·069 | 0·015 | 0·086 |
| 33. Sexual delusions .. | 0·032 | 0·104 | 0·006 | 0·056 |
| 34. Delusions of self-depreciation .. | 0·024 | 0·099 | 0·066 | 0·176 |
| 35. Somatic delusions .. | 0·068 | 0·179 | 0·033 | 0·119 |
| 36. Hallucinations .. | 0·101 | 0·248 | 0·050 | 0·166 |
| 37. Other delusions .. | 0·008 | 0·049 | 0·012 | 0·063 |
| 38. Affective accompaniments of experience .. .. | 0·169 | 0·224 | 0·083 | 0·200 |
| 39. Blunting .. .. | 0·315 | 0·347 | 0·070 | 0·213 |
| 40. Abnormalities of behaviour .. .. | 0·095 | 0·190 | 0·030 | 0·117 |
| 41. Non-social speech .. | 0·063 | 0·200 | 0·013 | 0·083 |
| 42. Restricted quantity of speech .. | 0·117 | 0·228 | 0·074 | 0·200 |
| 43. Manner of speech .. | 0·106 | 0·188 | 0·051 | 0·135 |
| 44. Incomprehensibility | 0·314 | 0·343 | 0·105 | 0·224 |

TABLE II

*Schizophrenics: Frequency distribution of scores for a selection of variables*

| Scores | Variables | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 3 | 6 | 16 | 23 | 27 | 29 | 30 | 32 | 36 | 39 | 44 |
| 0 .. | 72 | 52 | 125 | 113 | 41 | 120 | 86 | 139 | 141 | 121 | 73 | 69 |
| 1 .. | 6 | 21 | 2 | 14 | 19 | 12 | 5 | 3 | 3 | 12 | 10 | 15 |
| 2 .. | 13 | 32 | 10 | 6 | 24 | 4 | 10 | 2 | 1 | 3 | 17 | 22 |
| 3 .. | 12 | 18 | 4 | 4 | 17 | 4 | 8 | 3 | 0 | 1 | 12 | 12 |
| 4 .. | 11 | 8 | 0 | 1 | 23 | 4 | 11 | 1 | 0 | 0 | 11 | 10 |
| 5 .. | 10 | 8 | 1 | 4 | 9 | 1 | 5 | | 1 | 1 | 6 | 5 |
| 6 .. | 8 | 2 | 2 | 1 | 9 | 1 | 9 | | | 3 | 8 | 4 |
| 7 .. | 5 | 2 | 2 | 1 | 3 | 6 | | | | 1 | 4 | 2 |
| 8 .. | 4 | 2 | | 1 | 0 | | 4 | | | 4 | 2 | 2 |
| 9 .. | 1 | | | 1 | 1 | | 2 | | | | 3 | 1 |
| 10 .. | 2 | | | | | | | | | | | 0 |
| 11 .. | 1 | | | | | | | | | | | 1 |
| 12 .. | 1 | | | | | | | | | | | 3 |

Now it is difficult to get a satisfactory measure of co-relationship or correlation between two variables which do not have a bivariate normal distribution. In particular the product-moment correlation formula can lead to very inflated estimates in the case of variables for which zero scores predominate. To illustrate this let us look at the following five pairs of scores, on two variates X and Y, namely

| | | | | | |
|---|---|---|---|---|---|
| X | 6, | 5, | 3, | 7, | 9, |
| Y | 5, | 8, | 1, | 7, | 5. |

The correlation coefficient is found to be 0·46. But if the sample size had been 200 and the additional 195 patients had had zero scores on X and Y the product-moment correlation calculated for all 200 patients would be found to be double this size. One way round the difficulty would be to discard those patients who had zero scores on both variables when estimating the correlation coefficient between them. This approach is sometimes used, but it has the disadvantage that the correlation matrix obtained may prove difficult to handle in subsequent calculations, say in a factor analysis (in technical terms the matrix is unlikely to be positive definite). Another approach, which is the one employed in this study, is to use a factor analysis as a routine screening device for the data, carrying it out on the correlation matrix for the complete sample. In doing so it is important not to lay undue stress on the actual magnitudes of the factor loadings obtained, as they will be inflated if the correlations are inflated. In addition, the validity of the clusters of variables which the analysis reveals must be checked against the distributions of these variables.

## THE SAMPLE AND THE DATA

We commence by examining the data for the patients listed in the first six diagnostic categories considered by Everitt, Gourlay and Kendell (1971). These patients are taken in two groups in the broad diagnostic categories, Schizophrenics (146) and Affective Psychotics (146). The variables employed, and listed in Table I, are section scores on the Mental State Schedule used in the U.S.-U.K. Diagnostic Project. (For a full report of this project see *Psychiatric Diagnosis in New York and London*,

Maudsley Monograph No. 20, Cooper, Kendell *et al.*). Each section in the schedule contained several items of relatively homogeneous content as regards patient symptomatology, which in general were scored on a three-point scale. Each section score was an aggregate of the item scores concerned. As many of the items (symptoms) were absent in the case of many of the patients the most frequently occurring score was zero. To illustrate this, some typical score distributions are shown in Tables II and IV. Apart from the zero values, the score distributions tended to be skewed in a positive direction, and to counteract this tendency log-scores were used in the calculations. The means and standard deviations for the 44 variables are shown in Table I, and the absence of normality in the distributions is revealed by the fact that the standard deviations frequently exceed the corresponding means.

## Factor Analyses

Separate factor analyses were carried out on the correlation matrices for schizophrenics and affective psychotics. The factor model (Lawley and Maxwell, 1971) was used in preference to the principal component model, as it makes specific allowance for errors of measurement in the variables and it is wise to assume that such errors are present. This is not a reflection on the work of the psychiatrists engaged on the U.S.-U.K. Diagnostic Project, as the data are probably well above average in reliability.

Factorial techniques on their own have no means of detecting spurious content in a correlation matrix. They take the correlations at their face value and tell us how many hypothetical variables or factors are required to reproduce them. The authenticity of these factors, as already noted, depends on the underlying assumption of multivariable normality in the variables themselves, and in the present study this point will require special attention. For each diagnostic category the factors extracted were subjected to a varimax rotation. From an arithmetic viewpoint these rotations proved very satisfactory, as they reduced a high percentage of the loadings to zero or near zero values, and virtually eliminated negative signs from the remainder. In the discussion which follows, the loadings given are those on rotated factors only.

## The Schizophrenic Sample

In the schizophrenic sample the analysis yielded 10 factors, but in view of the spurious content in the correlation matrix only loadings of about 0·4 or greater need receive serious attention. Of the 10 factors only one was sufficiently general to be convincing as a dimension of personality, but the two group factors associated with it (see Table III) are defined by variables of considerable incidence in the sample and so also deserve consideration. The remaining seven 'factors', labelled A to G below are largely artifactual in nature. This can be illustrated by an examination of one of them which we call *phobic anxiety* (A). The principal loadings on it are:

| Variables | Factor loadings |
|---|---|
| 5. Situational anxiety | 0·819 |
| 6. Phobic avoidance | 0·841 |
| 7. Specific autonomic symptoms | 0·480, |

while the loadings of these variables in the other factors are negligible. Now these three variables are of rare occurrence in the sample, for example only 21 of the 146 patients (see Table II) have non-zero scores on the variable 'phobic avoidance'. The correlations between the three variables, based on the full sample of 146 patients, were found to be:

| | 5 | 6 | 7 |
|---|---|---|---|
| 5. | 1·000 | 0·743 | 0·541 |
| 6. | | 1·000 | 0·452 |
| 7. | | | 1·000 |

Some indication of the spurious content in these correlations is shown by the fact that for variables 5 and 6 the correlation of 0·743 falls to 0·395 if the 120 patients who have zero scores on both variables are omitted from the calculations. Similarly, the correlation between variables 6 and 7 falls from 0·452 to −0·109 when patients with zero scores on both variables are omitted.

It is now clear that the *phobic anxiety* factor does not represent a *dimension* or *scale* of any generality for the schizophrenics as a whole, but, by default as it were, it indicates that within the

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sample of schizophrenics there is a sub-group of patients who display phobic-type symptoms. This does not imply that these patients tend to have phobic symptoms only; in fact they have non-zero scores on many of the other variables, though these variables do not correlate significantly with variables 5, 6 and 7.

The remaining 6 factors for the schizophrenic sample may be interpreted in a similar way. They have been given provisional labels and the variables which have sizeable loadings in them are listed below.

| Variables | Loadings |
|---|---|
| B. Delusional mood | |
| 15. Irritability | (0·333) |
| 16. Hypomania | (0·324) |
| 20. Depersonalization | 0·524 |
| 21. Perceptual disturbances | 0·925 |
| C. Schizophrenic Deterioration | |
| 39. Blunting | 0·744 |
| 42. Restricted quantity of speech | 0·641 |
| 43. Manner of speech | 0·738 |
| 44. Incomprehensibility | 0·471 |
| D. Grandiose delusions | |
| 16. Hypomania | 0·412 |
| 30. Delusions of grandeur | 0·721 |
| 31. Religious delusions | 0·864 |
| 37. Other delusions | 0·401 |
| E. Delusions of control | |
| 25. Frequency of voices | (0·363) |
| 26. Subjective thought disorder | 0·564 |
| 27. Delusions of control | 0·740 |
| 35. Somatic delusions | 0·495 |
| 36. Hallucinations | 0·417 |
| F. Paranoid symptoms | |
| 23. Lack of insight | (0·358) |
| 28. Delusions of reference | 0·537 |
| 29. Delusions of persecution | 0·723 |
| G. Catatonic symptoms | |
| 13. Signs of depression | 0·438 |
| 24. Motor symptoms | 0·780 |
| 40. Abnormalities of behaviour | 0·431 |
| 41. Non-social speech | 0·420 |

The loadings for the dominant factor (R) in the schizophrenic sample, and for the two group factors (H and I) associated with it, are given in Table III and the factors are labelled respectively:

R Retarded depression,
H General anxiety,
I Self-depreciation.

TABLE III

*Schizophrenics: A general and two group factors*

| Variables | Retarded depression | General anxiety | Self depreciation |
|---|---|---|---|
| | R | H | I |
| 8. Slowed thought .. | 0·651 | | |
| 9. Retardation .. | 0·642 | | |
| 15. Irritability .. | 0·283 | | |
| 18. Fading interest .. | 0·620 | | |
| 19. Lack of concentration .. .. | 0·700 | | |
| 22. Complaints of poor memory .. .. | 0·396 | | |
| 25. Frequency of voices | 0·246 | | |
| 28. Delusions of reference .. .. | 0·257 | | |
| 1. Worry .. .. | 0·485 | 0·343 | |
| 2. Muscular tension .. | 0·651 | 0·375 | |
| 3. General anxiety .. | 0·307 | 0·744 | |
| 4. Anxiety on examination .. .. | 0·295 | 0·194 | |
| 12. Depression mood .. | 0·580 | 0·222 | 0·362 |
| 14. Somatic symptoms | 0·311 | 0·210 | 0·290 |
| 38. Aff. acc. of experience .. .. | 0·339 | 0·213 | −0·201 |
| 10. Shyness and sensitivity .. .. | 0·488 | | 0·366 |
| 11. Low self opinion .. | 0·397 | | 0·601 |
| 13. Depression on examination .. | 0·227 | | 0·319 |

## THE AFFECTIVE PSYCHOTIC SAMPLE

In the affective psychotic sample 12 factors were found, and in describing them the factor labels used for the schizophrenics will be applied when appropriate. The dominant factor again was *retarded depression* (R). The loadings on it are shown in Table V, and it should be noted that the loading for 'hypomania' is negative so that in some measure the factor indicates a manic-depressive dichotomy. Also included in

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the table are the loadings on three group factors associated with factor R, namely *general anxiety* (H), *self-depreciation* (I), and an additional factor labelled *signs of anxiety* (J), which did not appear in the schizophrenic sample.

The variables defining the remaining factors are for the most part unique subsets none of which has a loading of any magnitude on the dominant factor. In general, too, the incidence of these variables is rare, so that the 'factors' do not represent *dimensions*, but serve only to indicate that there are subgroups of patients within the affective psychotic sample who tend to have certain relatively rare symptoms in common. These factors and the loadings on them are listed below.

| Variable | Loading |
|---|---|
| A. Phobic anxiety | |
| 5. Situational anxiety | 0·834 |
| 6. Phobic avoidance | 0·824 |
| 7. Specific autonomic symptoms | 0·350 |
| B. Delusional mood | |
| 21. Perceptual disturbances | 0·868 |
| 28. Delusions of reference | 0·523 |
| C. Schizophrenic deterioration | |
| 24. Motor symptoms | 0·511 |
| 39. Blunting | 0·630 |
| 42. Restricted quantity of speech | 0·978 |
| 43. Manner of speech | 0·689 |
| D. Grandiose delusions | |
| 16. Hypomania | (0·314) |
| 30. Delusions of grandeur | 0·510 |
| 31. Religious delusions | 0·743 |
| 32. Fantastic delusions | 0·956 |
| F. Paranoid symptoms | |
| 29. Delusions of persecution | 0·917 |
| 38. Affective accompaniments of experience | 0·475 |

Three additional factors had loadings of 0·932 on 'subjective thought disorder', of 0·874 on 'lack of insight', and of 0·840 on 'delusions of control', respectively.

## Discussion

The statistical method for describing the covariation between a set of variables in terms of a smaller number of hypothetical variables or dimensions is factor analysis. Since the scales

Table IV

*Affective psychotics: Frequency distribution of scores for a selection of variables*

| Score | Variables | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 6 | 11 | 16 | 21 | 23 | 27 | 30 | 32 | 39 | 42 | 44 |
| 0 .. .. | 44 | 28 | 59 | 101 | 29 | 109 | 109 | 73 | 143 | 137 | 141 | 129 | 128 | 117 |
| 1 .. .. | 6 | 9 | 16 | 7 | 18 | 5 | 7 | 22 | 0 | 3 | 3 | 6 | 5 | 6 |
| 2 .. .. | 9 | 14 | 14 | 11 | 21 | 6 | 16 | 21 | 3 | 2 | 1 | 1 | 5 | 13 |
| 3 .. .. | 5 | 14 | 21 | 9 | 17 | 7 | 5 | 10 | | 3 | 0 | 3 | 1 | 3 |
| 4 .. .. | 6 | 14 | 8 | 8 | 19 | 2 | 3 | 13 | | 1 | 1 | 0 | 3 | 4 |
| 5 .. .. | 8 | 10 | 9 | 3 | 8 | 3 | 2 | 4 | | | | 2 | 2 | 0 |
| 6 .. .. | 14 | 12 | 8 | 3 | 11 | 5 | 1 | 3 | | | | 3 | 2 | 3 |
| 7 .. .. | 7 | 11 | 6 | 1 | 6 | 4 | 1 | | | | | 0 | | 0 |
| 8 .. .. | 15 | 12 | 1 | 1 | 9 | 1 | 2 | | | | | 1 | | 1 |
| 9 .. .. | 7 | 8 | 6 | 0 | 5 | 1 | | | | | | 0 | | |
| 10 .. .. | 10 | 5 | 1 | 0 | 0 | 1 | | | | | | 0 | | |
| 11 .. .. | 6 | 2 | 0 | 2 | 3 | 1 | | | | | | 1 | | |
| 12 .. .. | 2 | 3 | 3 | | | 1 | | | | | | | | |
| 13 .. .. | 2 | 1 | 1 | | | | | | | | | | | |
| 14 .. .. | 0 | 2 | 0 | | | | | | | | | | | |
| 15 .. .. | 3 | | 1 | | | | | | | | | | | |
| 16 .. .. | 1 | | | | | | | | | | | | | |

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TABLE V

*Affective psychotics: A general and three groups factors*

| Variables | Retarded depression R | General anxiety H | Anxiety O/E J | Self depreciation I |
|---|---|---|---|---|
| 8. Slowed thought | 0·784 | | | |
| 9. Retardation | 0·707 | | | |
| 18. Fading interests | 0·785 | | | |
| 19. Lack of concentration | 0·778 | | | |
| 5. Situational anxiety | 0·375 | | | |
| 6. Phobic avoidance | 0·361 | | | |
| 14. Somatic symptoms | 0·413 | | | |
| 16. Hypomania | −0·436 | | | |
| 23. Lack of insight | −0·327 | | | |
| 10. Shyness and sensitivity | 0·514 | 0·303 | | |
| 15. Irritability | 0·294 | 0·486 | | |
| 1. Worry | 0·537 | 0·262 | 0·373 | |
| 2. Muscular tension | 0·502 | 0·276 | 0·333 | |
| 3. General anxiety | 0·332 | 0·615 | 0·378 | |
| 7. Specific authonomic symptoms | 0·290 | 0·441 | 0·298 | |
| 4. Anxiety on examination | (0·108) | | 0·664 | |
| 22. Complaints of poor memory | 0·404 | | −0·240 | 0·393 |
| 13. Signs of depression | 0·551 | | 0·317 | 0·276 |
| 11. Low self opinion | 0·756 | 0·343 | | 0·235 |
| 12. Depressed mood | 0·776 | 0·277 | | 0·259 |

of the variables are in general arbitrary the analysis is customarily performed on a matrix of correlation coefficients in which the variance of each variable is equated to unity. The validity of the estimates of the correlation coefficients themselves, and of the factor loadings derived from them, depends on bivariate normality for all pairs of variables. Psychiatric variables, as we have seen (Tables II and IV), are seldom normally distributed. More frequently they have reversed J-shape distributions in which zero scores predominate. For two variables thus distributed it is difficult to get a reliable measure of correlation, and the product-moment formula in particular gives an estimate which is spuriously high and often misleading. Factorial procedures perforce take these correlations at their face value, but in doing so they can throw some light on spurious content in the correlation coefficients. This is revealed by 'factors' with large loadings on but a few variables which themselves have low, though concomitant, incidence in the sample. Such factors are artifactual in nature, often unreliable, and cannot be taken as dimensions of variability for the sample of patients as a whole. Since the majority of the factors found for both the Schizophrenic and the Affective Psychotic patients in this study are deemed to be artifactual, it would appear that a dimensional approach to the description of these patients' symptomatology has strict limitations. It is not, however, wholly without value, as the factors shown in Tables III and V show. For both samples of patients a large general factor labelled *retarded depression* appears to exist, even though we cannot have complete confidence in the numerical values of the loadings reported for it because of the non-normality of most of the variables concerned. The presence of this dominant factor and of the two lesser group factors associated with it, namely *general anxiety* and *self-depreciation*, in both the schizophrenic and the affective psychotic samples is worth emphasizing. These three factors account for the greater part of the covariance of variables 1 to 23 in each sample and suggest that the determinants of the two categories of illness may be similar. The main difference between the categories lies in the slightly greater

incidence of psychotic variables in the schizophrenic sample as indicated by the mean values of variables 25 to 44 in Table I. Notable examples are variables 27, 39 and 44, namely *delusions of control*, *blunting*, and *incomprehensibility*, though these variables are by no means general in occurrence (see Table II), nor are they confined to members of the schizophrenic sample (see Table IV).

The dominant role which the factor *retarded depression* plays in the data for affective psychotics is not inconsistent with the main negative finding in the cluster analyses carried out by Everitt, Gourlay and Kendell (1971). Their analysis showed that a considerable percentage of these patients fell into 'ragbag' clusters when compared with the diagnostic categories to which they had been allocated by the psychiatrists who examined them. But these investigators also found definite positive results; their computer analyses yielded 'separate clusters identifiable with the manic and depressive phases of manic-depressive illness, with acute paranoid schizophrenia and with chronic or residual schizophrenia', and of these the evidence for a manic cluster was compelling. In view of the latter finding a search was made amongst the artifactual factors (reported above) to see if one of them would serve to identify a manic cluster. It was unsuccessful: the variables which the joint authors found to be especially persistent in their manic group had their principal loadings on our dominant factor, namely *retarded depression*. On the other hand our 'factor' F (paranoid symptoms) in some measure isolated the patients who composed the joint authors paranoid schizophrenic cluster.

## Conclusions

The difficulties in a dimensional approach to the description of patient symptomatology, in the case of psychotic illnesses, arise from the fact that many symptoms are of rare incidence, while the more common symptoms tend to be recorded only when they are present to an extent which is thought to be pathological. Nevertheless, variables 1 to 23 in Table I, which may be called the *neurotic variables*, show considerable variability in both the schizophrenic and affective psychotic samples (see Tables II and IV) and these variables give rise to one clear dimension of variability namely the factor *retarded depression*, and two other group factors (see Tables III and V). These factors could be defined with some rigour if the neurotic variables had a 'lower floor'. We may take the first variable, namely *worry*, again as an example. Instead of scoring *worry* of a pathological kind only, a psychiatrist might feel able to extend the scale of this variable to include indications of *worry* below the pathological level. In some measure he does reach a low floor on other variables, as the distributions of numbers 2 and 11, namely *tension* and *low self-opinion*, in Table IV shows. Given lower floors the distributions of the neurotic variables would more closely approach normality, and the factors derived from them could then be defined with greater precision.

But the possibility of defining in any acceptable sense *dimensions* in terms of the psychotic variables, namely 25 to 44 in Table I, is extremely remote. These variables are too limited and restricted in range.

In passing, we may recall (Maxwell, 1971) that even if it were possible to describe patients' symptomatology adequately in terms of dimensions this would not contribute to a typology or classification of patients, for all patients would have scores on all dimensions and for each dimension the distribution of scores would tend strongly to normality, with the majority of patients clustering round the mean.

In view of the partial success reached by Everitt, Gourlay and Kendell in validating currently used typologies by means of a cluster analysis, and the main conclusion reached in this study that the covariation between the neurotic variables can be accounted for largely by one dominant and a few group factors, Torgerson's suggestion, stated in our introduction, is borne out (if we overlook the fact that it is in part a non-sequitur). But it is not the full story, since rare symptoms of a psychotic type are not amenable to a dimensional description and have a fragmenting effect on a typological system.

## Postscript

As a postscript to this study it was decided to

look at the 95 neurotic patients included by Everitt *et al.* in their analysis and for whom no evidence of clustering was found. The data for these patients using variables 1 to 24 only, yielded four well-defined factors which may be assigned the labels *retarded depression*, *phobic anxiety*, *delusional mood* and *self-depreciation*.

Taking an overall view, we thus have firstly a sample of patients, broadly labelled 'neurotic', for whom clustering techniques fail, but whose symptomatology can be satisfactorily described in terms of several dimensions of abnormal behaviour. Secondly we have an affective psychotic sample in which Everitt *et al.* found two relatively distinct, though not exhaustive, clusters consisting of manic and psychotic depressive patients respectively. In contrast the dimensional approach revealed numerous 'factors' indicative of small subgroups of patients with rather specific symptoms, together with a dominant factor and three groups factors which accounted for most of the covariation between the neurotic variables. Finally, we have the sample of patients broadly labelled schizophrenic, in which Everitt *et al.* found two reasonably well defined, but again not exhaustive, clusters which they identified as paranoid schizophrenics and chronic schizophrenics respectively. Here the dimensional approach again revealed numerous small subgroups of patients having specific symptoms mainly of a psychotic type; but, in common with the affective psychotics, the bulk of the covariation of the neurotic variables was accounted for by a dominant general factor and two group factors. In brief, the majority of all patients tend to have a basic core of symptoms, neurotic in type, which lend themselves to a dimensional description, but one whose prominence decreases somewhat as we pass from neurotics through affective psychotics to schizophrenics. In addition there are the psychotic type symptoms, which are rare and haphazard in occurrence. These are virtually absent in neurotics: they are most common in schizophrenics but still not sufficiently numerous or patterned to support a clear-cut typology, or to lend themselves to a dimensional description.

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