

PERSONALITY AND MENTAL ILLNESS

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Summary.—The new Eysenck Personality Questionnaire was administered to 441 male and 441 female subjects, 63 in each of seven groups (normal, criminal, schizophrenic, endogenous depressive, personality disorder, anxiety state, reactive depression). Means and SDs are reported for the groups, and a discriminant function analysis was performed to estimate the relative positions of the groups in three-dimensional space. The groups were significantly separated (1) along a dimension ranging from normality to abnormality, (2) a dimension ranging from neurotic to psychotic, and (3) a dimension ranging from anti-social behaviour to socialized behaviour. The results are interpreted as showing that personality traits characterize psychiatric groups in a manner not dissimilar to that in which they are characterized by "signs and symptoms" and suggesting that dimensional description of psychiatric abnormality may be superior to categorical nosology.

Foulds (1965) has made a very clear distinction between personality traits and psychiatric symptoms. He believes that "it is important to distinguish between personality traits and attitudes on the one hand and the symptoms and signs of mental (or personal) illness on the other. These symptoms signal a disruption of the normal continuity of the personality. Such a distinction is a necessary prelude to any further understanding of the interaction between personality and illness which might lead to advances in the diagnosis, treatment, aetiology and prophylaxis of the mentally ill" (p. 3). Such a distinction is, of course, valuable and indeed essential, but it does not preclude the existence of certain relations between the two sets of variables. Jung already postulated that hysteria was more likely to develop in extraverted individuals, psychasthenia in introverted ones, and Kretschmer linked cyclothymia (as a personality variable) with manic-depressive disorder and schizothymia (as a personality variable) with schizophrenia (Eysenck, 1970c). The present study was undertaken in the hope that some links would be found between symptom-based psychiatric diagnoses, on the one hand, and the personality variables which are measured by the new Eysenck Personality Questionnaire (S. B. G. Eysenck & H. J. Eysenck, 1976a) on the other. The personality variables measured by this questionnaire, which is a development of the earlier Maudsley and Eysenck Personality inventories, are N (neuroticism vs emotional stability), E (extraversion vs introversion), P (psychoticism vs normality), and L (a Lie or dissimulation scale which however also measures, under conditions not dissimulation motivating, conformity or orthodoxy).

Of these variables, Extraversion, Neuroticism, and Lie are familiar from earlier versions of our inventory; Psychoticism is a relative newcomer which

may deserve a brief discussion (Eysenck & Eysenck, 1968, 1971; S. B. G. Eysenck & H. J. Eysenck, 1968, 1969a, 1969b, 1972, 1973; Eysenck, Eastings, & Eysenck, 1971; Verma & Eysenck, 1973). Psychoticism is conceived of as a personality dimension, independent of Extraversion and Neuroticism, genetically based, and predisposing high scorers to psychotic-type disorders (Eysenck, 1972). In view of the apparent genetic relationship between psychosis (particularly schizophrenia) and schizoid, antisocial, psychopathic behaviour it is also postulated that certain groups of criminals are likely to be characterized by high Psychoticism scores (Eysenck, 1970b, 1974; Eysenck & Eysenck, 1973; S. B. G. Eysenck & H. J. Eysenck, 1970, 1971a, 1974b). Results of empirical tests, summarized by Eysenck and Eysenck (1976a), have supported the major hypotheses involved in the postulation of such a dimension of psychoticism. (1) Psychotics (both schizophrenics and endogenous depressives) have higher Psychoticism scores than normals and neurotics. (2) More seriously ill psychotics have higher Psychoticism scores than less seriously ill psychotics. (3) Psychoticism scores reflect improvement in clinical state of psychotic patients. (4) Criminals have higher Psychoticism scores than non-criminals. (5) Experimental laboratory studies show that high Psychoticism scorers in the normal population show results on tests of vigilance, preservation of set, unusual associative responses, etc. which are similar to those achieved by psychotics. (6) In normal populations, there is a strong genetic factor involved in determining differences in Psychoticism, heritability of reliable variance in Psychoticism amounting to 81%. (7) The mode of inheritance of Psychoticism is closely similar to that of schizophrenia.

Analysis of personality (including its psychiatrically relevant aspects) into these various components (P, E, N) assumes a dimensional framework, as opposed to the categorical system of diagnosis almost universally adopted by psychiatrists. The general principles underlying the dimensional system and the criticisms of the categorical system have been discussed elsewhere (Eysenck, 1970a); it would not be appropriate to go into details here. Insofar as the results of our present study are relevant to this fundamental diversity of opinion, we will discuss the points that arise in brief. The major purpose of this study was the attempt to discover the degree of relationship existing between the results of a dimensional investigation of personality differences in various psychiatric populations and the categorical diagnostic judgments made by psychiatrists of the members of this same population.

General Outline of Investigation

During the construction and validation of the Eysenck Personality Questionnaire, several thousand normal, neurotic, psychotic, and criminal subjects were tested, as well as over 3,000 boys and girls of various ages (Eysenck & Eysenck, 1976a, 1976b). From our files we took records of adult males and females belonging to seven different groups (normals, criminals, schizophrenics, personality disorders, anxiety states, reactive depressives, and endogenous depressives) and subjected them to a discriminant function analysis

which was thought to give us information concerning the relation between the four personality variables and the seven psychiatric status variables. Each group contained 63 individuals; this number was determined by the smallest available group (female endogenous depressives). All the other groups were made up by random sampling from the available records. Table 1 shows the mean ages of subjects in the various groups.

TABLE 1
MEAN AGES (YR.) OF MALE AND FEMALE GROUPS OF SUBJECTS IN EXPERIMENT

Group	Ages, males	Ages, females
1. Normals	25.6	27.5
2. Prisoners	25.4	27.2
3. Schizophrenics	33.9	39.7
4. Personality disorders	29.9	29.6
5. Anxiety states	31.1	34.6
6. Reactive depressives	32.7	28.8
7. Endogenous depressives	44.5	41.9

Note.—Psychoticism, Extraversion, and Neuroticism values decline with age (H. J. Eysenck & S. B. G. Eysenck, 1976b), hence the higher ages of psychiatric groups work against normal-abnormal discrimination.

We had to rely on routine psychiatric diagnosis in the allocation of patients to the various neurotic and psychotic categories; normals were not diagnosed as such but were simply people not currently under psychiatric treatment. No doubt this group contained a number of people who either had in the past or would have in the future, psychiatric breakdowns. Criminals were prisoners in several of HM Prisons; clearly they constitute only a sample and probably not a random one, of all criminals. These principles of data collection should be borne in mind; they impose serious limitations on the ability of the Eysenck Personality Questionnaire to discriminate between groups. The groups are not exclusive (some normals are probably and some criminals certainly, psychiatrically ill and should, therefore, ideally be placed in one of the psychiatric categories); this could only be done if the members of these groups had been seen and diagnosed by a psychiatrist. For the groups that were diagnosed psychiatrically, we have the unreliability of such diagnoses to contend with. Table 2 shows mean reliabilities of such diagnoses for such groups as we employed, under optimal conditions of diagnosis (Spitzer & Fleiss, 1974); these

TABLE 2
RELIABILITIES OF PSYCHIATRIC DIAGNOSES

Disorders (Psychiatric Diagnosis)	Mean Reliability* (Kappa values)
Psychosis:	.55
Schizophrenia	.57
Endogenous depression	.24
Manic-depressive illness	.33
Neurosis:	.40
Reactive depression	.26
Personality disorder	.32
Anxiety reaction	.45

*Taken from Spitzer and Fleiss (1974).

values are averages from several studies. Conditions of diagnosis in our own study were far from ideal, there being no *prior* discussion among the psychiatrists making the diagnoses, there being no *homogeneity* of background making them use similar principles of nosology, and many of them being relatively junior and/or not convinced of the value of diagnoses in psychiatric work anyhow. The values in Table 2 thus seem to suggest a limit to what even a perfect diagnostic test could do when compared against the psychiatric criterion used.

The data were analysed by discriminant function analysis (Cooley & Lohnes, 1971). This type of statistical analysis combines scores from the scales used in such a way that it extracts a *first component* which gives the maximum possible discrimination between groups; this component is then tested for statistical significance. If significant, a second component is extracted which gives the maximum discrimination between groups and is *orthogonal* to (independent of) the first component; this second component is then tested for *significance*. Successive components are extracted following the same principle; each gives the maximum differentiation between groups, while orthogonal to preceding components. The number of components is limited by the number of groups (the maximum number of components must be one less than the number of groups) or the number of tests (the maximum number of components cannot exceed the number of tests), whichever is the smaller. In our case, the number of components cannot be larger than four (the number of tests), but it could very well be less. The efficacy of the discrimination can be tested by the number of misclassifications to which it gives rise.

RESULTS

Tables 3 and 4 give the means and standard deviations of the different scales for the seven groups. It will be clear that the abnormal groups have higher Psychoticism scores, higher Neuroticism scores and lower Extraversion scores than the normals; it will also be obvious that the psychotic groups have much higher Lie scores than the other groups. These high Lie scores make it inadvisable to look at Psychoticism scores alone in comparing psychotics and neurotics, say; Psychoticism scores must be looked at in conjunction with Lie scores. In fact, the principle of dimensional analysis makes it mandatory that in comparing groups, unless these are located precisely on the dimensions involved, a combination of several scores should be used; it is this task of combining scores in the optimal manner that is undertaken by discriminant function analysis.

TABLE 3
MEANS AND SDs OF DIFFERENT GROUPS: MALE

Groups	Psychoticism	Extraversion	Neuroticism	Lie
1	3.87±2.73	13.35±5.23	10.29±4.84	6.09±3.67
2	5.72±3.92	13.42±4.98	13.29±5.22	5.72±4.28
3	6.21±4.51	10.44±5.19	13.70±6.33	9.77±5.22
4	5.86±3.45	10.27±6.11	15.51±4.89	7.18±4.50
5	4.84±3.12	9.01±5.16	16.42±4.80	6.94±3.88
6	4.01±2.90	11.00±5.02	16.61±5.08	7.75±4.46
7	4.02±2.76	9.70±5.52	16.01±5.37	9.95±4.64

TABLE 4
MEANS AND SDs OF DIFFERENT GROUPS: FEMALE

Groups	Psychoticism	Extraversion	Neuroticism	Lie
1	2.55±2.08	12.63±4.35	12.39±5.19	7.52±3.29
2	6.24±4.06	12.16±5.32	14.83±5.60	9.27±4.57
3	4.57±3.26	10.40±4.42	14.92±5.33	11.10±5.05
4	5.58±3.65	10.34±6.11	18.25±4.64	6.90±4.05
5	2.79±2.34	9.02±6.00	17.59±4.08	9.34±4.09
6	3.73±3.38	9.40±5.52	19.07±3.14	9.21±4.04
7	3.61±2.40	10.18±5.83	16.37±4.42	11.87±4.14

The observed correlations between scales may be of interest; they were calculated as pooled within-cell coefficients, i.e., correcting for between-group differences in scores. Giving the correlations for males first, we find that Psychoticism correlates with Neuroticism (.20, .15) and with Lie (−.27, −.33). Extraversion correlates with Neuroticism (−.26, −.16). Neuroticism and Lie correlate −.26 and −.20, respectively. These correlations are higher than those reported in the manual for normal groups which are effectively zero; it has often been observed that such zero correlations become significant when extracted from data furnished by psychiatric groups. This is, therefore, not an unexpected finding.

F ratios for 24 and 1504.70 *df* were calculated to establish the over-all significance of the differences observed; the values obtained (8.27 and 10.78) gave $p < .0001$, leaving no doubt that the groups were very significantly discriminated by the tests. Univariate and step-down *F* values for the separate scales showed all four scales to contribute at the $p < .0001$ level. Four canonical variates were extracted from the data and Bartlett's chi square test for significance of successive canonical variates applied. The first three variates were found significant at $p < .0001$ levels for both sexes; the fourth variate was significant for the males only at the $p < .02$ level; for the females, it was insignificant ($p < .60$). With such large numbers, the statistical significance of the fourth root for the males is too slight to make interpretation useful.

The clearest way of looking at the data is by calculating the canonical form of the least squares estimates of variates \times groups. This is plotted for the first two variates (much the most important) in Figs. 1 and 2. These plots are readily interpretable. The first variate contrasts normals (and to a lesser extent prisoners) with all the psychiatric groups; this may be called a psychiatric abnormality variate. The second variate contrasts psychotic (schizophrenic, endogenous depressive) with neurotic (anxiety state, reactive depression) disorders, with personality disorders intermediate, but perhaps somewhat closer to the psychotic end. This variate may be called psychotic vs neurotic. The third variate puts together the criminals and the personality disorders, for both males

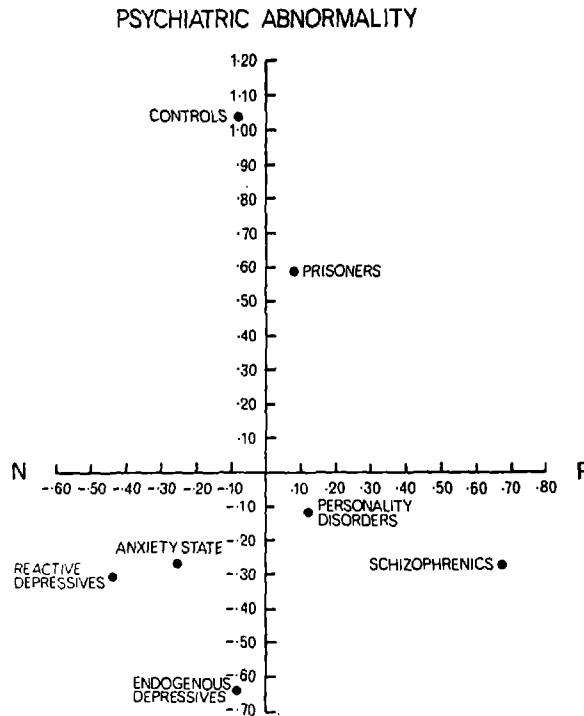


FIG. 1. Position of seven psychiatric groups on first two canonical variates (males)

and females; this may be interpreted as an anti-social variate and makes perfectly good sense. Note that endogenous depression and reactive depression go respectively with schizophrenia and anxiety state; this is in good agreement with the view that depression can be divided into a psychotic and a neurotic kind (Eysenck, 1970).

We thus find that the three canonical variates can, at a reasonable level of statistical significance, sort our seven groups in a relatively clear-cut and understandable manner, very much as expected in terms of our underlying dimensional theory of mental and criminal dysfunctioning. This finding suggests strongly that there are, as postulated, relations between personality variables and what Foulds calls "signs and symptoms" of abnormality on the other; this is an important conclusion. We also find evidence that neurotic and psychotic groups can be contrasted on the basis of their personality scores, with the ill-understood and poorly diagnosed "personality disorders" group somewhere intermediate. Nevertheless, however poorly diagnosed this group may be, the essentially anti-social character implicit in this diagnosis is well brought out by our third variate, linking this group with the criminals. One result may require a brief explana-

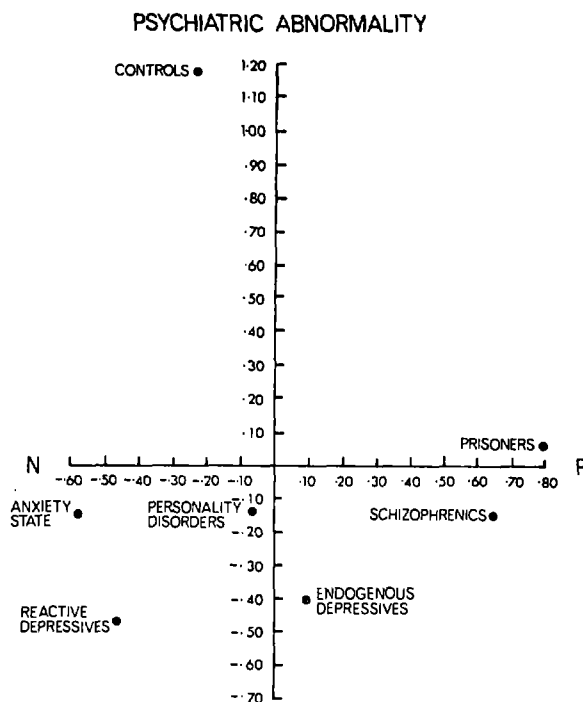


FIG. 2. Position of seven psychiatric groups on first two canonical variates (females)

tion; this is the position of the female criminal group close to the schizophrenics. This was not unexpected; psychiatrists familiar with prisoners at the prison in question had stated that, in their opinion, there was a much higher incidence of psychosis-like states there than would be found in male prisons. This, of course, is not evidence but it agrees well with our finding.

We turn next to the amount of misclassification encountered. Not too much should be expected here; even when questionnaires based on "signs and symptoms" are used, such as the MMPI and when only the easiest discrimination is attempted, i.e., that between neurotics and psychotics as a whole, the validity of the average trained judge using this instrument was only .28 and that of the best of a large number of compound diagnostic signs, .39 (Goldberg 1965). This low validity is, of course, largely due to the poor reliability of the criterion (see Table 2), and in our own case, the overlap between categories already mentioned must also play a part. Many normals should, in fact, be "misclassified" as criminals because quite a few undoubtedly are in the position of having committed crimes, even though they have not (or not yet) been caught, or of committing such acts in the future. In other words, the test may be more valid than the criterion!

Our findings suggest that from the point of view of allocating people to psychiatric groups, it may be more useful to use *combinations* of scales rather than single, unidimensional scales. For this purpose, formulae have been derived which can be used to convert scale scores into canonical variate scores; these are given elsewhere (Eysenck & Eysenck, 1976a). Use of these formulae enables any single patient's position in the two-dimensional space shown in Figs. 1 and 2 to be calculated, so that it also becomes possible to determine which of the seven diagnostic groups he is nearest to. This may be a useful exercise, particularly with unusual and doubtful cases. Alternatively, a consideration of the whole set of scale values may be sufficient to obtain insight into the personality pattern of a given case. Under no circumstances should single scale values be interpreted without some consideration of the values attained by the other scales; this is particularly true of the contribution made by the Lie scale to the interpretation of the Psychoticism, Extraversion, and Neuroticism scales.

TABLE 5
NUMBERS (AND PERCENTAGES) OF MEMBERS OF 7 GROUPS CLASSIFIED CORRECTLY
(ITALIC) AND INCORRECTLY BY DISCRIMINANT FUNCTION: MALES

Actual Groups	Discriminant Function Classification						
	1	2	3	4	5	6	7
1. Normals	38(60)	11(17)	4(6)	0(00)	6(10)	3(5)	1(2)
2. Criminals	20(32)	<i>17(27)</i>	6(10)	3(5)	7(11)	5(8)	5(8)
3. Schizophrenics	5(8)	4(6)	<i>21(33)</i>	5(8)	11(17)	6(10)	11(17)
4. Personality Disord.	5(8)	13(21)	7(11)	7(11)	13(21)	6(10)	12(19)
5. Anxiety State	7(11)	8(13)	5(8)	8(13)	<i>15(24)</i>	7(11)	13(21)
6. Reactive Depress.	11(17)	5(8)	2(3)	3(5)	9(14)	20(32)	13(21)
7. Endogenous Depress.	9(14)	3(5)	8(13)	2(3)	10(16)	9(14)	22(35)
Total predicted	95	61	53	28	71	56	77

Tables 5 and 6 give the numbers and percentages of members of each of our seven groups who have been correctly and incorrectly classified by the discriminant function. Thirty-one percent are correctly classified, as compared with a chance value of 14%; this figure applies to males and females equally. The groups clearly differ from one other with respect to ease of correct classification; normals are easiest, i.e., have the smallest number of misclassifications, while other groups have much larger numbers of misclassifications. However, there are considerable differences between the male and female samples; personality disorders are much easier to classify correctly in women than in men, reactive depression in men than in women. The tables also show which groups are most difficult to differentiate, i.e., which groups have the largest number of members mistaken for each other. Male personality disorders are more frequently classified as criminals or anxiety states than as personality disorders; female reactive depressions are more frequently classified as anxiety states than

TABLE 6
NUMBERS (AND PERCENTAGES) OF MEMBERS OF 7 GROUPS CLASSIFIED CORRECTLY
(ITALIC) AND INCORRECTLY BY DISCRIMINANT FUNCTION: FEMALES

Actual Groups	Discriminant Function Classification						
	1	2	3	4	5	6	7
1. Normals	42(67)	2(3)	2(3)	6(10)	6(10)	2(3)	3(5)
2. Criminals	10(16)	20(32)	6(10)	11(17)	5(8)	2(3)	9(14)
3. Schizophrenics	8(13)	8(13)	10(16)	11(17)	5(8)	3(5)	18(29)
4. Personality Disord.	11(17)	9(14)	2(3)	24(38)	6(10)	8(13)	3(5)
5. Anxiety State	8(13)	1(2)	4(6)	11(17)	8(29)	10(16)	11(17)
6. Reactive Depress.	2(3)	5(8)	1(2)	14(22)	22(35)	7(11)	12(19)
7. Endogenous Depress.	8(13)	8(13)	8(13)	5(8)	7(11)	11(17)	16(25)
Total predicted	89	53	33	82	69	43	72

as reactive depressions. In this classification procedure the formula groups each person in accordance with his distance from the seven group means in 4-dimensional space; this means that more people may be classified in some groups than in others. The last line in Tables 5 and 6 illustrates this; more people are classified as normal (95 and 89 respectively), and fewer as personality disorders (male) or schizophrenic (female) (28 and 33 respectively) than the correct number of 63.

TABLE 7
PERCENTAGES OF SUBJECTS CORRECTLY CLASSIFIED AND KAPPA VALUES INDICATING
INTRAClass CORRELATION OF QUESTIONNAIRE SCORES WITH
PSYCHIATRIC CLASSIFICATIONS

Group	Males		Females	
	% Correctly Classified	Kappa Coefficient	% Correctly Classified	Kappa Coefficient
Normals	60	.42	67	.46
Criminals	21	.16	37	.25
Schizophrenics	33	.27	16	.12
Personality Disord.	11	.07	38	.20
Anxiety State	24	.09	29	.15
Reactive Depress.	32	.23	11	.02
Endogenous Depress.	35	.19	25	.10

Another way of expressing the observed relations between personality and diagnosis is by way of the kappa coefficient. This coefficient, which is in effect an intraclass correlation, comes to .20 for both males and females over-all; these values should be compared with those in Table 2 for inter-psychiatrist reliabilities. Kappa coefficients were also calculated for each group; they are, of course, roughly proportional to the percentage of accurately classified values for the groups, and are given in Table 7. As usual, the values indicate that it is easier to distinguish between normals and psychiatric casualties than between different types of psychiatric casualties.

DISCUSSION

There are two ways of looking at the results of our investigation. If our purpose had been to produce a questionnaire which could be useful in diagnosing psychiatric patients, then clearly the large percentage of misclassifications found would have shown the endeavour to have been a failure. Indeed, our knowledge of the inability of the MMPI, expressly created for this purpose, and employing a much larger number of questions directly enquiring after "signs and symptoms" of mental disorder, to sort out patients into different nosological categories (Goldberg, 1965), would have indicated that any such attempt would fail with a much shorter inventory only using questions enquiring into temperament and character, rather than symptoms. However, our purpose was of course quite different. We see no purpose in replicating, unreliably and not very successfully, diagnoses which themselves are unreliable and lacking in theoretical justification. It was not our intention to use psychiatric categories as a *criterion* against which to evaluate our scales; there appears to be no good *a priori* reason to accept these categories as being of any fundamental scientific value, and many reasons for believing that the very notion of qualitatively different categories is faulty and should be substituted by some form of a dimensional system (Eysenck, 1970a). Our effort has been to build up such a dimensional system and to demonstrate that such a system has validity both in the normal and in the psychiatrically abnormal realm.

This leads us to the second way of looking at our results. It is of interest to see just where various groups, diagnosed psychiatrically according to prevailing custom, are situated in our dimensional system of personality description, and how they are related to each other with respect to the personality traits measured by our inventory. The very terms used to characterize some of our scales (neuroticism, psychoticism) suggest certain hypotheses, e.g., that abnormal groups (psychotics, neurotics) should have high Psychoticism and Neuroticism scores and be separated from normal people who should have rather lower scores. Similarly, neurotic groups should be differentiated from psychotic groups. We would expect some congruence between psychiatric diagnosis and questionnaire scores, on the assumption that in part at least psychiatric nosology is collinear with reality as expressed in self-ratings. Figs. 1 and 2 show that our expectations are in fact fulfilled; the various groups locate themselves in the two-dimensional space very much as predicted. Expectation is also satisfied in the third dimension, which seems to be related to antisocial conduct. From this point of view, then, we have been successful in showing that there is a considerable degree of collinearity between the dimensional personality model and the psychiatric "disease" model.

Psychiatric diagnostic categories may best be looked upon as points in the multidimensional space generated by the personality traits of the patients, and the "normal" part of the population; the position of patients in this multidimensional

mensional space does not always (or even usually) coincide with these "diagnosis" points. Only "classical," pure examples of schizophrenia, reactive depression, anxiety state, etc. are to be found coincident with these points, and such cases are notoriously rare. Most patients can be represented in the multi-dimensional space at points removed some distance away from all diagnostic points but usually closer to one than others. In these cases, diagnosis becomes more and more doubtful the further away the patient is from any particular diagnostic point; in cases where he is equidistant from two or more such points, diagnosis becomes a toss-up. Such a picture seems more realistic than the artificial one of a number of nosological categories to one of which the patient has to be assigned, Procrustes-like. If it is in fact more realistic, then one may wonder why the dimensional view is not more widely adopted and, indeed, substituted for the categorical diagnostic one. Perhaps further research can clarify and simplify the dimensional system sufficiently, and lead to better measuring instruments also, so that the dimensional way of looking at classification will become more widely accepted. Any attempt to do this would, of course, have to go beyond questionnaires using personality items only, and add not only "sign and symptom" items, but also perhaps objective laboratory tests of psychological and physiological functioning. For the present, we can only conclude that personality dimensions are related, though perhaps not very strongly, to psychiatric diagnostic categories; when corrected for attenuation due to diagnostic unreliability and scale unreliability, the relationship becomes strong and acceptable.

If there is indeed some such relationship between personality, as measured by the Eysenck Personality Questionnaire, on the one hand, and "signs and symptoms," on the other, this relationship ought also to extend to severity of symptoms; in other words, those psychotics having the most severe symptoms should also have the highest Psychoticism scores. That this is so has been shown in studies by Verma and Eysenck (1973), and by McPherson, *et al.* (1974). [Several unpublished studies giving similar results are referred to by Eysenck and Eysenck (1976b).] The former study used ratings and objective test scores as its criterion of severity of illness; the latter used psychiatric estimates of four signs indicative of "non-integrated psychosis" (affective flattening, incongruous affect, negative thought disorder, and positive thought disorder), four of which produced statistically significant differences. In addition, there were significant differences in Psychoticism scores between psychotic patients with non-integrated delusions, integrated delusions, and no delusions ($p < .01$). We may conclude that higher Psychoticism scores go with more severe psychosis. McPherson, *et al.* failed to find significant differences in Psychoticism between groups of psychotics, neurotics and normals, although mean values were in the predicted direction. They failed to correct for the highly elevated Lie scores of their psychotics which were well over twice the size of the normal Lie scores; the high correlation between Lie and Psychoticism in their study, which was $-.33$,

should have warned them that the uncorrected use of raw Psychoticism values was contraindicated.

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