

## **The Measurement of Psychoticism: a Study of Factor Stability and Reliability**

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An investigation is reported into the measurement of the personality dimension P (psychoticism), which has emerged from factorial and other empirical studies as a third dimension additional to E (extraversion) and N (neuroticism.) Large groups of normal men and women, and of male and female students, were administered an inventory containing 106 potential P, E and N items, and the results analysed in detail. It emerges that P, E and N factors are found, as predicted, in the factor analysis of the data; that reliable scales can be constructed from the available items for P; and that the factors found are relatively invariant from one sex to the other, and from one sample to others. It appears that N and P are not entirely independent, but correlate to a moderate extent. It is suggested that P might be a personality variable of interest in connexion with many experimental investigations; that it might determine differential performance, either alone or in conjunction with E and/or N; and that experimental studies of P in normal subjects might throw much needed light on the nature and meaning of psychoticism as a personality variable.

In a paper entitled 'A dimensional system of psychodiagnostics' one of us has outlined a descriptive analysis of normal and abnormal personality differences in terms of three factors or dimensions (Eysenck, 1968). Two of these factors (E for extraversion-introversion, N for neuroticism-stability) have received much empirical research (Eysenck & Eysenck, 1968*a*) and can be measured reliably and validly by means of questionnaires (Eysenck & Eysenck, 1965); the third factor (P for psychoticism) has been rather neglected in the past. Briefly, the name of this factor is meant to suggest the hypothesis 'that there exists a set of correlated behaviour variables indicative of predisposition to psychotic breakdown, demonstrable as a continuous variable in the normal population, and independent of E and N' (Eysenck & Eysenck, 1968*b*). Several studies using discriminant function analysis (Lubin, 1951; Eysenck, 1952*a*, 1955; S. B. G. Eysenck, 1956; Devadasan, 1964), factor analysis (Trouton & Maxwell, 1956; Eysenck, 1960), and criterion analysis (Eysenck, 1952*b*) have given support to parts of this general hypothesis, but not until recently has the problem of measurement by inventory been tackled.

Eysenck & Eysenck (1968*b*) constructed a 106 item questionnaire which contained items known to have high loadings on E and N, as well as items thought to be likely (*a*) to be relatively independent of E and N, and (*b*) to measure different aspects of P. The inventory was given to 821 women and 512 men, constituting a reasonably random sample of the population, and the intercorrelations between the items were factor-analysed for men and women separately. In this sample (to be referred to as RS—for random sample) three factors clearly identifiable as P, E and N appeared, and high factor similarity indices indicated that the male and female

samples gave rise to very similar factors. N and P were not found to be quite independent; a correlation of approximately 0.3 was discovered between the factors.

METHOD

The present study presents a repetition of the previous one, and attempts to construct a set of 20 items for the measurement of P: it also attempts to evaluate the reliability of this

Table 1. Description of male and female normal samples

(a) Male normal sample		(b) Female normal sample	
<i>n</i>	Type of work	<i>n</i>	Type of work
26	Ford apprentices, Printing apprentices	9	Machinists
7	Shop assistants	6	Shop assistants
8	Factory workers	2	Laundry workers
1	Receptionist	6	Domestics
1	Labourer	9	Factory workers
7	Services (lower ranks)	5	Receptionists
38	Firemen	12	Printing apprentices
4	Printers	4	Printers
7	Drivers	2	Weavers
4	Builders	7	Supervisors
24	Fitters and mechanics	3	Leather workers
18	Butchers and bakers	84	Housewives
13	Foremen and supervisors	2	Scientists
12	Airways employees	1	Director
6	Skilled labourers	1	Doctor
24	Chemical workers	47	Teachers
86	Gas company fitters	4	Civil servants
4	Accountants	7	Designers and artists
16	Scientists	3	Buyers
5	Directors	5	Lecturers
3	Doctors	3	Journalists
2	Sociologists	5	Manageresses
34	Teachers	1	Pharmacist
17	Civil servants	1	Advertiser
11	Designers and artists	14	Student social workers
5	Solicitors	1	Farmer
1	Buyer	7	Models
10	Lecturers	55	Secretaries
12	Managers	28	Clerks
3	Insurance	1	Saleswoman
1	Services (higher rank)	1	Assistant manageress
5	Salesmen	1	Telephonist
2	Assistant executives	8	Data processors
4	Data processors	29	Nurses
22	Nurses	4	Caterers
14	Welfare officers	21	Welfare officers
4	Hairdressers	10	Hairdressers
1	Laboratory assistant	5	Laboratory assistants
9	Technicians	76	Occupational therapists
4	Librarians	10	Librarians
1	Farmer		
21	Athletes		
1	Student caterer		
2	Student nurses		

brief questionnaire. The population tested consisted of 500 men and 500 women; these were contacted through employers, unions, personal approaches and in various other ways. Table 1*a* gives a survey by listing of employment of the male sample, and Table 1*b* gives a similar one for the female sample. No claims are made that these represent random samples, but they certainly range more widely than is customary in questionnaire research, which has concentrated almost exclusively on students. Students have been explicitly excluded from this sample, which will be designated NS (normal sample); two separate student samples were also tested, made up of 700 male and 700 female students. Tables 2*a* and 2*b* list the types of studies reported by these younger groups.

Table 2. *Description of male and female student samples*

(a) Male student sample		(b) Female student sample	
Social work	4	Social work	11
Athletics	179	Teaching	89
Teaching	59	General	37
General	65	Physiotherapy	84
Engineering	39	Secretarial	74
Sociology, etc.	3	Physics	3
Building	7	Sociology, etc.	3
Languages	3	Languages	2
Medical	12	Catering	12
Arts	119	Medicine	7
Printing	202	Data processing	4
Physics	8	Nursing	275
		Arts	99

Product-moment correlations were run for the male and female NS groups separately for the 106 questions included in the questionnaire; this list of questions has been given in full in Eysenck & Eysenck (1968*b*) and will not be reprinted here. In the tables given below, those items having high loadings on factors of interest will be given in full to facilitate interpretation. The matrices of correlations were then submitted to a principal components form of factor analysis, three factors were extracted, and rotated into oblique simple structure by means of Promax (Hendrickson & White, 1964). This solution will be called the 'three-factor solution'. As an alternative, 20 factors were extracted by principal components and rotated into simple structure by Promax; higher order factors, 7 for males and 6 for females, were then extracted, until at the third-order level the three factors of E, N and P appeared. This will be called the 'third-order solution'. In our previous paper we showed that the two solutions were sufficiently similar to give rise to high indices of factor similarity, although of course individual loadings may show dissimilarities. We shall concentrate on the three-factor solution as, for reasons given in the previous article, we consider it to be marginally superior on theoretical grounds.

## RESULTS

In order to compare the results of this analysis with those of the previous one, indices of factor similarity were calculated (Eysenck & Eysenck, 1968*a*). For all three factors in our present sample males and females show remarkable similarity: indices are 0.985 for N, 0.996 for E and 0.991 for P. When we compare the RS with the NS groups, results again show considerable similarities; the figures for the indices of factor similarity are given in Table 3. These figures indicate clearly that for both male and female samples the present groups give rise to factors which are very similar to those extracted from the RS in the previous analysis. It seems, then, that replication is possible in the extraction and definition of P, as well as of N and E, and to this extent our study suggests confirmation of our hypothesis.

Upon consideration of the results of this and the previous analysis, 20 items were selected to represent the P factor, 20 items to represent the N factor, and 20 items to represent the E factor. Considerations present in our minds when selecting these items were as follows:

Table 3. *Indices of factor comparisons for male and female groups in random sample and in normal sample*

	RS <sub>M</sub> v. NS <sub>M</sub>	RS <sub>F</sub> v. NS <sub>F</sub>	RS <sub>M</sub> v. NS <sub>F</sub>	RS <sub>F</sub> v. NS <sub>M</sub>
N	0.977	0.997	0.935	0.980
E	0.999	0.992	0.994	0.984
P	0.946	0.992	0.894	1.000

(1) high loadings on the factor in question; (2) consistency of loadings over different samples and sexes; (3) low loadings on factors not being measured; (4) consistency of loading from three-factor solution to third-order solution; (5) known previous loadings in earlier analyses on different factors (cf. discussion in Eysenck & Eysenck, 1968b). Table 4 shows the 20 items selected to measure factor P, together with the numbers of these items in the original 106 item questionnaire (to facilitate cross-checking with the previous article); factor loadings for the three-factor solution on N, E and P, males and females separately; and factor loadings, P only, for the third-order solution. Consideration of the nature and wording of these 20 questions will clarify the notion of 'psychoticism' better than any verbal discussion could do at this stage. It should be noted, of course, that up to this stage the term 'psychoticism' implies an aspiration rather than a demonstrated relevance to psychotic behaviour; we will continue to use it because in ongoing work we have in fact found that the items of this scale differentiate at a high level of significance between psychotics, on the one hand, and normals and neurotics on the other. Until these data are published, however, the more neutral appellation P might be preferred.

Tables 5 and 6 give the 20 items respectively relevant to the N and E factors. There is little of special interest here, except perhaps to note the low P factor loadings of the items in both sets. This is of course a vital and indeed indispensable part of our theory, and its verification is of importance.

The factors as extracted are not of course necessarily orthogonal; the supreme virtue of the Promax type of rotation procedure is that it allows the factors to assume their natural positions relative to each other, rather than be forced into orthogonality, as would be the case with Varimax. Table 7 gives the correlations between the factors for this sample, as well as those for the RS; it will be seen that again the P v. N correlations are the only important ones, and that they are somewhat higher than in the RS group. It is not known why this should be so; possibly the absence of the young student groups from the NS groups may be responsible, although it is not clear why this should be so.

Reliabilities were estimated for the P scale by means of the generalized form of the Kuder-Richardson Formula 20 (Hoyt, 1941). These are given in Table 8, for the RS, the NS, and the student groups. Considering the shortness of the scale, these reliabilities, which centre around 0.75, are distinctly encouraging; they suggest that there is indeed some solid common core to these 20 items. It may be mentioned in this connexion that in the case of neurotic and psychotic subjects reliabilities are as high and higher; for 310 psychotics our provisional figure is 0.78, while for 217 neurotics it is 0.76. These are of course consistency reliabilities, not repeat ones, but in our experience the latter tend to run at roughly the same level as the former for personality inventories of this kind. In any case, the former are perhaps more crucial for the theory underlying the construction of the P scale.

## DISCUSSION

The results of this experiment need little discussion. It is clear that items can be found which (a) are theoretically relevant to the hypothesis of a 'psychoticism' factor, (b) cohere together factorially in a consistent manner, (c) show relative independence of N and E, (d) measure this factor P reliably in a normal population, (e) give similar results for males and females, and (f) produce repeatable patterns when different population samples are tested. All this is necessary but not sufficient to support our hypothesis; further work is clearly needed, particularly with respect

Table 4. Loadings of 20 P items on N, E and P

	Three-factor solution						Third-order solution	
	N		E		P		M	F
	M	F	M	F	M	F	M	F
4. Do most things taste the same to you?	-0.05	-0.04	-0.07	-0.05	0.37	0.19	0.18	0.04
7. Do you enjoy hurting people you love?	0.17	0.27	0.01	0.03	0.28	0.03	0.09	0.04
10. Are you generally in good health?	0.03	0.08	0.12	0.12	-0.42	-0.47	-0.27	-0.28
13. Was your mother a good woman?	0.03	-0.16	0.10	0.03	-0.37	-0.02	-0.25	-0.02
16. Have you had more trouble than most?	0.16	0.12	0.05	0.07	0.30	0.29	0.06	0.21
19. Have you had an awful lot of bad luck?	0.21	0.01	0.15	0.07	0.36	0.49	0.16	0.37
21. Do you worry a lot about catching diseases?	0.10	-0.07	0.10	0.06	0.39	0.35	0.16	0.21
23. Did you love your mother?	-0.02	-0.24	0.21	0.08	-0.25	-0.00	-0.27	-0.05
27. Are there several people who keep trying to avoid you?	-0.06	0.08	0.06	0.03	0.54	0.35	0.40	0.24
29. Is there someone who is responsible for most of your troubles?	0.28	0.09	0.06	-0.04	0.19	0.44	-0.05	0.40
30. Do you let your dreams warn or guide you?	-0.08	0.18	0.02	-0.00	0.54	0.24	0.17	0.32
32. Do people generally seem to take offence easily?	0.13	-0.02	0.09	-0.03	0.40	0.44	0.18	0.40
33. Would you take drugs which may have strange or dangerous effects?	0.12	0.30	-0.03	0.02	0.19	-0.07	0.21	-0.05
40. Do you have enemies who wish to harm you?	0.11	-0.12	0.07	0.01	0.46	0.50	0.32	0.53
44. Do your friendships break up easily without it being your fault?	0.11	0.03	-0.08	0.05	0.39	0.44	0.15	0.26
47. Was your father a good man?	-0.10	-0.09	0.06	0.01	-0.31	-0.04	-0.18	-0.07
55. Do people mean to say and do things to annoy you?	0.21	0.11	0.08	0.14	0.38	0.40	0.27	0.27
58. Would you have been more successful if people had not put difficulties in your way?	0.18	-0.01	0.03	0.09	0.26	0.48	0.10	0.56
62. When you are in a crowded place like a bus do you worry about dangers of infection?	-0.09	-0.06	-0.00	0.03	0.55	0.20	0.32	0.03
99. Would it upset you a lot to see a child or animal suffer?	0.01	0.05	-0.00	0.11	-0.30	0.07	-0.25	0.02

Table 5. Loadings of 20 N items on N, E and P

	Three-factor solution						Third-order solution	
	N		E		P		N	
	M	F	M	F	M	F	M	F
2. Do you find it hard to get going some mornings?	0.33	0.25	0.26	-0.11	0.00	0.07	0.12	0.15
3. Have you ever been afraid of losing your mind?	0.30	0.34	0.00	-0.06	0.21	0.17	0.39	0.26
6. Can you usually make up your mind easily?	-0.23	-0.31	0.19	0.19	0.05	0.06	0.10	-0.46
11. Do you do much day-dreaming?	0.51	0.54	-0.06	-0.04	-0.10	-0.07	0.27	0.38
22. Do you find it hard to keep your mind on what you are doing?	0.41	0.52	-0.12	-0.04	-0.02	-0.04	0.17	0.52
24. Do you often feel fed up?	0.61	0.41	-0.03	-0.13	-0.08	0.29	0.24	0.41
25. Do you get depressed in the mornings?	0.49	0.24	0.14	-0.10	0.12	0.25	0.29	0.29
42. Are you ever 'off your food'?	0.24	0.16	-0.01	0.05	0.07	0.26	0.02	0.15
46. Does your mood often go up and down?	0.65	0.46	-0.02	-0.06	-0.11	0.16	0.35	0.40
54. Do you sometimes feel you don't care what happens to you?	0.54	0.32	0.02	-0.04	-0.05	0.26	0.56	0.26
57. Do you ever feel 'just miserable' for no good reason?	0.51	0.32	-0.10	-0.07	-0.13	0.09	0.14	0.35
61. Are you often troubled about feelings of guilt?	0.37	0.35	-0.02	-0.03	0.11	0.14	0.16	0.30
64. Do you feel self pity now and again?	0.54	0.40	0.03	-0.15	-0.15	0.07	0.27	0.31
71. Do you worry a lot about your looks?	0.42	0.42	0.17	0.21	0.07	0.10	0.21	0.49
76. Do you often feel very weak all over?	0.41	0.10	-0.01	0.03	0.16	0.47	0.12	0.12
78. Do you sometimes feel uneasy indoors?	0.23	0.35	0.18	0.05	0.22	0.13	0.22	0.34
82. Have you always thought of yourself as different to others?	0.36	0.41	-0.16	-0.07	-0.08	-0.01	0.55	0.31
88. Have you ever wished you were dead?	0.40	0.44	0.00	-0.06	0.02	0.10	0.45	0.39
91. Do you usually work by fits and starts?	0.45	0.53	-0.14	-0.05	-0.13	-0.15	0.07	0.41
96. Do things sometimes seem as if they were not real?	0.47	0.49	0.20	0.11	0.06	0.03	0.40	0.43

Table 6. *Loadings of 20 E items on N, E and P*

	Three-factor solution									Third-order solution	
	N			E			P			E	
	M	F	M	M	F	M	M	F	M	F	
1. Are you more distant and reserved than most people?	0.19	0.08	-0.49	-0.49	-0.49	-0.01	-0.01	0.09	-0.26	-0.38	
5. Can you get a party going?	0.03	-0.23	0.57	0.47	0.47	0.04	0.04	0.14	0.51	0.37	
17. Would you do almost anything for a dare?	0.14	0.25	0.30	0.35	0.35	0.14	0.14	0.15	0.32	0.32	
26. Would you enjoy hunting, fishing and shooting?	0.13	0.12	0.38	0.22	0.22	-0.06	-0.06	-0.05	0.29	0.16	
31. Do you nearly always have a 'ready answer' when people talk to you?	0.00	-0.19	0.34	0.35	0.35	0.01	0.01	0.19	0.35	0.20	
37. Are you rather lively?	-0.21	-0.06	0.52	0.56	0.56	0.06	0.06	0.06	0.54	0.40	
48. Do you like plenty of bustle and excitement around you?	0.11	-0.04	0.55	0.57	0.57	0.01	0.01	0.06	0.46	0.54	
51. Do you like mixing with people?	0.04	-0.06	0.61	0.53	0.53	-0.12	-0.12	-0.01	0.40	0.41	
60. Would you call yourself happy-go-lucky?	-0.04	-0.03	0.45	0.47	0.47	0.14	0.14	0.10	0.50	0.46	
63. Do you find it hard to show your feelings?	0.23	0.08	-0.34	-0.34	-0.34	-0.12	-0.12	-0.01	-0.13	-0.22	
65. Can you usually let yourself go and enjoy yourself a lot at a gay party?	-0.02	0.00	0.61	0.56	0.56	0.01	0.01	0.00	0.47	0.51	
69. Do you like people around you?	0.08	-0.01	0.49	0.43	0.43	-0.29	-0.29	-0.05	0.34	0.37	
75. Do you like practical jokes?	0.12	0.08	0.43	0.33	0.33	0.03	0.03	0.08	0.39	0.34	
79. Do you normally prefer to be alone?	0.19	0.07	-0.36	-0.36	-0.36	0.18	0.18	0.08	-0.23	-0.34	
84. Do you like going out a lot?	0.04	0.12	0.47	0.44	0.44	-0.06	-0.06	-0.23	0.40	0.46	
89. Do you make friends easily with members of your own sex?	-0.20	-0.20	0.49	0.33	0.33	-0.00	-0.00	-0.03	0.44	0.26	
94. Would you call yourself talkative?	0.04	0.05	0.40	0.46	0.46	0.11	0.11	0.01	0.18	0.30	
97. When you were a child did you often like a rough and tumble game?	-0.08	0.13	0.39	0.22	0.22	-0.05	-0.05	-0.08	0.39	0.19	
100. Do you like telling jokes or funny stories to your friends?	-0.04	-0.00	0.46	0.43	0.43	0.01	0.01	0.09	0.39	0.34	
103. When you make new friends do you usually make the first move?	-0.09	-0.07	0.32	0.26	0.26	0.11	0.11	0.04	0.20	0.09	

Table 7. Correlations among N, E and P factors

	RS		NS	
	M	F	M	F
N v. E	-0.14	0.15	-0.18	-0.03
N v. P	0.30	0.34	0.45	0.40
E v. P	-0.13	-0.05	-0.17	-0.04
n	512	821	500	500

Table 8. Reliability of P scale for various groups tested

	Reliability
NS, males	0.81
NS, females	0.70
RS, males	0.77
RS, females	0.72
Students, males	0.66
Students, females	0.76

to the answer patterns of abnormal (psychotic and neurotic) groups. However, as far as they go the data reported here are in line with our hypothesis, and support the notion of a psychoticism factor as one of the major dimensions of personality.

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