

## THE ORTHOGONALITY OF PSYCHOTICISM AND NEUROTICISM: A FACTORIAL STUDY

HANS J. EYSENCK AND SYBIL B. G. EYSENCK<sup>1</sup>

*Institute of Psychiatry, Denmark Hill*

*Summary.*—Questionnaire scales for the measurement of psychoticism, neuroticism, extraversion and dissimulation ("Lie scale") were administered to 216 boys and 224 girls 11 and 12 yr. old; all 111 items of the questionnaire were intercorrelated and factor analyzed separately for the two sexes. Four main factors emerged, as expected, with the 3 personality factors (P, E, and N) almost entirely independent of each other. Scales of 20 items were made up to measure each of these factors, as well as L, and the scores on these scales were again largely independent of each other, with the exception of the L scale. The interpretation of these results is discussed.

Over a number of years, we have been engaged in developing a dimensional system of personality description in which the personality factors of E (extraversion), N (neuroticism) and P (psychoticism) are fundamental (Eysenck, 1970; Eysenck & Eysenck, 1969). It is only in recent years that we have concerned ourselves with the possibility of measuring the P dimension in normal persons through the use of questionnaires, and a number of factorial analyses of promising items have been carried out; only a small number of these have been published, some dealing with adults (S. Eysenck & H. Eysenck, 1968; H. Eysenck & S. Eysenck, 1968), others with children (S. Eysenck & H. Eysenck, 1969; H. Eysenck & S. Eysenck, 1970). In these, as well as in some of our unpublished studies, the correlations between the factors tended to vary considerably, depending on the actual items included in the factor analysis, or scored to make up the scales; thus P might or might not correlate positively with E, and might or might not correlate positively with N. It was thought that as selection of items improved, so these correlations might decrease; it was also thought that dissimulation, as measured on the L scale (Eysenck & Eysenck, 1964) might play a part—if N and P are uncorrelated, but if Ss with high L scores dissimulate and pretend to show less neuroticism and psychoticism, then N and P have a positive correlation which might be removed by partialling out L.

In the present study, 216 11- and 12-yr.-old boys and 224 girls filled in an 111-item questionnaire containing items previously shown to be good measures of these 4 factors; the items were intercorrelated (for each sex separately) by product-moment correlation and factor analyzed by principal components. The first four factors were then rotated through Promax into oblique simple structure; the interpretation of the factors as P, E, N, and L was quite clearcut in terms of predictions made from previous studies. Of major interest here are the intercorrelations between the factors; these are shown in Table 1. Also shown in Table 1 are the intercorrelations between scale scores; these scales were made up by selecting 20 items from each factor on the basis of high loadings on that factor alone. The reliabilities of these 20-item scales are .71 (P), .73 (E), .81 (N), and .80 (L) for the boys, and .71 (P), .70 (E), .82 (N), and .84 (L) for the girls, by K.R. 20 formula.

The factors seem to show reasonable independence, with PE and EN quite orthogonal for boys, and almost so for girls. PN shows a slight positive correlation for both sexes,

<sup>1</sup>We are indebted to the Maudsley and Bethlem Royal Hospitals Research Fund for the support of this investigation.

TABLE 1  
INTERCORRELATIONS OF FACTORS AND OF SCALE SCORES FOR PERSONALITY FACTORS

		PE	PN	PL	EN	EL	NL
Factors	Boys	.01	.06	-.26	-.00	-.05	-.11
	Girls	-.09	.19	-.11	-.16	-.21	-.22
Scale Scores	Boys	.02	.16	-.35	-.05	-.07	-.18
	Girls	-.00	.38	-.43	-.23	-.09	-.24

but both P and N are negatively correlated with L, as expected; when L is partialled out from the PN correlations these become .18 and .03. For the 20-item scale scores, the position is similar, except that such correlations as are shown by the factors are somewhat larger. Those for E are still satisfactory, except possibly that between E and N for the girls; PN correlations are quite noticeable for the girls, but not for the boys. Again, we can partial out L from the PN correlations; for the boys this now decreases to .00 and for the girls to .32, which is suggestive of some residual relationship. It remains possible that there are genuine sex differences in the relationship of these factors or, of course, the difference may be a statistical artifact; with so many relationships involved, such a possibility should not be disregarded. The scales are being administered to representative samples of school children of all ages, so that this point should soon be cleared up. In any case, of course, the relationships between factors are much more important theoretically than those between scores, as the latter are unduly influenced by somewhat arbitrary choices of items, and the former suggest almost complete orthogonality.

We conclude that three factors called by us P, E, and N can be measured in children of both sexes by means of questionnaire items, and that these are for all intents and purposes orthogonal particularly when the influence of dissimulation is removed. The possibility of doing this by the use of an L scale, such as that used in the present investigation, has been discussed in detail by Michaelis and Eysenck (1971), and the use of the indices suggested by them suggests that some dissimulation did in fact take place and can be removed through the use of partial correlation formulae.

#### REFERENCES

- EYSENCK, H. J. A dimensional system of psychodiagnostics. In A. R. Mahrer (Ed.), *New approaches to personality classification*. New York: Columbia Univer. Press, 1970. Pp. 169-207.
- EYSENCK, H. J., & EYSENCK, S. B. G. *Manual of the Eysenck Personality Inventory*. San Diego: Indust. & Educ. Testing Service, 1964.
- EYSENCK, H. J., & EYSENCK, S. B. G. A factorial study of psychoticism as a dimension of personality. *Multi. Behav. Res.*, 1968 (Special Issue), 15-31.
- EYSENCK, H. J., & EYSENCK, S. B. G. *Personality structure and measurement*. San Diego: R. R. Knapp, 1969.
- EYSENCK, H. J., & EYSENCK, S. B. G. Personality measurement in children: a dimensional approach. *J. spec. Educ.*, 1970, in press.
- EYSENCK, S. B. G., & EYSENCK, H. J. The measurement of psychoticism: a study of factor stability and reliability. *Brit. J. soc. clin. Psychol.*, 1968, 7, 286-294.
- EYSENCK, S. B. G., & EYSENCK, H. J. 'Psychoticism' in children: a new personality variable. *Res. in Educ.*, 1969, 1, 21-37.
- MICHAELIS, W., & EYSENCK, H. J. The determination of personality inventory factor patterns and intercorrelation by changes in real-life motivations. *J. gen. Psychol.*, 1971, in press.

*Accepted July 21, 1971.*