

## **COMPARISON OF SECOND-ORDER PERSONALITY STRUCTURES AT 6-8 YEARS WITH LATER PATTERNS**

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### **ABSTRACT**

The Early School Personality Questionnaire was administered to 630 children in grades 2 and 3. The primary scale scores were inter-correlated and the resulting matrix was factor analysed resulting in 4 second-order factors that were rotated to maximum simple structure. It was found that the second-order factors corresponded quite well with patterns that have previously been identified at older age levels; anxiety, cortertia and intelligence. The other factor was tentatively identified as exvia.

### **INTRODUCTION**

Relatively little is known about second-order personality structure at the early-school, 6-8 year level. It is a paradox of research that whereas developmental psychology recognizes that the child is father of the man, the technical difficulties of research with verbal tests with the young have resulted in the factor structure being firmly established for adults but only undependably explored toward infancy. Thus in Cattell's systematic survey (1973) of comparisons of the 16 PF, the HSPQ (High School Personality Questionnaire), the CPQ (Children's Personality Questionnaire), and the ESPQ (Early School Personality Questionnaire) the number of researches diminishes steeply toward the lower age.

One general theoretical conclusion from this work has been that, contrary to the a priori schools of personality theory, the number of primary factors does not seem to be substantially less at the lower than at the upper ages. Indeed, the recent study by Dreger and Cattell (1976), factoring at the pre-school (4-5 year) level, shows roughly 20 factors, which is on a par with the number in adults (Cattell, 1973). However, there are suggestive indications that the number of second-orders may be less, inasmuch as Cattell's survey (1973, p. 122) has instances of four secondaries at 8-12, and five at 12-18. But the nature of these factors is at present not well understood. Hence, the present research was undertaken with the aim of providing more information about second-order factors in the questionnaire responses of young children.

### **METHOD**

The ESPQ which contains 13 primary scales was administered to 630 second and third grade children (386 boys, 244 girls) in Ottawa, Canada. The ages ranged from 6 to 8 years with means of 7.8 (SD = .72) and 7.7 (sd = .73) years for males and females respectively.

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Form A of the ESPQ was administered following the instructions given in the test manual. They were scored by the usual key and prepared for correlation as raw scores.

Three factor analyses - for boys, for girls, and for boys and girls together - were carried out, though only the last is fully reported here. This is appropriate because it constitutes the biggest sample possible and is comparable with most other studies.

### RESULTS AND DISCUSSION

The initial principal components (on Pearson  $r$ 's) to decide the number of factors by the scree test yielded results as shown in Figure 1.

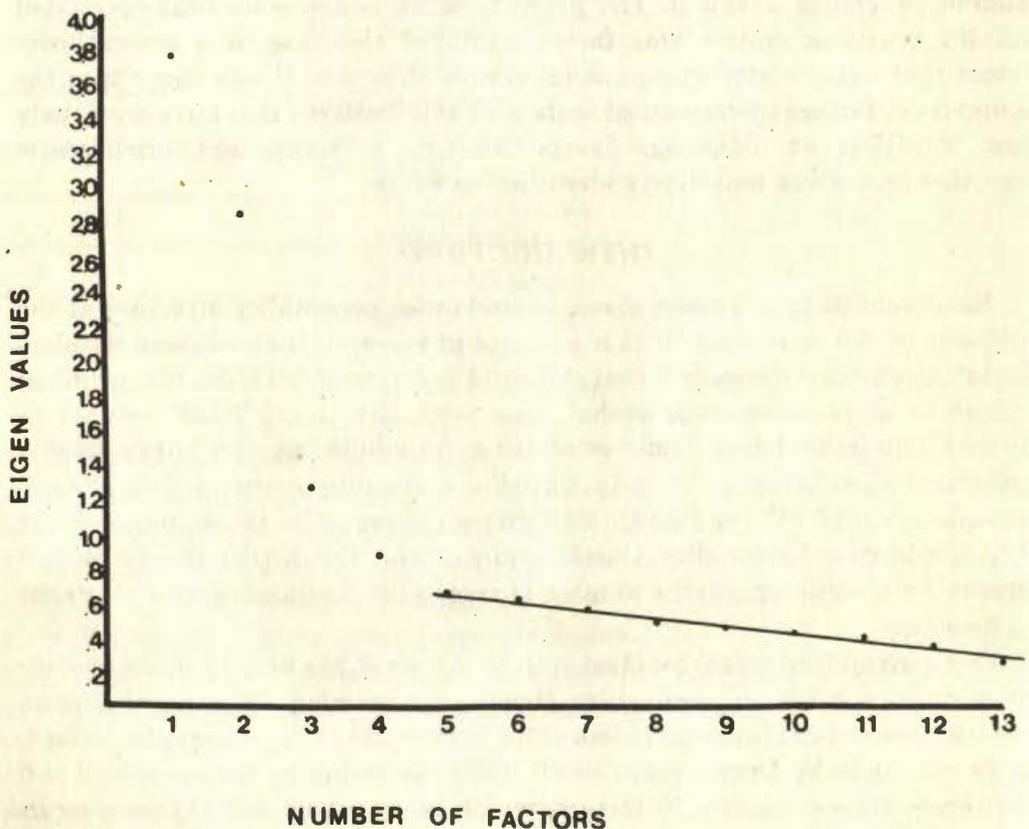


Figure 1 — Scree Test

With the girls, and therefore with the combined group, it is just possible to suspect that six rather than the more obvious four factors could be involved, but the boys clearly stop at four. As a conservative and main analysis we settled on four and then iterated the factor extraction to the communalities fitting that number. In rotation, both a Procrustes and a Promax were tried, but the important part of the rotation was a pursuit of simple structure by Rotoplot as shown in the eight successive steps in the History of the Hyperplane in Figure 2. This shows the irregularity of advance with potential hyperplane variables between the  $\pm .05$  and the  $\pm .10$  bands which is rather characteristic

of rotation with as few as 13 points. However the essential pattern of the factors altered little over the last four rotations, and it seemed hard to better the last three counts. By the Bargmann or Sine-Kameoka (Cattell, 1979) tables,

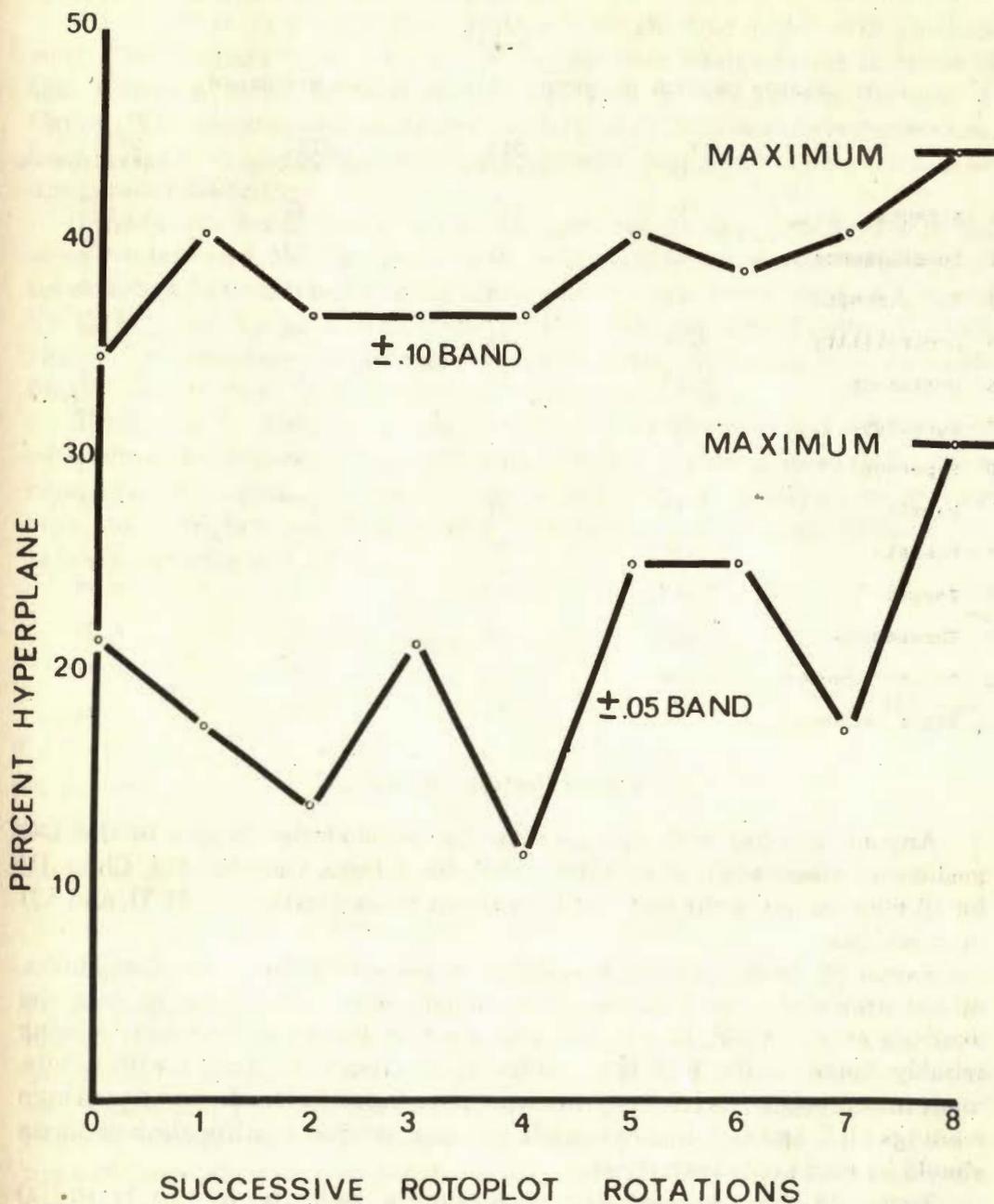


Figure 2  
History of Hyperplane

the fourth factor is significant on simple structure at the  $P < .01$  level, but the first three are not. With as few as 13 points we cannot take this inadequacy of simple structure too seriously and the main argument for the position of the first three is that it is the simplest that could be found. Nevertheless, if future

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researches should achieve better, the differences in their patterns would have to be given greater weight.

The present factor patterns are shown in Table 1. (Note that hyperplane counts are made in the reference vector system.)

Table 1  
Factor pattern of secondaries at simple structure

	Q <sub>I</sub> Exvia ?	Q <sub>II</sub> Anxiety	Q <sub>III</sub> Cortertia	Q <sub>VII</sub> Intelligence
A Affectia	.17	.01	-.81	.07
B Intelligence	.02	.01	-.02	.71
C Ego Strength	.60	-.37	-.24	.02
D Excitability	-.58	.51	.04	.32
E Dominance	-.03	-.31	1.06	.02
F Surgency	.58	.01	.12	-.27
G Superego	.09	-.57	.05	.10
H Parmia	.65	-.38	-.19	-.16
I Premsia	-.01	-.02	-.79	-.08
J Zeppia	-.13	.38	-.50	-.06
N Shrewdness	.18	.16	.53	-.03
O Guilt Proneness	-.64	.39	-.05	-.04
Q <sub>4</sub> Ergic Tension	.09	.84	-.01	.21

Factor Pattern Matrix

Anyone familiar with the patterns for second-order factors in the L-Q medium of observation (see Cattell, 1957, for L-Data, Cattell, 1973, Chap. IV for Q) may recognize the last 3 of the present factors indexed as II, II, and VII in those lists.

Factor #1 in the present investigation resembled factor Q<sub>I</sub> Exvia-invia, in the previously found second-order factors with older ages. In fact, the loadings on A, D(-), F, H, and J(-), plus the past history of Exvia-invia being reliably found in the first few factors in questionnaire studies with adults, made interpretation as Exvia-invia seem quite plausible. But the additional high loadings on C and O(-) are not typical, and suggest that identification as Exvia should be made only tentatively.

Factor #2 of the present study was found to be loaded by C(-), D, H(-), O and Q<sub>4</sub>, making it a strong candidate for identification as Q<sub>II</sub>, Anxiety. However, though it lacks nothing, it has intruders, namely, E(-), G(-), J, and possibly N, which, incidentally, deny it a significant simple structure. E(-) low dominance, could conceivably help generate anxiety at this age, while G(-) and J have appeared in this pattern at the 8-12 year (Cattell, 1973, p. 122). Consequently, we would consider it an acceptable hypothesis for further checking that in young children the anxiety factor is involved, beyond its usual pattern, in low superego strength, G-, and high zeppia, J. In normal adults the connection of high

super strength, G, with low anxiety has been firmly established (Gorsuch, 1965; Horn, 1961), but it takes the form of a negative correlation of the second-order  $Q_{II}$  with  $Q_{VIII}$ . Thus, a negative loading of superego on the anxiety factor  $Q_{II}$  is not anomalous or peculiar to this age.

Factor #3 of the present study appears to be the best match with previous work. The loadings on A(-), I(-) and N suggest that interpretation in terms of  $Q_{III}$ , Cortertia would be appropriate. The high school pattern (Burdsal & Cattell, 1974) and the previous 6-8 year study (Cattell, 1973) also have dominance, E, as here. The J(-) remains anomalous and seems more likely to be error than an age-peculiar associate.

Finally, the fourth factor is readily identified as  $Q_{VII}$ , intelligence at the second-order, and has, as mentioned, very significant simple structure. It nevertheless has moderate loadings on D and F(-) and trivial ones on H(-) and  $Q_4$ . D, F(-), and  $Q_4$  have been found in  $Q_{VII}$  with the ESPQ before (Cattell, 1973, p. 124), but since this latter used the same scales, the finding is questionable for the reasons given under scale-factor comparison below.

It remains to compare the correlations among these second-order factors with those hypothesized from previous studies. Table 2 essentially gives near-zero, nonsignificant correlations except for .44 between exvia and cortertia, -.29 between anxiety and intelligence and a large value of .64 between cortertia and anxiety.

Table 2

	Correlations among secondary traits			
	QI Exvia?	QII Anxiety	QIII Cortertia	QVII Intelligence
QII Anxiety-C	1.00			
QII Anxiety-O	.10	1.00		
QIII Cortertia	.44	.64	1.00	
QVII Intelligence	.13	-.29	-.03	1.00

#### Correlations Among Factors

Both the anxiety-intelligence correlation and the signs of the near-zeros, fit the magnitude and signs of previous results with adults, but the cortertia-anxiety relation is in complete disagreement with that of adults, which is usually substantially negative. Cortertia, with its meaning of high cortical alertness and obsessional qualities could be clinically regarded as in adults, an acquired mode of transformation of anxiety by defenses, which would account for a negative correlation with untransformed anxiety. Before entering on speculative theories that this accounts for a change of the relation from that in childhood, however, it would be well to await a check on the above large positive cortertia-anxiety correlation in childhood.

#### CONCLUSION

It is important to keep in mind that the correlations of the 13 primaries above are based on primary scales in the ESPQ itself. In a test such as the 16 PF in which by *progressive rectification* (Cattell, 1973), the scales have converged

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increasingly on the true factor positions, there proves not to be much difference (Cattell, Eber, & Tatsuoka, 1970) between the correlation matrix for the scales and those for the pure primary factors as found by simple structure rotation in the first-order factorization. But the distinction of the two bases for reaching second orders becomes important as we move down the age range to the earlier age scales, notably the CPQ and ESPQ.

The identification of the source traits in the factors found at earlier age levels in terms of the more widely replicated 16 PF factors at the adult level has had to proceed by successive "boundary studies," e.g., the 16 PF with the HSPQ, the HSPQ with the CPQ, and so on, in which the adjoining questionnaires are factored on the same boundary age group between the two ranges. The last phase in the construction of a set of questionnaires for developmental research on the same control, psychologically meaningful factors, is at present rough and incomplete. Until a study on a sufficient scale is done, there will be a degree of doubt about the identification of factors in the ESPQ and the PSPQ (*The Pre-School Personality Questionnaire*, Dreger & Cattell, 1976) being correct. And when the identification is proved correct there will still be doubt whether the scale for any factor X, as a test vector, lies along the axis for factor X, i.e., the factor "true" in the sense psychometrically defined by Cattell (1973, p. 380). All factor scales fall short of perfect factor trueness, i.e., in addition to specifics, which any scale must have, they also have *some* contamination with *common* (broad) factors other than X itself. Consequently, especially in newer scales, the second-order structure on the basis of scales will be inferior to, and in some degree distorted from, that found from the thoroughly rotated simple structure factors.

Until an analysis at the second order is done on the ESPQ factored (say with four subscales per factor and 52 variables in all) at the first order we cannot know whether the idiosyncracies in the present patterns are important in the theory of age changes of trait patterns or are in part due to changes in factor trueness of the scales used.

However, variations of ordinary degree in factor trueness would not be expected to reduce the number of second orders, so our first conclusion is that there are indications of absences of certain second-order factors found in adults — namely, Q<sub>IV</sub>, Q<sub>V</sub>, Q<sub>VI</sub>, and Q<sub>VIII</sub> — at the 6-8 level. As to the correctness of identification of the primaries at 6-8 years, the consistency of the high markers in the secondaries with those found at the adult level suggests there are not major misidentifications.

With the exceptions noted above, however, both the mutual consistency in identity of the primaries and the appearance of secondary patterns follows the meanings known at upper age levels. Two of the biggest three secondaries — Q<sub>II</sub>, Anxiety, and Q<sub>III</sub>, Cortertia — were clearly present, as was Q<sub>VII</sub>, Intelligence. There was also some evidence for Q<sub>I</sub>, Exvia: Possibly the other factors one would most expect, namely Q<sub>VI</sub>, Independence, and Q<sub>VIII</sub>, Control, were too small in variance to be picked up in this population.

FOOTNOTES

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