THIRD ORDER PERSONALITY STRUCTURE IN Q-DATA: EVIDENCE FROM ELEVEN EXPERIMENTS

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Eleven samples of subjects averaging 1010 in each, covering different countries (U.S.A., Germany, New Zealand, Venezuela and Brazil), classes and each sex, were measured on the 16 Personality Factor Questionnaire. Correlations among the scales were carried to second order factors of high mutual congruence and therefore identification in previous researches. Two studies, including seven extra primaries, yield 4 more secondaries than the 8 in the rest.

Third order analyses yield uniformly 5 factors (3 extra on the 12 base) which at final maximized simple structure show a high degree of congruence of pattern examined in 55 matrices, each 5 x 5 (plus). An averaging of factor loading patterns of matched factors across 5, 6 and finally 11 studies yields consistent patterns Q_α, Q_β, Q_γ, Q_δ, Q_ε etc. (to distinguish from the second order series QI, QII, etc.). The correlations among these tertiaries are set out and hypotheses about their nature are discussed in both general and specific terms.

Theory of Third Order Structures

The third stratum of factors, whether in the ability or personality structure domain, can be successfully explored only after substantial work at the first and second order levels. Like a climber of the highest mountains, the psychologist has to make a thorough preparation of "base camps". Even in the much travelled ability field, where foundations have long been laid (Guilford & Zimmerman, 1949-1955; Horn, 1968; Thurstone, 1938) we are only now beginning to get firm patterns for the higher order factors of fluid and crystallized intelligence, g_f and a_g, from the primaries (Cattell, 1971; Hakstian & Cattell, 1974). In the third order of the personality field there are only two pioneer studies in existence, that of Pawlik and Cattell (1964) in objective test data, and that of Cattell, Eber, and Tatsuoka (1970) in questionnaire data. Our contribution here is to questionnaire (Q-data) structure.

Some general observations on the theoretical and methodological states of third order factors are required before proceeding. By the concept of factors as influence, the third order factor is one that influences growth or individual differences in second order factors, such as anxiety, exvia, cortertia, etc. However, it has been pointed out (Cattell, 1966) that these more remote influences need no longer be psychological. They might be economic, historical, biological, etc., embedded in the structure of society and race, and responsible only for the "arrangement" of lower order, truly psychological traits. For example, as Fisher (1930) points out, social status is an influence which, mainly by

selection, brings about correlations among intelligence and various personality factors--correlations which later research (Cattell, 1942) shows can be analyzed into a single social status factor. Although in this case the higher influence on secondaries is sociological, other third order factors might be biological.

Emphasis on this broader theoretical position is necessary because of the popularity of a more narrow and statistical "hierarchical" view of factor structure which explicitly or implicitly views the higher strata factors as psychologically more important than the lower. If anything from a psychologist's standpoint, the reverse is true. The primary personality factors are more "real" in terms of development, learning theory, etc., than the secondaries and tertiaries, which may not be psychological in nature. Incidentally, they also give more complete and accurate predictions, since they hold the large part of the common variance (Cattell, 1973b). And in accepting strata we do not necessarily accept a hierarchy. Indeed, one must guard against the assumption that strata imply a hierarchy. For the latter could be an artifact in what is really a simple stratum or even a reticular model (Cattell, 1965). Nevertheless, exploring the third order structure is an important part of the total understanding of structure.

The Methodological Issues

When the conceptual position is explicit, as above, there will still arise methodological problems. Higher order factorings are based on correlations among lower order concepts, and these correlations can be either: (a) among primary scales or (b) among pure factors as reached by the simple structure position in the

primary factoring of variables. These two approaches should--and in the 16 P. F. primary personality factor domain consistently have--produced essentially the same end result. This agreement is encouraging, because approach (b) requires great skill and thouroughness in rotation if the cosines among factors are to be determined exactly enough to give a firm basis for second order analysis. Indeed, some psychologists have argued that these angles at simple structure are so poorly determined that even by the second order the structure is unstable and undependable. They are quite right if the simple structure is left to the mercies of push button analytical programs, but not if it is pursued long and patiently by Rotoplot to a demonstrably unimprovable plateau in hyperplane count. The agreement of the pattern of second order structure from primary scale and pure primary rotation correlations now demonstrated when--and only when--these cosine values rest on thouroughly pursued structure, supports the emphasis on the need for thorough pursuit by Rotoplot (Cattell & Nichols, 1972).

At the third order, at the time this research was started, it was not possible to use both approaches because a set of eight or nine scales for the known secondaries simply did not exist. Eysenck's (1970) scales are actually at the second order, but cover only exvia, anxiety and possible general psychosis, and, because of the short cut taken by omitting primaries are not as factor true as is necessary (Barton, 1973). Comrey's (1970) scales are largely second order, but are even less factor-true (Barton, 1973). Barton's new Core Trait State Kit of eight secondary scales (Barton & Cattell, 1974) was not ready. Consequently the climb had to take off from the pure factor correlations from simple structure

rotations. This is actually a superior basis, but in the future the cross check from actual second order scales should be made.

Meanwhile we actually have an abundance of second order resolutions--no fewer than eleven. They exist for independent populations and samples in the studies described below (Cattell & Nichols, 1972; Cattell, 1973a; Gorsuch & Cattell, 1967; Nesselroade, 1966). These have led to such precision of loading definition of the second orders that factor-true scales of measurable validity have recently been constructed for eight of them by Barton in the above mentioned Core Trait State Kit (CTS).

Sources of Experimental Data and the Factor Analytic Procedures Applied

Because the structure necessarily gets more loose with height, especial care in rotations at the second order is a precondition for getting anywhere in third order factoring. This precondition exists to our knowledge mainly in the work of Nichols and Gorsuch in eleven second order factorings, based on the same 16 primary factors, as reported elsewhere (Cattell & Nichols, 1972; Gorsuch & Cattell, 1967; Cattell, 1973). From these eleven studies the first nine (for a certain conformity of standards in methods) constitute the most substantial part of our evidence though relations to the tenth and eleventh researches are also worked out.

The tenth and eleventh studies differ in embracing a more extended basis of second orders made possible by extention of the primaries, by additional primaries, covering more remote parts of the personality sphere, from two directions: (1) the so-called seven missing factors" bringing the normal primaries up to the 23

(Cattell & Delhees, 1973; Cattell & DeVoogd, 1973; Marshall & Cattell, 1974) and (2) the 12 new primaries fround in the area of pathological behavior (Cattell, 1973c: Cattell & Sells, 1974). Since these overlap by 16 primaries with the nine studies mentioned it is possible effectively to bring a third order analysis from each of these new areas into relation with the core of nine studies in the 16 primaries.

The experimental bases of the studies thus involved are shown in Table 1.

Since the correlations among second order factors used here depend for their soundness on the goodness of simple structure reached, it is desirable that the hyperplane counts in the main Nichols studies (the other two are closely similar) be set out as is done in Table 2.

Especially in view of the fact that second order studies normally have a lower count than primaries (Cattell & Finkbeiner, 1973) these figures suggest that the plateaus reached by Nichols represent a high degree of simple structure. Incidentally, although the analyses at this third stratum thus rest on cosines (correlation $r_{12}=h_1 h_2 \cos \theta_{12}$) at maximum simple structure, the primary correlations for reaching the second order were all based on actual scale correlations, except for studies 10 and 11 which are pure factor correlations as here. (The difference should not affect the cosines but only the variances of the second orders.) The explanation of why Study 6 in the Nichols series was dropped is that it was not on an independent sample relative to his Study 7. As a "pure factor" factoring of the 1097 subjects used in the scale factoring on the same 1097 in No. 7 here, it agreed very

closely, so that either could have been used (see Cattell & Nichols, 1972).

The eleven correlation matrices from the above researches (preserved along with the eventual unrotated factor (V_o's) and transformation (L's) matrices at NAPS) were subjected to a principal components analysis and a scree test for number of factors was applied to the latent roots in every case as shown in Figure 1.

Among the nine studies from the normal 16 primaries and nine secondaries the majority--seven of them--converge clearly and immediately on five tertiaries, while one other indicated six and one, seven. Since these latter--one Brazil and one New Zealand, are aberrant from the other data from the same country in each case, indicating five, we have concluded it is not a specific population effect and have uniformly taken five tertiaries in all the studies. On the larger basis of primaries (23 normal and 28 with clinicals) it is perhaps slightly surprising that just the same number of secondaries, namely, 12, arises from the two somewhat different bases. From these 12 secondaries, eight tertiaries resulted in both cases (see Figure 1).

The procedure from this point was that adhered to in all of our analyses: (1) iteration of communalities to the factor number; (2) initial advance toward simple structure by an automatic (oblimax) rotation program; (3) completion of simple structure search by about a dozen overall Rotoplot shifts to a plateau unimprovable over least the last three shifts; (4) test for significance of simple structure, and (5) matching of patterns across studies by congruence, r_c, and/or salient variable similarity in-

dex, s.

The simple structure "history of hyperplane" plots are not reproduced for the nine small studies (which had in every case 10 overall shifts after oblimax) but Figure 2 shows the plots for the larger studies and the steady climb to a plateau which occurred in each case.

It will be recognized that these searches exhibit the satisfactory hallmarks of (a) an increasing re-distribution of variables from the broad (±15) poorly differentiated band typical of an analytic program toward maximization at the ±.05 width characteristic of a well rotated resolution, and (b) a plateau reached after six to eight shifts verified as a plateau by offering no essential improvableness over another four to six checking shifts. At these levels, moreover, all 11 of the researches have resolutions which reach at least a $P > .05$ level of significance. However, we shall not rest on simple structure significance but shall next ask to what extent invariance has been attained across the researches.

Collation and Matching of Results

Calculation of congruence can be made across all 11 studies if we confine ourselves to the first eight second orders in the comparison, but studies 10 and 11 can also be compared on a further three or four factor loadings. The comparison of all 11 studies across eight secondaries is possible because in identifying secondaries by matching we have always ultimately converged on the indexing system of QI being exvia, QII, anxiety, QIII, corteria, and so on through to QIX, though at this stage we have not attempted to identify and use the last of the replicated secondaries

Table 1

Experiments Constituting Foundations

of the Second and Third Stratum

Analyses

(a) On the first 16 Primaries

(i) Particulars of the Population Samples

Study No.	Reference Symbol	Country	Age	Sex	N	Education Level
1	U.S.A.M.	USA	mixed	men	1000	stratified
2	U.S.A.F.	USA	mixed	women	880	stratified
3	G.A.H.	Germany	student	mixed	1800	high (gymnasium)
4	G.A.L.	Germany	student	mixed	1100	low (elementary Ed ted)
5	Ven.	Venequela	mixed	mixed	300	stratified
6	NZLA	New Zealand	21-23	mixed	397	selective high school
7	NZEA	New Zealand	17-19	mixed	1097	selective high school
8	Br.M	Brazil	student	men	770	university
9	Br.f.	Brazil	student	mixed	2234	university

(ii) Nature of Scales Used

Study no.	Reference Symbol	Test Form	Edition (Revision)	Language
1	U.S.AM	16 P.F. Forms A&B	1967-68	English
2	USAF	16 P.F. Forms A&B	1967-68	English
3	G.H	16 P.F. Forms A&B	1961-62	German
4	G.L.	16 P.F. Forms A&B	1961-62	German
5	Ven	16 P.F. Form A	1961	Spanish
6	NZLA	16 P.F. Forms A&B	1961-62	English
7	NZEA	16 P.F. Forms A&B	1961-62	English
8	Br.M	16 P.F. Form A	1956	Portuguese
9	Br.MF.	16 P.F. Form A	1956	Portuguese

Testing time: typically 40 mins for each form and in fact 1 1/2 to 2 hrs. for the two forms.

(b) On Extended Personality Sphere.

(i) Particulars of Samples

Study no.	Reference Symbol	Country	Age	N	Education Level
10	U.S.S.M.F.	USA	19-23	240	university
11	U.S.C.N.	USA			mixed

Table 1, cont.

(ii) Nature of Scales Used

Study no.	Reference Symbol	Test Form	Language
10	U.S.S.M.F.	16 P.F. Forms A&B &7 factor supplement	English
11	U.S.C.N.	CAQ Form A	English

Key to Reference Symbols and Published Source

U.S.A.M. American General Adult Sample Male Data from I.P.A.T. files Cattell & Nichols (1972)
U.S.A.F. American General Adult Sample Female Data fromI.A.P.T. files Cattell & Nichols (1972)
G.A.H. German Adults with Gymnasium Education Cattell, Schroder and Wagner (1969)
G.A.L. German Adults with Lower (Elem) Education Cattell, Schroder and Wagner (1969)
Ven. Venezuelan Adult Data
N.Z.L.A. New Zealand Late Adolescent Barton and Cattell 1972a & b
N.A.E.A. New Zealand Early Adolescent Barton & Cattell 1972 a &b
BrM Brazilian males (students) De Andrade, DeGodon and Ford, J.J. (1969)
BrMF Brazilian males and females De Andrade, DeGodon and Ford, J.J. (1969)
U.S.S.M.F. American undergrad. students male and female Cattell (1973b)
U.S.C.N. American mixed clinical and normal adult Subjects (Cattell (1973c)

Table 2
Mean Hyperplane Count Across
all Factors in Each of
Nine Second Order Studies

	Study								
	1	2	3	4	5	6	7	8	9
Percent in ±.10 Hyperplane	72	76	78	78	73	74	72	71	68

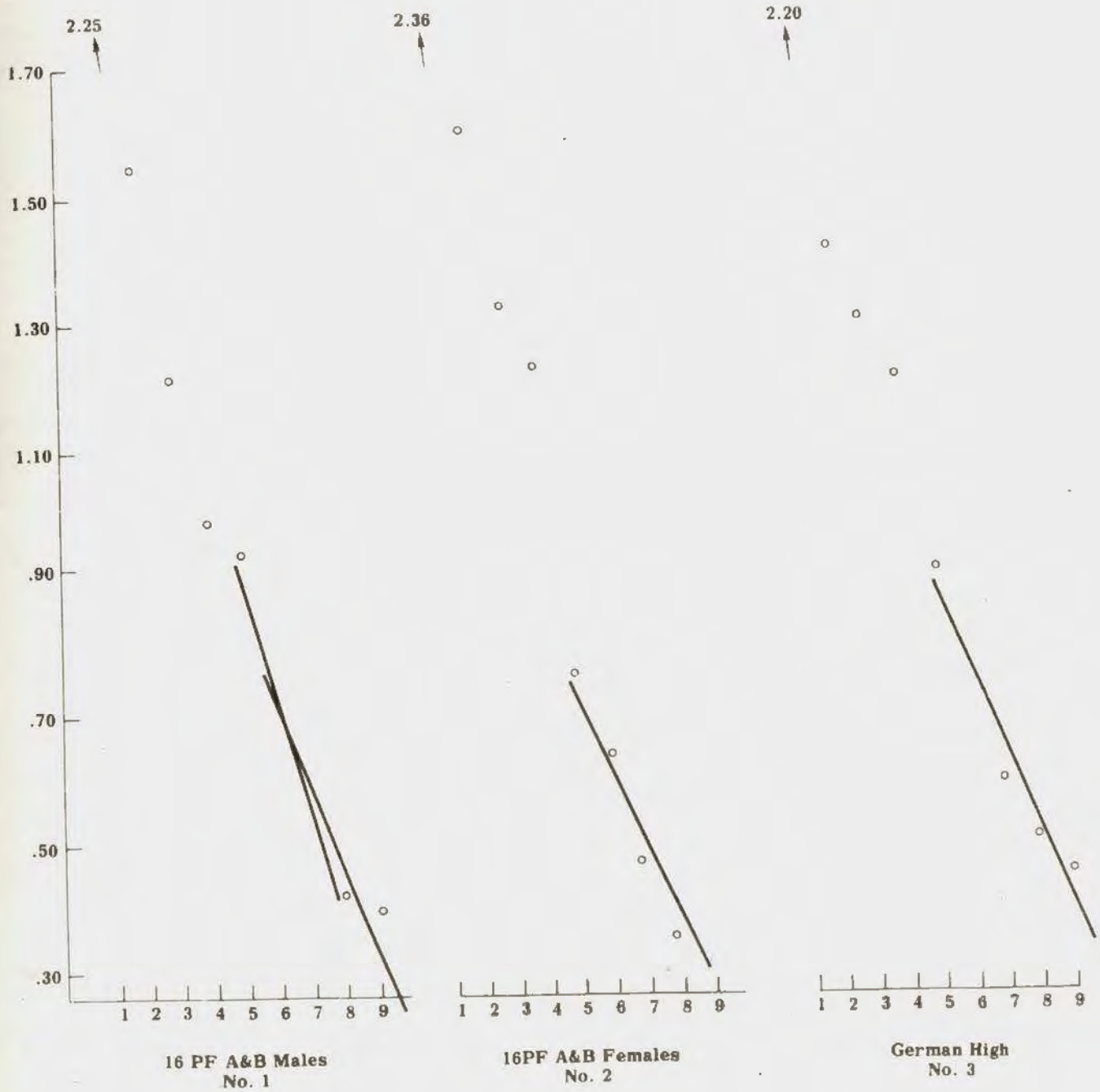
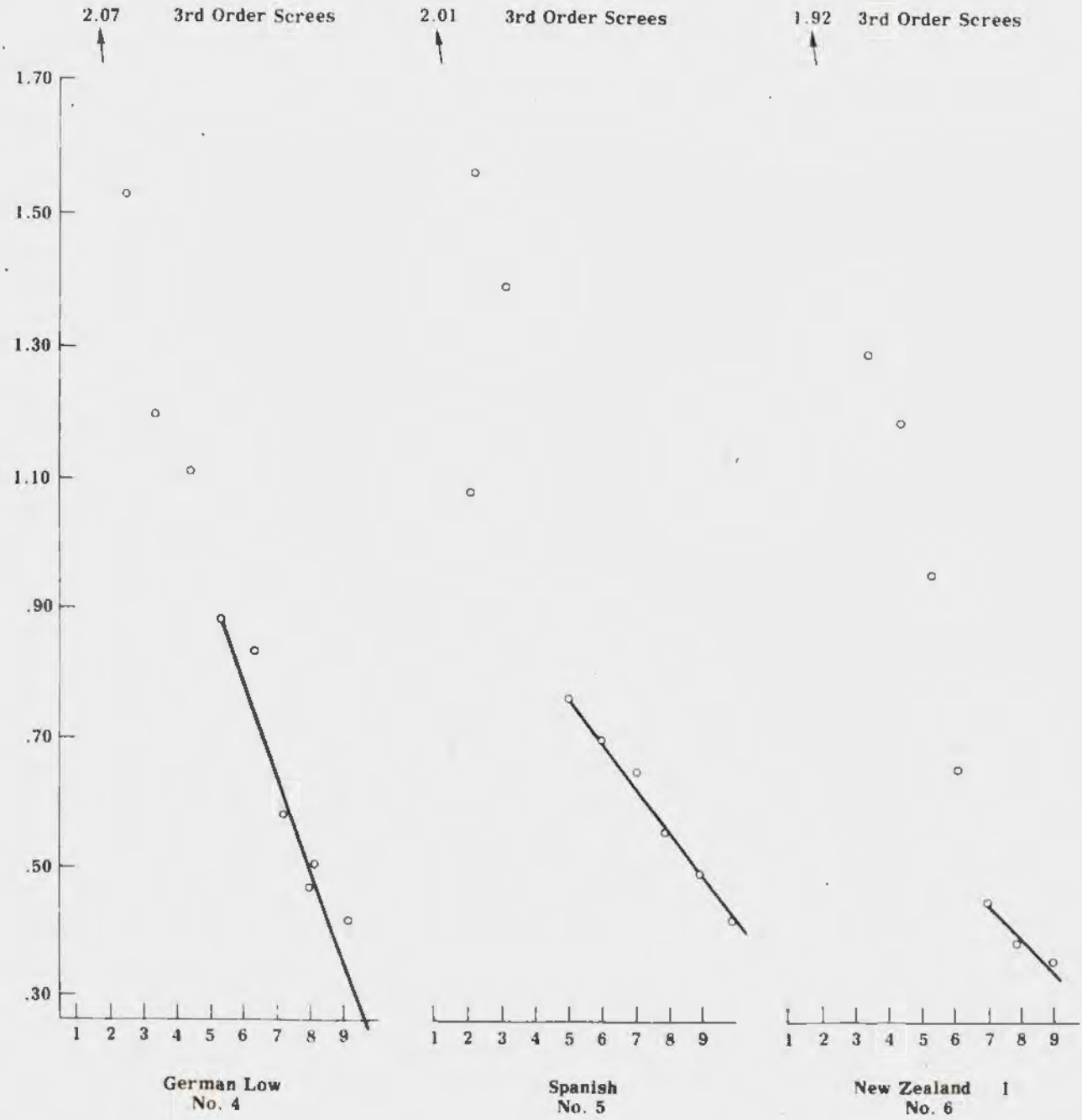
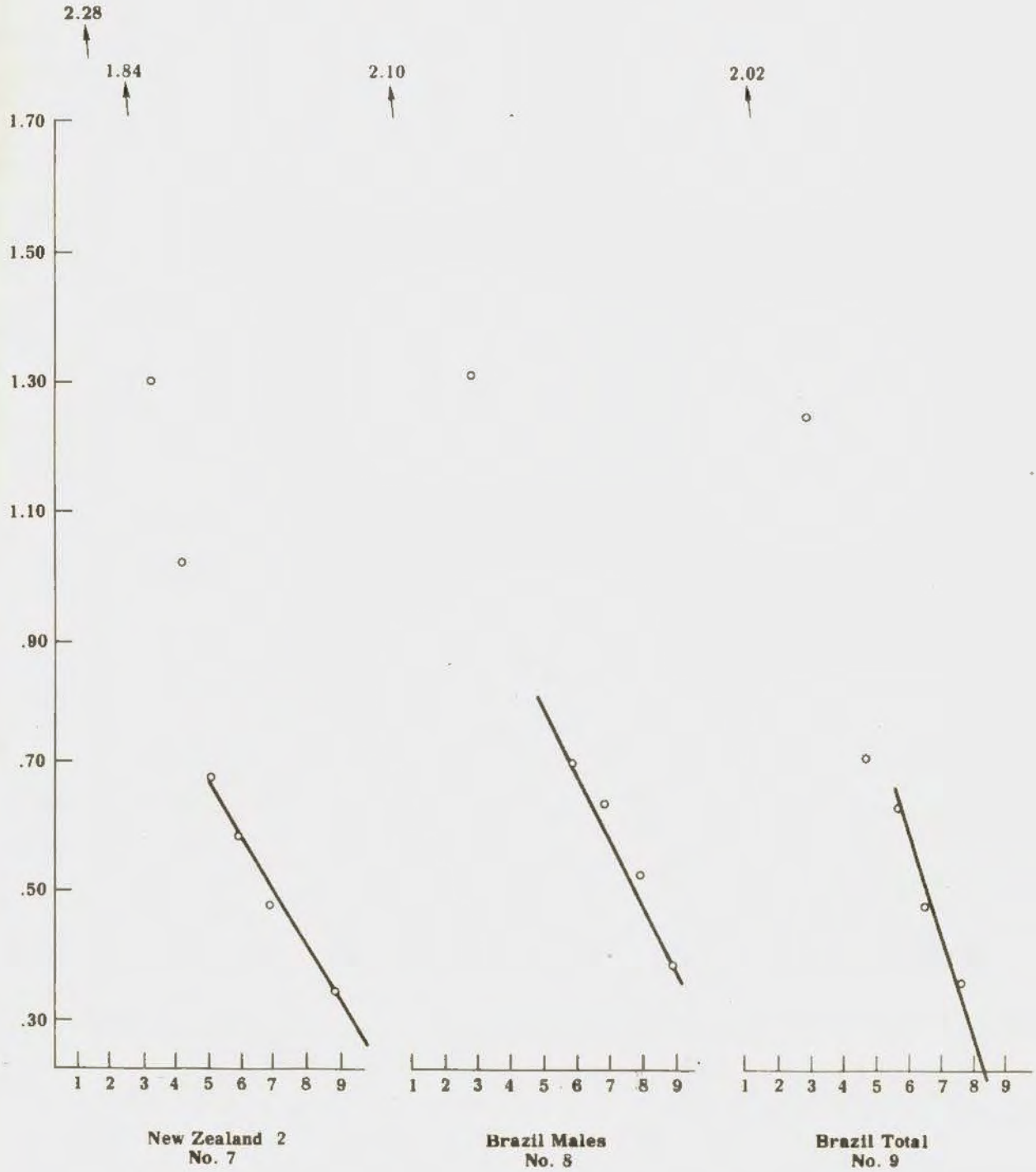
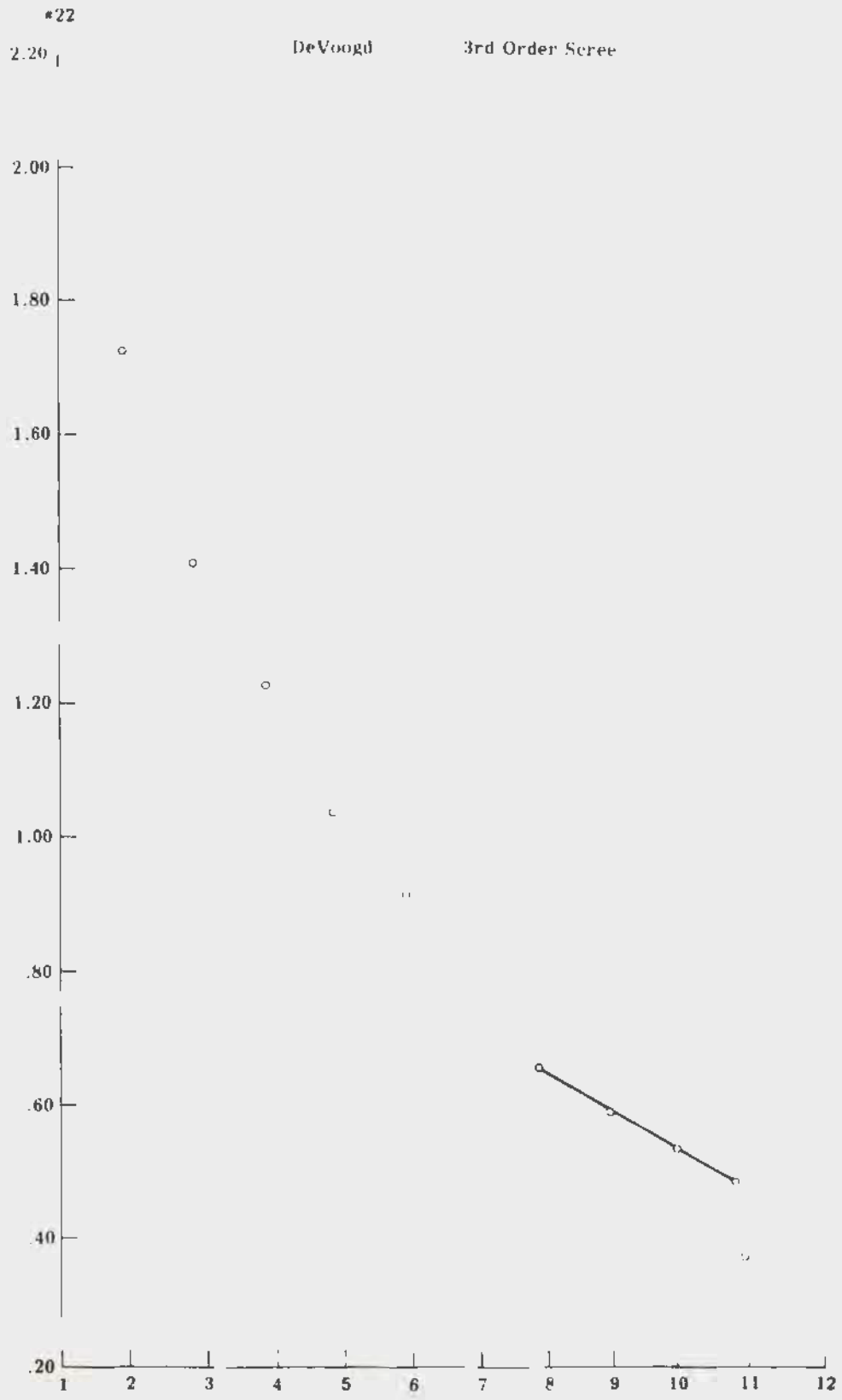


Figure 1

Scree Tests for the Number of Factors Based on 8 and 12 Secondaries from 16 and 23 Primaries


2.07 3rd Order Screes
2.01 3rd Order Screes
1.92 3rd Order Screes
1.70
1.50
1.30
1.10
.90
.70
.50
.30
1 2 3 4 5 6 7 8 9
German Low
No. 4
Spanish
No. 5
New Zealand I
No. 6


2.28
1.84
2.10
2.02
1.70
1.50
1.30
1.10
.90
.70
.50
.30
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8 9
New Zealand 2
No. 7
Brazil Males
No. 8
Brazil Total
No. 9



Based on 12 Secondaries from 23 Primaries


#22 Delhees
CAQ Normals & Clinicals
3rd Order Scree
2.30
2.10
1.90
1.70
1.50
1.30
1.10
.90
.70
.50
.30
1
2
3
4
5
6
7
8
9
10
11
12

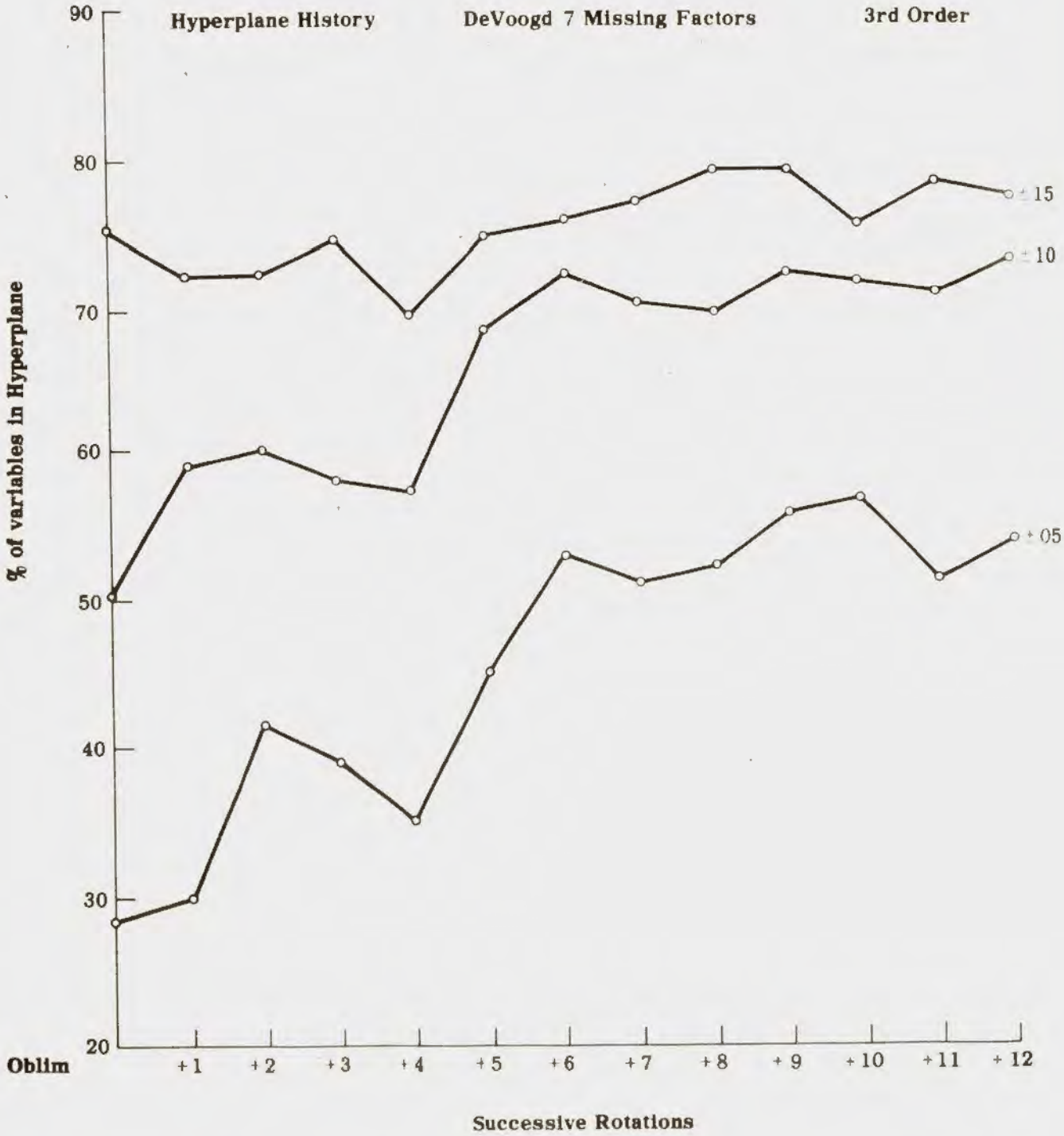
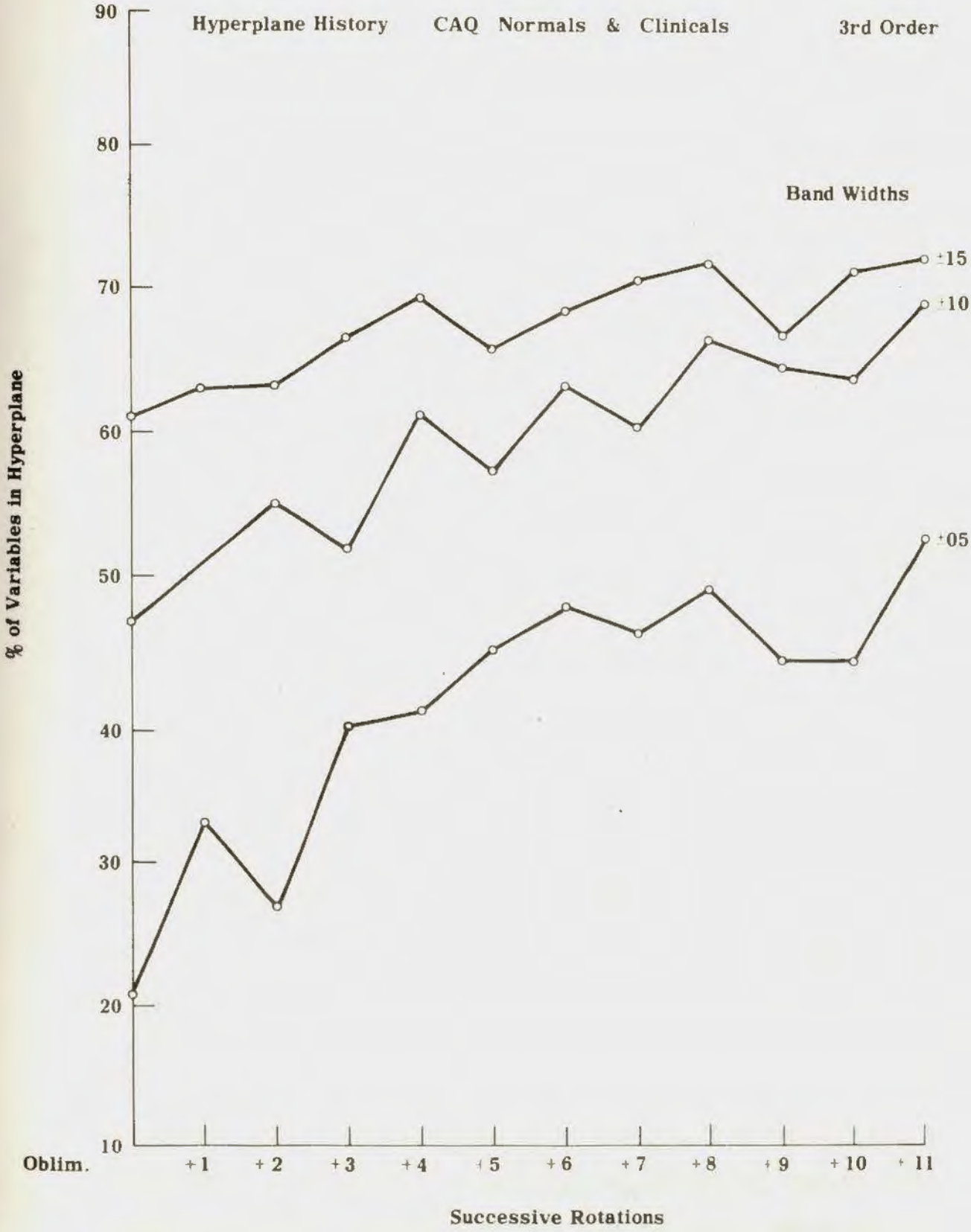


Figure 2

History of Hyperplane Counts to

Simple Structure Plateau


Hyperplane History
CAQ Normals & Clinicals
3rd Order
Band Widths
±15
±10
±05
% of Variables in Hyperplane
90
80
70
60
50
40
30
20
10
Oblim.
+1
+2
+3
+4
+5
+6
+7
+8
+9
+10
+11
Successive Rotations

(Cattell, 1973b & c). Since five tertiaries exist for each of 11 studies a 55 x 55 congruence coefficient matrix (triangular) was necessary for examining all possible matches. While the large matrix with 1485 congruence coefficients (55 x 54/2) is preserved, we produced only representative illustrations and means here. Table 3 shows the congruences among the first three studies.

It will be noted that with the exception of the last factor it is possible to arrange the highest r_c in each row and each column so that the highly significant r_c's (by the Schneewind & Cattell, 1970, tables) lie down the diagonal. In matrices (1) and (2), the fifth pattern fails to yield a three cornered congruence so that a match holds only between one and three. These four matching tertiary factors have been indexed in Greek, as Q_α, Q_β, etc. to distinguish them in any context from the Roman notation for secondaries, QI, QII, etc., and from the primaries in Arabic, Q1, Q2, etc., much more commonly represented as A, B, C, etc.

Of course a considerable experimentation was needed to rearrange the five factors from the chance order in which they originally came out in each study in order to attain the maximum internal consistency across the 55 factors in the 11 studies. As the preserved table will show, the nature of the data was such that in the end, it was possible in all but a minority of instances to arrange the 55 5 x 5 matching tables so that when the factor selected to be called α in the first three (Table 3) was matched with internal consistency in the remaining 22 tables, and similarly for the factor identified as β and so on. Indeed, it was surprising in what a small minority of instances (discussed below) in so large

a number of comparisons, the highest valued failed to fall on the diagonal when the factors were arranged in what, on overall matching considerations, was the same order--$\alpha, \beta, \gamma, \delta, \varepsilon$--for each study. When this order was reached we took the mean value across the 55 possible inter-study matching tables for the diagonals, as shown in Table 4.

In ten off-diagonal cell entries which we have calculated, summing across 55 tables, nine are less than ±.05 and the tenth was fairly substantial, representing some real similarity (cooperatives) of the α and ε factor patterns. The agreement of studies 10 and 11, taken over more secondary factors than in the 55 congruence tables so far discussed is not quite so good, as shown at (b) in Table 4. The agreements for study eight, based on a Brazilian population sample and a Portugese translation also reduces the average goodness of matching appreciably, though it is included in getting the mean third order pattern below. Both ε and eight must be considered poorly identified.

The Emerging Third Order Patterns

Having cross-identified the tertiary factors by the above procedures, we were now able to sum the loadings for the same factor across the different studies and obtain its mean loading pattern. To give a means of estimating the degree of agreement independently of the above congruence coefficients, however, we decided to sum the patterns for the six odd and five even numbered studies a present these separately for comparison before getting the final mean patterns in Table 5. The means are taken from the loadings directly, since the level of accuracy does not call for going via Fis-

her's z. As stated above, a minority of studies presented a minority of matches that were out of line. Most of these concerned the last pattern, which we now have called epsilon, and here a curious phenomenon presented itself. There appeared to be two distinguishable epsilon patterns, each showing a high cross-study congruence consistently in one sub-group of researches but only a moderate congruence across the two groups. The first, which we may call ε 1, showed good r_c values in all relations between studies 2, 3, 5, 6, and 7; the second, ε 2, among studies 1, 4 and 9. These two sets have been separately averaged and set out in Table 6.

In pursuing simple structure in over 200 published factor analytic experiments the present writer has encountered this phenomenon of possible alternative simple structures perhaps half a dozen times, twice at the primary level but more frequently with higher orders. It has appeared, for example, in the recent higher order factoring of primary abilities (Hakstian & Cattell, 1974). The phenomenon is to be distinguished from the appearance of alternatives when one underfactors, in which case there are actually more factors than one took out, and both rotations are approximations to possible real factors. Here, on the other hand, we have every reason to beleive that the number of factors is correct, and the uncertainty arises only through the sample of variables becoming too small to rotate ε 1 with its larger last value has moderate resemblance to that in the rough pioneer study of Cattell, Eber, and Tatsuoka (1970). Only time, new data on more numerous lower order variables, or new information from dR or P-technique analyses can hope to resolve the difficulties. So meanwhile, we present ε1 and ε 2 in Table 6 and would suggest that ε in Table 5 not be taken

as very accurate, since it is a compromise between these.

Finally, Table 7 presents the correlations among the tertiary factors, as the contribution to the basis that may someday be accumulated to make possible a fourth order study. In this table also we have averaged the odd and even studies separately, to permit an estimate of reliability, before going on to the total mean constellation of correlations in Table 7(c). In this case the agreement of odd and even numbered studies is not significant as it is for the factor loadings. However, we have averaged them for comparison with future results in Table 7(c).

Summary and Discussion

(1) Eleven diverse population samples measured on the 16 P. F. and carried to congruent simple structure second order patterns yielded second order R matrices to be carried to the third order. The mean size of sample in these being over 1000, and the simple structure being intensively pursued (Cattell & Nichols, 1970) justifies a hope of consistency at the third order.

(2) The outcome was in fact one of high mutual consistency as shown by the screes yielding 5 factors (in one instance +1, in another -1) and by the congruence coefficients being in the great majority of cases high and in virtually all significant. These are taken and averaged across all comparisons of five factor patterns in one study with five factor patterns in another, in all 55 possible comparisons of researches. With the identities adopted the highest row and column values run down a diagonal in the great majority of comparisons between researches.

(3) An exception occurs in factor epsilon where there are two

distinct clusters of congruences indicating that this factor locks into two distinct acceptable simple structure positions, some researches having converged on one and others on the other. Since the scree test makes it impossible to conclude that underfactoring (which sometimes leads to such anticipation of an omitted factor) has occurred, it must be concluded that due to the small sample of variables at the third order one position is false. Deciding which is a matter for work on a 12-basis, and auxiliary fields of evidence.

(4) As to matches beyond the five tertiaries, i.e., those between studies 10 (on DeVoogd 23 primary data) and Study 11 (on CAQ 28 primary data) only not much weight can be given the conclusions because the secondaries in these two cannot yet themselves be reliably matched. In No. 11--the CAQ study--the secondaries after .8 are reliably determined as XIII general depression, XIV general psychosis and XV (-) manic psychopathic, but the assignment of XIII, XIV and XV in Study 10 is uncertain. In any case only one definite (highest row, highest column) match emerges, of 6 in No. 10 with 6 in No. 11 (Table 5) and this is largely defined by -QI, +QV, and +12. This possibly sixth tertiary is left for later checks. One must not overlook, however, that though identification is lacking for the last, the evidence is definitely that eight tertiaries (and possibly more if the last two of Studies 10 and 11 are in different space--normal and abnormal) are now shown to exist.

(5) The correlations among the tertiaries, though less invariant than among secondaries, are reasonably stable, and are set out

for those who, with reinforcements, may wish to proceed to the fourth order. Meanwhile hypotheses about the nature of the tertiaries are as follows:

$Q\alpha$. High vs. Low Inhibition. With its emphasis on exvia and independence, and negatively on good upbringing, this was first (Cattell, Eber & Tatsuoka, 1970) thought to be possibly the same as Pavlov and Teplov's "strength of the nervous system" concept. Without committing ourselves to the traditional connotations of that concept, we would yet see here either a generalized resistance to inhibiting forces or a cultural lack of application of inhibiting forces or a cultural lack of application of inhibitions. The step in deciding between these alternatives would be the determination of the nature-nurture ratio for Q_α . However, the fact that the loading on good upbringing, QVII, is only moderate somewhat favors the interpretation as a temperamental genetic factor.

$Q\beta$. Favored Status vs. Underprivileged. This is a pattern of high anxiety, QII, with some introversion QI(-), naturalness, QV(-), lack of prodigality QVI(-), and lower intelligence QVII, and poorer upbringing QVIII(-). It suggests an individual treated more harshly by the world. However, it is not quite the pattern of neuroticism, into which QIV(-) would enter. It might be either a personality history of misfortune and exhaustion or the generalized effect of the dimension from underprivileged to highest social status. The latter hypothesis should be readily susceptible to testing by 16 P. F. data now becoming available.

$Q\gamma$. Efficient Responsiveness. If we discount, as we should, the loading on only two studies on QXIV, this is largely a loading on Cortertia, QIII, Independence, QIV, and Discreetness, QV. It

suggests an alert, independent, wariness, but not associated either with intelligence or good upbringing. A first hypothesis to test is surely that of some broad physiological factor of good health or cortical efficiency.

Q δ .Emancipation. Like the other tertiaries here this can easily be recognized in terms of the factors from the one rough pioneer study (Cattell, Eber and Tatsuoka, 1970) and this is the old No. 4 reversed in sign. However, since these patterns are based on ten times as much data we naturally discount the details of the earlier patterns. In this case a substantial loading on prodigal subjectivity QVI is added, but otherwise there is the identical pattern of independence, QIV; naturalness, QV; intelligence QVII, and lower super ego and self sentiment (upbringing) QVIII. It is clearly the picture of the "emancipated" individual, from Shelley and Rousseau to the latest phase in the current young generation. Presumably, it is the pattern generated by a subculture characteristic of adolescence and we have descriptively called it "emancipation". Age and period associations should provide a check. Epsilon and the later factors do not justify hypotheses at their present degree of definition. Our original general theoretical position that tertiaries represent very broad influences, possibly defined by conditions outside psychology has been illustrated here by the hypotheses that β is a physiological factor; α a dimension in sociology; γ a condition of general health, and δ the degree of belonging to a youthful subculture. The scoring of these factors from the 16 P. F. for further investigation can proceed from items by the Cattell-White formula: $V_{fp\,III} = V_{fp1}\ V_{fp2}\ V_{fp3}$, where V_{fp}'s

are the first, second and third orders as given in the literature (the V_{fp3} in Table 5 here), and with the conversion of $V_{fp\,III}$ to $V_{fe\,III}$, the factor estimation matrix by the usual procedures in Harman or Gorsuch.

Table 3

All Congruences Among First Three Studies

(American men, American women, German higher education group)

(1) American Men (N=1000) and American Women (N=800)

	α	β	γ	δ	ε
α	92	-47	-27	21	-01
β	25	72	-24	26	-74
γ	27	06	97	-13	-05
δ	43	21	-16	96	04
ε	35	-01	-87	24	10

(2) American Men (N=1000) and German Higher Education Group (M & F) (N=1800)

	α	β	γ	δ	ε
α	66	19	16	13	-57
β	00	85	04	15	-26
γ	12	14	93	-01	-00
δ	-16	07	08	89	08
ε	-37	27	18	03	-04

(3) American Women (N=800) and German Higher Education Group (M & F) (N=1800)

	α	β	γ	δ	ε
α	55	33	39	28	-40
β	-36	62	-07	26	36
γ	31	-26	29	-03	13
δ	-35	04	07	80	06
ε	06	-34	00	-03	60

Table 4

Mean Matching Values--Congruences--Taken over All Possible 55 Comparisons Among 11 Studies

(1) Mean of 55 studies each resting on congruence calculated over 8 secondaries:

	α	β	γ	δ	ε
α	51				
β		56			
γ			52		
δ				54	
ε					33

(2) Congruences specifically between studies 10 and 11, resting on patterns over 12 secondaries in each:

	α	β	γ	δ	ε	6	7	8
α	[41]	-39	-10	04	-14	-39	-15	50
β	-26	[69]	-03	-09	29	04	-07	-17
γ	-29	-05	[83]	-27	08	07	-02	-06
δ	-24	-01	18	[57]	65	-13	-58	07
ε	16	08	06	47	[30]	-40	53	-59
6	01	-45	08	-28	14	[63]	12	-13
7	67	02	-18	-27	04	24	[53]	02
8	-34	27	-04	20	-06	-50	03	[12]

Table 5

The Central Indications for the Third Order Patterns

(a) Estimated from the Odd Numbered Studies 1, 3, 5, 7, 9, and 11

	α	β	γ	δ	ε
QI Exvia	60	-16	05	-16	-07
QII Anxiety	-03	64	-08	02	02
QIII Cortertia	10	-07	57	-03	-05
QIV Independence	13	-09	27	40	-01
QV Discreetness	-07	-29	12	-17	-17
QVI Subjectivity	-04	-23	-02	53	03
QVII Intelligence	-07	-12	-13	09	28
QVIII Upbringing	-16	-15	-03	-28	-12

(b) Estimated from the Even Numbered Studies 2, 4, 6, 8, and 10

	α	β	γ	δ	ε
QI Exvia	57	-18	-04	-02	-00
QII Anxiety	-03	41	-16	-02	-11
QIII Cortertia	02	01	62	01	-03
QIV Independence	26	-02	12	55	03
QV Discreetness	09	-30	13	-16	-12
QVI Subjectivity	-22	-24	-05	45	-03
QVII Intelligence	-01	-11	12	21	23
QVIII Upbringing	-19	-35	06	-37	03

Table 5 Continued

(c) Estimated from All 11 Studies over Factors 1 through 8, and over Studies 10 and 11 alone over Factors 6, 7, and 8:

						6	7	8
1	54	-17	01	-09	04	-18	06	-09
2	-03	53	-12	00	-05	-01	04	-05
3	06	-03	60	-01	-04	02	01	-03
4	20	-06	20	48	01	-10	-43	03
5	01	-30	13	-17	-15	62	05	-22
6	-13	-24	-04	49	00	-06	06	07
7	-04	-12	-01	15	26	-15	16	-36
8	-18	-25	04	-33	05	12	38	-34
9	02	-07	-01	-33	-33	-03	07	-01
10	07	-02	42	01	14	13	39	17
11	00	-01	-02	-26	05	02	02	03
12	03	25	02	-02	03	23	-50	03

Table 6

The Two Sub-Species of Epsilon Patterns, ε_1 and ε_2

	ε_1	ε_2
QI	-05	-03
QII	-08	-02
QIII	-07	-03
QIV	00	02
QV	-05	-27
QVI	05	01
QVII	02	65
QVIII	-04	-18
QIX	59	--

Table 7

Correlation Among Tertiary Factors

(a) Mean of Odd Numbered Studies

	α	β	γ	δ	ε
α	1.00				
β	.13	1.00			
γ	.18	.02	1.00		
δ	-.03	-.14	-.03	1.00	
ε	.13	-.05	-.01	-.01	1.00

(b) Mean of Even Numbered Studies

	α	β	γ	δ	ε
α	1.00				
β	.08	1.00			
γ	.10	.12	1.00		
δ	.05	-.01	-.16	1.00	
ε	-.08	.08	.05	-.13	1.00

(c) Mean Over All Studies, with Addition of Extra Factors from Studies 10 and 11

	α	β	γ	δ	ε	6	7	8
α	1.00							
β	.11	1.00						
γ	.14	.07	1.00					
δ	.01	-.08	-.10	1.00				
ε	.03	.03	.02	-.06	1.00			
6	-.02	-.27	.02	-.03	-.10	1.00		
7	.18	.23	.02	.09	.14	.27	1.00	
8	.13	.07	-.09	.04	-.01	-.31	-.11	1.00

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