# PERSONALITY IN PRIMARY SCHOOL CHILDREN: 3.—FAMILY BACKGROUND

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SUMMARY. Family size, position in family, parental occupation and parental interest were investigated in some 4,000 boys and girls of primary school leaving age in relation to personality, intelligence and school achievement. Smaller families were associated with brighter, more extraverted and less neurotic children. Parental occupation was associated with both extraversion and stability in children, as well as with intelligence and achievement. Parental interest, correlated with status, was connected with extraversion, and most strongly with intelligence and achievement. Early-born children tended to do better at school, but not to differ from later-born children in personality or ability.

## I.—INTRODUCTION.

THE first paper in this series has described the method of data collection, the sample used, and the information analysed (Eysenck and Cookson, 1969). Scores of some 4,000 11-year-old boys and girls on the Junior Eysenck Personality Inventory were analysed in relation to performance on scholastic and ability tests. This paper will deal with certain variables relating to family background, i.e., size of family, position within family, parental occupation and parental interest. There is quite a large literature on these various topics, but the outcome of the many studies undertaken in different countries is neither very clear nor easy to understand theoretically. There is, of course, much agreement on the existence of a small negative correlation between achievement and ability on the one side, and family size on the other (Anastasi, 1956, 1957; Ferreira and Oakes, 1960; Nisbet, 1958; Palermo, 1962; Poppleton, 1968; Scott and Nisbet, 1955; Verma, 1958), but with respect to personality variables the position is more obscure (Altus, 1959; Ganda, 1962; Hawkes *et al.*, 1958; Lees, 1953; Thurstone and Jenkins, 1931). Few of these studies throw much light on the extraversion and neuroticism variables which were tested in our own study. Family position, too, has been much investigated, from the early days of Goring's (1913) and Pearson's (undated) demonstration that elder-born children show a disproportionate frequency of criminals and insane. Since then such writers as Hillinger (1958), Jones (1946), Krumboltz and Krumboltz (1958), Smart (1963) and Smith and McIntyre (1963) have related position in the family to a variety of behaviour patterns including alcoholism, psychiatric illness, and teaching ability. First-born children, however, do not always come out as delinquent or insane; Jones (1946) quotes data to show that first-born are actually over-represented among gifted children, English eminent men, entries in Men of Science and Who's Who in America; these disproportions arise equally in two-child, three-child and four-child families. This fact was first noted by Galton (1874) and confirmed by Ellis (1904) and Terman (1925). Other contributors include Allman and White (1968), Altus (1963), Bossard and Boll (1955), Busemann (1928), Dember (1963), Dittes (1961), Eisenman (1966, 1967, 1968), Glass *et al.* (1963), Green (1967), Gross (1964), Hall and Barger

(1964), Hinshelwood (1968), Jacoby (1968), Jamieson (1969), Rosenberg and Sutton-Smith (1964), Schachter (1959), Siegelman (1966), Singer (1964), Stotland *et al* (1962, 1963), Staples and Walters (1961), Weller (1962), Weiss (1966), Wrightsman (1960) and Zuckerman and Link (1968); reviews are available in Altus (1966), Burton (1968), Sampson (1965) and Warren (1966). Cross-cultural studies have been reported by Diab and Prothro (1968) and Greene and Clarke (1968).

Evidence on parental occupation and parental interest is quite considerable, at least as far as ability and achievement are concerned; Butler *et al.* (1966), Douglas (1964), Gooch *et al.* (1967), Peaker (1967) and Wiseman (1967) furnish an adequate introduction to this part of the literature. There is not much evidence, however, on personality variables in this connection. It seems likely that these are tied in with ability variables because of the correlations disclosed in our first paper between extraversion and ability/achievement, but more than that it is difficult to say. In the absence of strong guidance from past research, and in view of the lack of theoretical considerations which could furnish us with much guidance, the data of this paper must be left to speak for themselves; they cannot be used very easily for any hypothetico-deductive type of treatment.

Analysis of results was undertaken, as in the previous paper, by both analysis of variance and by product-moment correlation. For the former type of analysis records were extracted in such a manner as to construct as a $2\times3\times3$ table of means (2 sexes, 3 grades of E, 3 grades of N) with equal numbers of children in each cell. The number of children in each cell average between 170 and 180, the inequalities being due to occasional absence of full records for a given child, necessitating the dropping of one child each in the other 17 cells. Correlational analyses were carried out on all the available data.

## II.—Results.

(*a*) *Size of family.* The detailed scores are given in Table 1; the only variable which is highly significant statistically is E ($P<\cdot001$). Sex also has a significant P value ($<\cdot05$), as has the $S\times E\times N$ interaction ($P<\cdot05$). The more extraverted children tend to come from the smaller families; this is not perhaps the result which one would have predicted, but it is clearly shown by both girls and boys. The differences in mean size of family between E and I children are not large, but they amount to 0·30 for boys and 0·57 for girls, differences which cannot be overlooked and must be accepted as real. It must, of course, be admitted that these families are not yet complete in many cases,

TABLE 1

Size of Family.

| | Boys | | | | Girls | | | |
|---|---|---|---|---|---|---|---|---|
| | N— | A | N+ | All | N— | A | N+ | All |
| I | 3·46 | 3·03 | 3·27 | 3·25 | 3·44 | 3·62 | 3·55 | 3·54 |
| A | 3·03 | 3·29 | 3·38 | 3·23 | 3·24 | 3·17 | 3·47 | 3·30 |
| E | 2·70 | 3·15 | 3·01 | 2·95 | 2·93 | 2·88 | 3·10 | 2·97 |
| All | 3·06 | 3·15 | 3·22 | 3·15 | 3·20 | 3·23 | 3·38 | 3·27 |

I=introverts. A=ambiverts. E=extraverts. N— =stable. A=average. N+=emotionally unstable.

and that it is possible that the observed difference might be eliminated, or reversed, if only complete families had been considered. It is not obvious, however, why this factor should generate the results found, and until some hypothesis is offered we cannot regard this as a serious proposition.

The sex difference is very slight; as far as it goes girls come from larger families. However, with such large numbers results often achieve statistical significance without producing psychologically or socially important differences, and this would appear to be such a case. The triple interaction, too, probably belongs to this category of pseudo-significant results; no obvious psychological explanation suggests itself for it. Descriptively, it seems to originate in the fact that the general progression of greater family size with increase in N score, which occurs for both boys and girls, becomes U-shaped at different levels of E for boys and girls.

(*b*) *Position within family.* Here the only significant result ($P < \cdot 01$) is that extraverted children are born earlier into their families than introverted children; the differences are not large, but they occur equally for boys and girls. This finding, which is shown in detail in Table 2, may be nothing but an artefact due to the fact noted above that introverts more frequently come from larger families; this would automatically make their average position assume a higher value. The fact that the differences in position are quite small suggest that this is the most likely explanation.

TABLE 2

POSITION IN FAMILY.

| | Boys | | | | Girls | | | |
|---|---|---|---|---|---|---|---|---|
| | N— | A | N+ | All | N— | A | N+ | All |
| I | 2·21 | 2·04 | 2·14 | 2·13 | 2·08 | 2·41 | 2·23 | 2·24 |
| A | 1·99 | 2·07 | 2·09 | 2·05 | 2·21 | 2·09 | 2·14 | 2·15 |
| E | 1·88 | 2·09 | 1·92 | 1·97 | 1·98 | 2·03 | 1·99 | 2·00 |
| All | 2·03 | 2·07 | 2·05 | 2·05 | 2·09 | 2·18 | 2·12 | 2·13 |

In some ways these findings contradict well-established beliefs that first-born children are more introverted (Price, 1969; McArthur, 1956). However, many of the items given by Price (in his Table 3) relate to schoolwork (more natural ability at schoolwork; worked harder at his schoolwork; given more responsibility at school); or intelligence (learned to talk at a younger age; earlier at learning to read). But there is no doubt that the majority of items favour the hypothesis of greater introversion in first-born children (less fond of cuddling and similar contacts; easier to train to avoid traffic; tidier; higher standards; less impulsive; more serious, more regular and methodical; more law-abiding; less happy, optimistic disposition; spends less time on social activites). It seems possible that our findings would have been different had we tested 15-year-olds rather than 11-year-olds; as suggested in the first paper of this series, introverts are late developers, and possibly change not only in intellectual ability but also in personality. Clearly only detailed follow-up studies are capable of sorting out those various strands of evidence.

(*c*) *Parental occupation.* The details under this heading are given in Table 3; occupations are rated from high (1) to low (5). Both N and E are highly significant ($P < \cdot 001$); S×E and N×E interactions are also significant

($P < \cdot 05$). High family occupation is encountered more frequently in the parents of extraverted children and of low-N children ; in other words, stable extraverts come from the more affluent homes. For both sexes combined, the difference between stable extraverts (2·87) and neurotic introverts (3·16) is almost one-third of the s.d. of the distribution of parental occupation scores ; the true difference is no doubt greater still because the method of ascertaining parental occupation was undoubtedly less than perfectly accurate.

TABLE 3

PARENTAL OCCUPATION.

| | Boys | | | | Girls | | | |
|---|---|---|---|---|---|---|---|---|
| | N— | A | N+ | All | N— | A | N+ | All |
| I | 3·12 | 3·09 | 3·13 | 3·11 | 3·14 | 3·27 | 3·20 | 3·21 |
| A | 2·81 | 3·36 | 3·15 | 3·11 | 2·90 | 3·07 | 3·13 | 3·03 |
| E | 2·89 | 3·12 | 2·99 | 3·00 | 2·84 | 2·86 | 3·01 | 2·90 |
| All | 2·94 | 3·19 | 3·09 | 3·07 | 2·96 | 3·07 | 3·11 | 3·05 |

The sex/extraversion interaction is apparently due to the greater relationship between parental occupation and E in the female group ; the difference between extraverts and introverts is ·11 for the boys but ·31 for the girls. The N/E interaction is caused by the failure of some of the N columns to show a regular decrease in occupation scores with increasing extraversion. Neither effect is probably of much importance, and unless replicated in future research cannot be accepted as factual.

(*d*) *Parental interest.* This variable shows a very slight sex effect ($P < \cdot 05$), with females receiving greater parental interest. Extraversion shows a very significant relationship ($P < \cdot 001$), the details of which are given in Table 4. Parental interest is shown more for the extraverted than for the introverted children, and this relationship is more clearly expressed for the girls than for the boys, as evidenced by a very significant sex/extraversion interaction ($P < \cdot 001$).

TABLE 4

PARENTAL INTEREST.

| | Boys | | | | Girls | | | |
|---|---|---|---|---|---|---|---|---|
| | N— | A | N+ | All | N— | A | N+ | All |
| I | 2·41 | 2·36 | 2·41 | 2·39 | 2·36 | 2·63 | 2·48 | 2·49 |
| A | 2·25 | 2·45 | 2·48 | 2·39 | 2·18 | 2·34 | 2·28 | 2·26 |
| E | 2·29 | 2·25 | 2·21 | 2·25 | 2·06 | 2·03 | 2·10 | 2·06 |
| All | 2·32 | 2·35 | 2·37 | 2·34 | 2·20 | 2·33 | 2·29 | 2·27 |

(*e*) *Correlational analysis.* Table 5 records, for boys and girls separately, the correlations between the four familial variables and selected personality, teachers' ratings and intelligence variables. Altogether, there are 1,869 boys and 2,162 girls in this sample. Size of family is so highly correlated with

position in family (·69 for boys, ·70 for girls) that no special discussion of the latter variable seems called for; in a small family a child's position must inevitably be first or second. Size of family shows the usual inverse correlation with occupation (−·22 and −·23), and also with parental interest (−·28 and −·27); low-occupation parents tend to have larger families and to show less interest in their children's work (at least in the judgment of the teachers). High status and parental interest are positively correlated (·44 for both boys and girls). These results make good sense, and are in agreement with previous findings.

TABLE 5

CORRELATIONS WITH FAMILIAL VARIABLES.

| | Boys | | | | Girls | | | |
|---|---|---|---|---|---|---|---|---|
| | Fam. Size | Fam. Pos. | Occu. | Par. Int. | Fam. Size | Fam. Pos. | Occu. | Par. Int. |
| 1. Age | ·07 | ·04 | −·02 | −·01 | ·07 | ·03 | −·03 | ·01 |
| 2. Extraversion | −·11 | −·08 | ·12 | ·12 | −·11 | −·09 | ·12 | ·11 |
| 3. Neuroticism | ·09 | ·04 | −·09 | −·10 | ·08 | ·04 | −·09 | −·10 |
| 4. Lie score | ·01 | −·00 | −·08 | −·03 | ·01 | −·01 | −·08 | −·03 |
| 5. Stability | −·05 | −·03 | ·08 | ·24 | −·04 | −·04 | ·09 | ·25 |
| 6. Perseverance | −·08 | −·07 | ·22 | ·40 | −·09 | −·08 | ·24 | ·42 |
| 7. Sociability | ·00 | ·04 | ·06 | ·19 | ·00 | ·04 | ·07 | ·19 |
| 8. Impulsiveness | ·05 | ·07 | −·08 | −·20 | ·05 | ·07 | −·10 | −·20 |
| 9. VR 70 | −·22 | −·18 | ·42 | ·43 | −·22 | −·19 | ·41 | ·44 |
| 10. Grammar School | −·13 | −·09 | ·35 | ·37 | −·13 | −·10 | ·35 | ·38 |
| 11. Family Size | / | ·69 | −·22 | −·28 | / | ·70 | −·23 | −·27 |
| 12. Position in Family | ·69 | / | −·17 | −·21 | ·70 | / | −·18 | −·22 |
| 13. Occupation: high status | −·22 | −·17 | / | ·44 | −·23 | −·18 | / | ·44 |
| 14. Parental interest: high | −·28 | −·21 | ·44 | / | −·27 | −·22 | ·44 | / |

Children from large families tend to be duller; correlations with VR 70 are −·22 for both boys and girls, a figure which agrees well with previous researches. Figures for success in various school subjects are almost identical: reading (−·20 and −·21), maths. (−·22 and −·21), English (−·23 and −·22); so are the figures of VR 71 (−·22 and −·23). They are rather lower for grammar school entrance: −·13 for both boys and girls.

Children from large families are more introverted, and more neurotic; on teachers' ratings they appear less stable, less persevering, and more impulsive. All these correlations are very small indeed, but as far as they go they support the results from previous analyses of variance.

High occupational status of parents goes with intelligence and grammar school entrance; it also goes with school success. Correlations are all positive with subject examinations: reading (·34 and ·34), maths. (·39 and ·39), and English (·41 and ·38). On the personality side, children from high status parents are more extraverted, less neurotic, have lower scores on the Lie scale; they are rated as more stable and persevering, more sociable and less impulsive. Correlations are similar, but higher for the personality variables as far as teachers' ratings go, when we consider parental interest; all the relations are in the same direction as for occupational status. We thus find emerging a compound picture of the intelligent, high-occupational-status child, pushed by interested parents, extraverted and emotionally stable, sociable and persevering, who succeeds in his school subjects and goes on to grammar school.

This picture is probably much influenced by occupational status,which correlates with all the variables in which we are interested (size of family and position in family; E, N and VR test scores). However, analysis by partial correlation indicates that the observed correlations are on the whole only slightly diminished, and remain significant, even when occupational status is partialled out. Size of family now correlates −·09 with E, ·07 with N, and −·14 with VR; position in family now correlates −·06 with E and −·12 with VR. But size of family affects the position in family effect to a much more decisive extent; when it is partialled out, family position only correlates −·01 with E and −·04 with VR. Thus clearly for these variables family size is the crucial causal factor, although occupational status works in the same direction; position in the family is irrelevant, and only acts through its correlation with size of family. It might be argued that if position in family were to be partialled out from the size of family correlations, then these too would be markedly reduced, and this objection is well taken; partialling out procedures never give clear-cut answers to questions of causal priority. It is for this reason that yet another type of analysis has been attempted, and will be described in the next section. The conclusion outlined above is in part written in anticipation of this new type of analysis, which enables us to study the influence of these two confounded sets of causes (size of family and position in family) in complete independence of each other.

## III.—Family size *versus* position in family.

As pointed out several times, family size and position in family are not independent, and hence it is difficult to assign proper causal meaning to observed differences. A first-born child may differ from a fifth-born because of its position in the family, or because of the likelihood that it comes from a much smaller family. A special analysis was carried out by calculating mean scores for all variables in groups arranged by family size and position, i.e., first-borns were separated according to the size of family from which they came, and so were second-born, third-born, fourth-born and fifth-born children; sixth-born, of course, must come from a six-child family (we have grouped all families with more than six children together with the six-child families in view of the smallness of numbers involved). The grouping involved is shown for the variable Extraversion in Table 6; given in the table are the mean scores of the 21 groups involved. Table 7 shows the number of children in each group; boys and girls have not been kept separate as otherwise numbers would have been very small in some of the cells.

TABLE 6

Family Position: Mean E Scores.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P≤ |
|---|---|---|---|---|---|---|---|
| 1 | 17·46 | | | | | | |
| 2 | 17·28 | 17·22 | | | | | NS |
| 3 | 16·98 | 16·98 | 17·00 | | | | NS |
| 4 | 17·17 | 16·91 | 17·15 | 16·61 | | | NS |
| 5 | 16·17 | 16·28 | 15·85 | 16·27 | 16·63 | | NS |
| 6+ | 15·86 | 16·15 | 16·46 | 16·16 | 16·03 | 15·88 | NS |
| P≤ | ·01 | ·05 | ·05 | NS | NS | | |

TABLE 7

FAMILY POSITION : NUMBER OF CHILDREN IN EACH GROUP.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ |
|---|---|---|---|---|---|---|
| 1 | 379 | | | | | |
| 2 | 639 | 537 | | | | |
| 3 | 334 | 343 | 260 | | | |
| 4 | 145 | 201 | 177 | 121 | | |
| 5 | 65 | 71 | 65 | 55 | 60 | |
| 6+ | 35 | 72 | 90 | 91 | 78 | 144 |

Similar tables were constructed for all other variables. It is now possible to carry out analyses of variance (*a*) for the whole table, and, if this gives significant results, (*b*) for the rows and (*c*) the columns separately, thus enabling us to separate out size from position effects. Six values are given in each table for rows and columns. A more detailed discussion of the figures in Table 6 will illustrate the method ; the other variables will be discussed in less detail. In Table 6 the highly significant overall analysis of variance ($P < \cdot 01$) leaves little doubt that more detailed analysis is permissible There are five analyses possible for family position (first *versus* second in two-child family ; first *versus* second *versus* third in three-child family ; and so on to 6+ child family. None of these comparisons is significant, thus confirming the result of simply inspecting the values given in Table 6. Analysis for family size also allows us to make five separate analyses (different family sizes for first-borns, second-borns, etc., up to fifth borns). The results show that for first-borns $P < \cdot 01$ ; for second and third-borns $P < \cdot 05$; for the other two groups P is non-significant (although the trend towards lower values of E for larger families is maintained). It is clear that in this population there is a distinct tendency for larger families to have less extraverted children and that family position is not related to E. The published figures are likely to underestimate the true relation between E and family size as many of the families studied are undoubtedly incomplete, and will become larger in due course. It seems unlikely that changes in family size will alter the position of E as related to family position ; this is less obviously affected by changes of this kind. Individual t tests were carried out ; these, as might have been expected, assume significance in relation to the extreme groups (five and six+ children in family) rather than to intermediate groups.

Table 8 gives figures for N ; inspection reveals that there is a tendency for high N scores to be found more in the larger families, although the trend is not

TABLE 8

FAMILY POSITION : MEAN N SCORES.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P⩽ |
|---|---|---|---|---|---|---|---|
| 1 | 12·92 | | | | | | |
| 2 | 13·05 | 13·50 | | | | | NS |
| 3 | 13·56 | 13·70 | 13·49 | | | | NS |
| 4 | 13·86 | 13·99 | 13·51 | 12·99 | | | NS |
| 5 | 14·09 | 14·75 | 13·58 | 13·53 | 14·42 | | NS |
| 6+ | 15·57 | 14·51 | 13·44 | 14·55 | 13·79 | 13·74 | NS |
| P⩽ | ·01 | NS | NS | NS | NS | | |

as clear-cut as it was for E. Again the overall F is significant at $P < \cdot 01$, and again family position gives no significant F values. Family size is significantly related to N for first-borns ($P < \cdot 01$), but not for any of the other sets of groups although these show a similar tendency for N to increase with size of family. Again it seems likely that the results are attenuated by the fact that families are not yet complete.

We next turn to the results for the Lie scale; there is here no overall significance, and although individual F values were calculated, all except one were also insignificant. This one significant value ($P < \cdot 05$) is between the first and second child in a two-child family, and can hardly be taken seriously. We must conclude that the data do not justify us in assuming that L scores are determined in any way by family size or position.

Of the four ratings made by teachers (sociability, emotional stability, perseverance and impulsiveness), none except sociability ($P < \cdot 05$) reaches overall significance. Table 9 gives the actual mean values for sociability ratings: it will be seen that there is a mild tendency for the children from larger families to be rated as being less sociable. However, although this fits in with the data for E scores, none of the group analyses of variance was significant, so that little confidence can be placed on these findings.

TABLE 9

FAMILY POSITION: MEAN SOCIABILITY RATINGS.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P≤ |
|---|---|---|---|---|---|---|---|
| 1 | 2·99 | | | | | | NS |
| 2 | 3·00 | 2·92 | | | | | NS |
| 3 | 2·95 | 2·84 | 2·87 | | | | NS |
| 4 | 3·01 | 2·92 | 2·79 | 2·95 | | | NS |
| 5 | 3·23 | 2·93 | 2·89 | 2·98 | 2·88 | | NS |
| 6+ | 3·09 | 3·10 | 2·92 | 3·04 | 2·86 | 3·02 | |
| P≤ | NS | NS | NS | NS | NS | | |

Table 10 gives the reading scores of the children; overall F gives a highly significant value ($P < \cdot 001$). Analysis confirms the impression that all the significance derives from differences in family size; none of the position analyses gives significant F values. First-borns give the most significant family

TABLE 10

FAMILY POSITION: MEAN READING SCORES.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P≤ |
|---|---|---|---|---|---|---|---|
| 1 | 65·67 | | | | | | |
| 2 | 63·50 | 62·28 | | | | | NS |
| 3 | 63·07 | 61·33 | 60·41 | | | | NS |
| 4 | 61·57 | 60·66 | 61·32 | 56·74 | | | NS |
| 5 | 61·83 | 62·21 | 57·97 | 58·62 | 57·15 | | NS |
| 6+ | 55·69 | 56·01 | 55·90 | 55·19 | 51·78 | 53·42 | NS |
| P≤ | ·01 | ·05 | NS | NS | NS | | |

size differences ($P < \cdot 01$), followed by second-borns ($P < \cdot 05$); the other comparisons are not significant. Reading ability is thus strongly affected by family size.

Tables 11, 12 and 13 give results for VR 70, English and mathematics; all are clearly significant, and inspection of the tables shows that again it is size of family rather than position in family which is the important variable. Children from smaller families have higher scores in all three tests, and to almost identical degree in all three tests. The regressions are pretty linear, and the differences between smallest and largest amount to almost $\frac{1}{2}$ s.d.—differences which in turn would presumably be even larger had only complete families been used.

TABLE 11

FAMILY POSITION: MEAN VERBAL REASONING SCORES (VR 70).

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P⩽ |
|---|---|---|---|---|---|---|---|
| 1 | 96·41 | | | | | | |
| 2 | 96·09 | 96·13 | | | | | NS |
| 3 | 95·81 | 94·94 | 93·97 | | | | NS |
| 4 | 94·68 | 94·33 | 93·81 | 92·00 | | | NS |
| 5 | 94·57 | 94·35 | 92·28 | 92·51 | 89·85 | | NS |
| 6+ | 90·37 | 89·97 | 91·57 | 91·05 | 88·81 | 88·64 | NS |
| P⩽ | ·01 | ·001 | NS | NS | NS | | |

TABLE 12

FAMILY POSITION: MEAN ENGLISH SCORES.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6th+ | P⩽ |
|---|---|---|---|---|---|---|---|
| 1 | 97·52 | | | | | | |
| 2 | 96·68 | 95·86 | | | | | NS |
| 3 | 96·09 | 94·94 | 93·83 | | | | ·05 |
| 4 | 95·69 | 94·32 | 93·75 | 90·94 | | | ·01 |
| 5 | 94·72 | 94·89 | 92·26 | 91·64 | 90·75 | | NS |
| 6+ | 89·83 | 90·61 | 91·47 | 91·14 | 87·67 | 88·19 | ·05 |
| P⩽ | ·01 | ·01 | NS | NS | NS | | |

TABLE 13

FAMILY POSITION: MEAN MATHEMATICS SCORES.

| Family Size | 1st | 2nd | 3rd | 4th | 5th | 6+ | P⩽ |
|---|---|---|---|---|---|---|---|
| 1 | 95·58 | | | | | | |
| 2 | 95·25 | 94·61 | | | | | NS |
| 3 | 94·56 | 94·01 | 92·80 | | | | NS |
| 4 | 92·76 | 93·73 | 92·46 | 89·93 | | | ·05 |
| 5 | 93·45 | 92·79 | 91·57 | 91·00 | 89·57 | | NS |
| 6+ | 89·89 | 88·85 | 90·37 | 89·23 | 88·68 | 87·62 | NS |
| P⩽ | ·01 | ·01 | NS | NS | NS | | |

For VR 70 there is no significant ' position in family ' effect, but for VR 71 such an effect appears for the four-child and the six-child family; in both cases of course the earlier children are the brighter ones. This is in accord with the

literature, but it is not clear why this effect should not have emerged significantly with VR 70.

Mathematics and English show a significant trend for early-born children to do better than later-born, when size of family is held constant. For maths. the tendency is significant only for the four-child family ($P < \cdot 05$), but for English significance emerges for the three-child ($P < \cdot 05$), four-child ($P < \cdot 01$) and six-child ($P < \cdot 05$) family. Taken together with the significant results from the VR 71 test this suggests that for ability/achievement measures early-born children have the advantage ; this conclusion is more apparent for achievement than for ability, and this fact may support the interpretation often made of similar findings by others that early-born children are given better educational opportunities. On the other hand, this facile phrase does not carry much obvious meaning when applied to children as young as these ; it makes more sense in relation to college students. Neither does it explain the failure of the reading scores to show family position differences. Our data do not enable us to give any convincing answer to the causal problem raised by our results. However, it may be of some interest to compare visually the trends of the personality variables (where family size alone is relevant), and the trends of the achievement variables (where family position as well as family size is relevant), and accordingly the data from Tables 6 and 12 have been plotted, and are reproduced in Figures 1 and 2. It will be seen that as far as scores on extra-

FIGURE 1

EXTRAVERSION SCORES AS RELATED TO POSITION IN FAMILY AND NUMBER IN FAMILY.

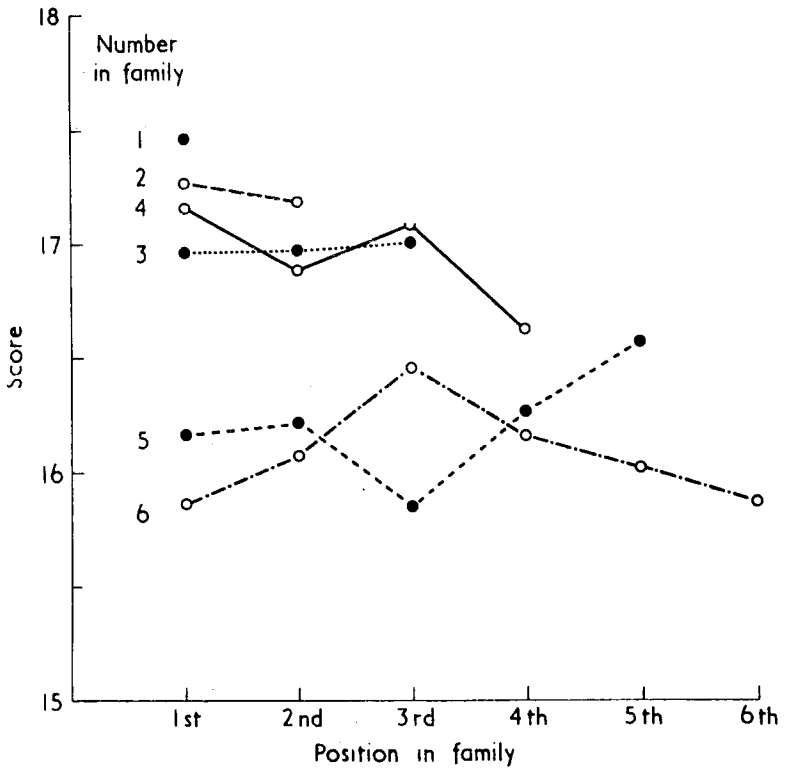
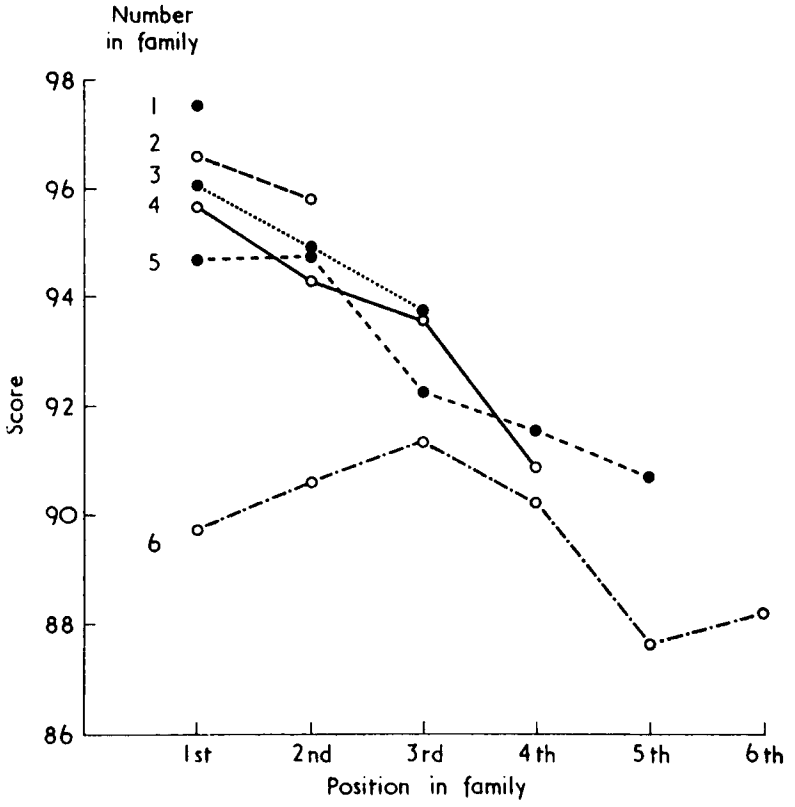


FIGURE 2

SCORES IN ENGLISH EXAMINATION AS RELATED TO POSITION IN FAMILY AND NUMBER IN FAMILY.




version are concerned there is a steady and regular decrement with increase in size of family, but all the ' position in family ' lines run parallel to the abscissa. For English, the same steady and regular decrement is observed with increase in the size of family, but there is also a regular decline in the ' position in family ' lines from left to right. This clear-cut difference constitutes a major finding of this study.

## IV.—DISCUSSION.

The problems involved in investigating the relationships between size of family and position within family on the one hand, and personality, ability and achievement on the other, are complicated by the fact that (*a*) size of family and position within family are highly correlated, that (*b*) personality and ability/achievement are not independent, that (*c*) status is correlated with both size of family and the personality-ability-achievement complex, and that (*d*) the families investigated are in any case not complete, so that the relations found between family variables and psychological variables are almost certainly much attenuated as compared with those which would be found had only complete

families been used. This last point is important because it suggests that the observed relationships, which are statistically not very impressive even though significant, would probably come out much more strongly if complete families had been used; unfortunately, this is of course impossible by definition—a study of the personality and performance of children cannot be undertaken except whilst their parents are young enough to have further children after the completion of the inquiry. Only a large-scale long continued follow-up would enable us to obtain terminal data on family size, and such a study was not feasible in view of very limited resources.

The other complexities mentioned make any simple and straightforward statistical analysis impossible, and for this reason three different types of analysis have been performed; these make different statistical assumptions, and combine data in different ways, so that the mutual support which they give each other may suggest that the final conclusions arrived at are perhaps in line with reality. These conclusions are on the whole not opposed to previously reported results, particularly in the ability/achievement field; previous work with personality variables has not on the whole been sufficiently clear-cut to enable meaningful comparisons to be made.

What then are our main results? The analysis of variance discloses six definite findings:

(*a*) extraverted children come from small families;
(*b*) neurotic children come from large families;
(*c*) extraverted children come from high-status families;
(*d*) neurotic children come from low-status families;
(*e*) more parental interest is shown to extraverted children, particularly to girls;
(*f*) extraverted children tend to be earlier-born, but this may be due to their being born into small families, and thus be a statistical artefact as shown by direct comparison later.

The correlational analysis confirms findings (*a*) and (*b*), even when status is partialled out, thus demonstrating that the effect is not a mere statistical artefact. It is also found that high status families have fewer children, show more interest in their children, and have children who are brighter and better at school. Children from large families are duller, and do less well in school, than children from small families. Such effects as are observed for position in family on ability and personality are most likely due to size of family, as shown by partial correlation techniques.

Our final analysis separating out by analysis of variance size and position effects confirms that for personality size of family is the only variable which exerts an effect; position within family is irrelevant. The same is true of intelligence; with only the slightest suggestion of a position effect, the general impression is one of overwhelming importance of size of family. The same is true of reading; here, too, position within family is unimportant. The position is quite different for the two achievement papers, English and maths.; here position within the family clearly is independently and significantly related to achievement, in the sense that early-born children do better than later-born children; size of family, too, is of course important, in the sense that children from smaller families do better, as we had already shown by previous analyses. Why achievement should show this effect is not clear, although the fact itself is not unexpected from the results of previous work; the usual explanation of greater parental stress on education is not as clearly applicable to youngsters of this

kind as it would be to students where parents have to make sacrifices to enable the child to continue his or her education. Nor is it clear why reading, which after all, is a scholastic accomplishment highly correlated with English, shows no position effect ; parental pressure would seem likely to be brought to bear on this skill more than on any other, perhaps more esoteric one. While our findings are clear enough, and in good accord with traditional findings and folklore, their interpretation is by no means clear.

We can conclude, therefore, that size of family is significantly correlated with the personality, ability and achievement of 11-year-old school children, with smaller families tending to give rise to intelligent and stable extraverts even when the influence of status has been removed by statistical manipulation. Position in family is not relevant to either personality or ability, but early-born children do better in school than later-born children, a fact which we find it difficult to explain. Further studies with different samples, particularly with older children, would seem to be needed before any larger generalisations become possible.

## V.—REFERENCES.


ALLMAN, T. S., and WHITE, W. F. (1968). Birth-order categories as predictors of select personality characteristics. *Psychol. Rep.*, 22, 857-860.

ALTUS, W. D. (1959). Adjustment, IQ, family size and illiteracy. *Psychol. Rep.*, 5, 494.

ALTUS, W. D. (1963). The first born as conservative : Adler revisited. *Amer. Psychol.*, 18, 356.

ALTUS, W. D. (1966). Birth order and its sequelae. *Science*, 151, 44.

ANASTASI, A. (1956). Intelligence and family size. *Psychol. Bull.*, 53, 187-209.

ANASTASI, A. (1957). Tested intelligence and family size ; methodological and interpretive problems. *Eugen. Quart.*, 1, 155-160.

BOSSARD, H. H., and BOLL, E. S. (1955). Personality roles in the large family. *Child Dev.*, 26, 71-78.

BURTON, D. (1968). Birth order and intelligence. *J. soc. Psychol.*, 76, 199-206.

BUSEMANN, A. (1928). Die Familie als Erlebuismilieu der Kinder. *Ztschr. f. Kinderforsch.*, 36, 17-82.

BUTLER, N. R., KELLMER-PRINGLE, M. L., and DAVIE, R. (1966). 11,000 *Seven-year-olds*. London : Longmans.

DEMBER, W. N. (1963). Birth order and need affiliations. *J. abnorm. soc. Psychol.*, 66, 91-96.

DIAB, L. N., and PROTHRO, E. I. (1968). Cross-cultural study of some correlates of birth order. *Psychol. Rep.*, 22, 1137-1142.

DITTES, J. E. (1961). Birth order and vulnerability to differences in acceptance. *Amer, Psychol.*, 16, 358.

DOUGLAS, J. W. B. (1964). *The Home and the School*. London : McGibbon and Kee.

EISENMAN, R. (1966). Birth order, anxiety and verbalisations in group psychotherapy. *J. consult. Psychol.*, 30, 521-526.

EISENMAN, R. (1967). Birth order and sex differences in aesthetic preference for complexity-simplicity. *J. gen. Psychol.*, 77, 121-126.

EISENMAN, R. (1968). Personality and demography in complexity-simplicity. *J. consult. clin. Psychol.*, 32, 140-143.

EISENMAN, R., and PLATT, J. J. (1968). Birth order and sex differences in academic achievement and internal-external control. *J. gen. Psychol.*, 78, 275-285.

ELLIS, H. (1904). *A Study of British Genius*. London : Hurst and Blackett.

EYSENCK, H. J., and COOKSON, D. (1969). Personality in primary school-children : 1. Ability and achievement. *Br. J. educ. Psychol.*, 39, 109-122.

EYSENCK, H. J., and COOKSON, D. (1969). Personality in primary school-children : 2. Teachers' ratings. *Br. J. educ. Psychol.*, 39, 123-130.

FERREIRA , J. R., and OAKES, P. W. (1960). Automatic data processing : an aid in studying pupil characteristics. *Calif. J. educ. Res.*, 11, 3-6.

GALTON, F. (1874). *English Men of Science*. London : Macmillan.

GLASS, D. C., HORVITZ, M., FIRESTONE, I., and GRINKER, J. (1963). A note on birth order and reactions to frustrations. *J. abnorm. soc. Psychol.*, 66, 149-195.

GANDA, T. A. (1962). The relation between complaints of persistent pain and family size. *J. Neurol. Neurosug. Psychiat.*, 25, 277-281.

GOOCH, S., LEVY, P., and KELLMER-PRINGLE, M. L. (1967). The interaction of four status

variables and measured intelligence and their effect on attainment in two junior schools. *Educ. Sci.*, 2, 37-45.
GORING, C. B. (1913). *The English Criminal.* London : Wyman and Sons.
GREEN, C. E. (1967). Birth order, family size and differential scoring in a card-guessing situation. *J. psychophys. Res.*, 1, 23-30.
GREENE, R. L., and CLARK, J. R. (1968). Birth order and college attendance in a cross-cultural setting. *J. soc. Psychol.*, 75, 289-290.
GROSS, H. J. (1964). Birth order, anxiety and affiliation tendency. *J. nerv. ment. Dis.*, 139, 588-590.
HALL, E., and BARGER, B. (1964). Attitudinal structures of older and younger children. *J. individ. Psychol.*, 20, 59-68.
HAWKES, G. R., BURCHINAL, L., and GARDNER, B. (1958). Size of family and adjustment of children. *Marriage fam. Living*, 20, 65-68.
HILLINGER, F. (1958). Introversion und Stellung in der Geschwisterreike. *Ztschr. f. exp. angew. Psychol.*, 5, 268-276.
HINSHELWOOD, R. D. (1968). Schizophrenic birth order in the last but one position. *Nature*, 220, Nov. 2, 2, 490.
JACOBY, J. (1968). Birth, rank and pre-experimental anxiety. *J. soc. Psychol.*, 76, 9-12.
JAMIESON, B. D. (1969). The influence of birth order, family size, and sex differences in risk-taking behaviour. *Br. J. soc. clin. Psychol.*, 8, 1-8.
JONES, H. E. (1946). Environmental influences in mental development. In L. CARMICHAEL (Ed.), *Manual of Child Psychology.* New York : Wiley.
KRUMBOLTZ, H. B., and KRUMBOLTZ, J. D. (1958). Birth rank and family size : relationship to certain qualifications of prospective teachers. *J. teach. Educ.*, 9, 171-178.
LEES, J. P. (1953). Some connections between family position and behavioural differences. *Bull. Br. psychol. Soc.*, 20, 12.
MCARTHUR, C. (1956). Personalities of first and second children. *Psychiatry*, 19, 47-54.
MUKHERJEE, B. N. (1968). Birth order and verbalised need for achievement. *J. soc. Psychol.*, 75, 223-230.
MUNZ, D. C., SMOUSE, A. P., and LETCHWORTH, G. (1968). Achievement motivation and ordinal position of birth. *Psychol. Rep.*, 23, 175-180.
NISBET, J. D. (1958). Intelligence and family size, 1949-1956. *Eugen. Rev.*, 49, 201-202.
PALERMO UNIVERSITY, PSYCHO-STATISTICS CENTRE (1962). Heredity and environment in the development of mental acitivity. *J. psychol. Res.*, Madras, 6, 52-53.
PEAKER, G. F. (1967). The regression analysis of the National Survey. In *Children and their Primary Schools*, A Report of the Central Advisory Council for Education (England). Vol. 2 : Research and Surveys. London : H.M.S.O.
PEARSON, K. (1931). *On the Handicapping of the First Born.* Univ. London, Galton Lab. Nat. Eugen., Lecture Ser. XI. Quoted by Thurstone and Jenkins.
POPPLETON, P. K. (1968). Puberty, family size and the educational progress of girls. *Br. J. educ. Psychol.*, 38, 286-292.
PRICE, J. (1969). Personality differences within families : a comparison of adult brother and sisters. *J. biosoc. Sci.*, 1, 177-205.
ROSENBERG, B. G., and SUTTON-SMITH, B. (1964). The relationship of ordinal position and sibling sex status to cognitive abilities. *Psychonom. Sci.*, 1, 81-82.
SAMPSON, E. E. (1965). The study of ordinal position : Antecedents and outcomes. In B. A. MAHRER (Ed.), *Progress in Experimental Personality Research* (Vol. 2). New York : Academic Press.
SCHACHTER, S. (1959). *The Psychology of Affiliation.* Stanford : University Press.
SCOTT, E. M., and NISBET, J. D. (1955). Intelligence and family size in an adult sample. *Eugen. Rev.*, 46, 233-235.
SIEGELMAN, M. (1966). Loving and punishing parental behaviour and introversion tendencies in sons. *Child Dev.*, 37, 985-992.
SINGER, J. E. (1964). The use of manipulation strategies. *Sociometry*, 27, 128-150.
SMART, R. G. (1963). Alcoholism, birth order and family size. *J. abnorm. soc. Psychol.*, 66, 17-23.
SMITH, C. M., and MCINTYRE, S. (1963). Family size, birth rank and ordinal position in psychiatric illness. *Canad. Psychiat. Ass. J.*, 8, 244-248.
STAPLES, F. R., and WALTERS, R. H. (1961). Anxiety, birth order and susceptibility to social influence. *J. abnorm. soc. Psychol.*, 62, 716-719.
STOTLAND, E., and COTTRELL, N. B. (1962). Similarity of performance as influenced by interaction, self-esteem and birth order. *J. abnorm. soc. Psychol.*, 64, 183-191.
STOTLAND, E., and DUNN, R. E. (1962). Identification, opposition, authority, self-esteem and birth order. *Psychol. Monogr.*, 76 (9), Whole No., 528.
STOTLAND, E., and DUNN, R. E. (1963). Empathy, self-esteem and birth order. *J. abnorm. soc. Psychol.*, 66, 532-540.
STOTLAND, E., and WALSH, J. A. (1963). Birth order and an experimental study of empathy.

*J. abnorm. soc. Psychol.*, 66, 610-614.
TERMAN, L. M. (1925). *Genetic Studies of Genius*, Vol. 1. Stanford : University Press.
THURSTONE, L. L., and JENKINS, R. L. (1931). *Order of birth, parentage and intelligence.* Chicago : Univ. Chicago Press.
VERMA, R. M. (1958). Sociological variability and intelligence of the school-going population. *Educ. Psychol.*, Delhi, 5, 165-170.
WARREN, J. R. (1966). Birth order and social behaviour. *Psychol. Bull.*, 65, 38-49.
WEISS, R. L. (1966). "Acquiescence" response set and birth order. *J. consult. Psychol.*, 30, 365.
WELLER, L. (1962). The relationship of birth order to anxiety : a replication of the Schachter findings. *Sociometry*, 25, 415-417.
WISEMAN, S. (1967). The Manchester Survey. In *Children and their Primary Schools*, A Report of the Central Advisory Council for Education (England), Vol. 2 : Research and Surveys. London : HMSO.
WRIGHTSMAN, L. S. (1960). Effects of waiting with others on changes in level of anxiety. *J. abnorm. soc. Psychol.*, 61, 216-222.
ZUCKERMAN, M., and LINK, K. E. (1968). Expectancy and birth order as determinants of affective responses to isolation. *Percept. mot. Skills*, 27, 279-286.

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