

## The Two-dimensional Picture

The results we have reported so far combine to form a picture which is clear and consistent, and which establishes a number of important points:—

(1) The children in one or both of our two extreme abnormal groups have 'worse' scores than those in the control group in every single instance where a direct comparison can be made, and the differences are statistically significant. This applies not only to the total scores for complete tests, but also to every individual sub-test.

(2) Of the two abnormal groups, the scores of the very light-for-dates children are almost invariably 'worse' than those of the short-gestation group. Few of these differences are statistically significant, partly because of the relatively small numbers of children in these two groups (58 and 74, respectively, at the age of five years), but in every case where the difference is statistically significant the score of the very light-for-dates group is the 'worse' of the two (see, for example, Tables 3.6, 4.7 and 6.1).

(3) The scores of the rather light-for-dates group consistently fall somewhere between the scores of the control and the very light-for-dates groups in all the assessments of the children's performance. In some instances they are significantly 'worse' than the controls (see Tables 3.3, 3.4, 6.1 and 6.2) and in some they are significantly 'better' than the very light-for-dates (see Tables 3.6, 3.7), but they are never significantly 'better' than the control or 'worse' than the very light-for-dates scores.

(4) The performance of the boys in the extreme abnormal groups is significantly 'worse' than that of the boys in the control group in many more instances than the performance of the girls in the abnormal groups is 'worse' than that of their controls. This is true for all the variables in respect of which we have looked for a difference, in the fields of cognitive function, behaviour, neurological signs and physical growth. In other words the boys appear to be consistently more vulnerable than are the girls to the harmful effects of the two abnormalities of intra-uterine growth in which we are interested.

(5) The effects of the children's social class of origin is also striking, and apparently cumulative, particularly when assessed in terms of cognitive function and behaviour. For instance, there is a difference of nearly 30 points in the WPPSI and of more than 20 points in the ITPA between the mean scores of children in social classes I and II in the control group and those in social classes IV and V in the very light-for-dates group.

Since the very light-for-dates group does not differ significantly from the control group in respect either of sex or social-class distribution, neither of these 'confusing' factors is likely to account for the impairments of performance of the children in the former group. The likelihood that these are accounted for by a long-term organic effect of impaired intra-uterine growth is considerably strengthened by the finding

of an intermediate degree of impairment of performance in the rather light-for-dates group, which by definition experienced an intermediate degree of impairment of intra-uterine growth. This finding is unlikely to be accounted for by the associated factors in the rather light-for-dates group to which we have drawn attention, namely a relative deficiency of boys and of children in social classes I and II (see Tables 2.2, 2.3).

The situation is different in the case of the short-gestation group. There is a marked excess of children in social classes IV and V (and a deficiency in social classes I and II) among those available for assessment, and much of their impaired performance could be accounted for by this fact. It is tempting to suppose, therefore, that the direct, organic effects of being born too soon may be even less than would be suggested by a first glance at our raw data. Moreover, the fact that the detailed pattern of this group's impaired performance is remarkably similar to that of the very light-for-dates group (though less in degree) suggests the possibility of a similar mechanism. This could be a period of postnatal undernutrition, corresponding to but less severe than the period of intra-uterine undernutrition of the very light-for-dates group, and we have some suggestive evidence in support of this possibility (see pp. 56-57).

In summary, therefore, our direct observations and simple analyses would strongly suggest that being born too soon need produce no harmful long-term effects upon the survivors of the neonatal period (provided they are maintained on an adequate plane of nutrition from birth onwards) but that being born too small, as a result of significant impairment of the net rate of intra-uterine growth, does inevitably increase the risk of impaired performance at school age because of organic effects upon the brain and other tissues at a critical stage of development. It would be tempting, therefore, to say at this stage that we have answered the two key questions which are of practical importance to the obstetrician and the paediatrician concerned with the care of the newborn.

However, quite apart from the complexity of the relationship between the 'confusing' factors whose effects we have mentioned, which should make us hesitate to accept these simple answers, there is another type of 'confusing' factor for which we have made no allowance in our analyses—although we drew attention to it in Chapter 2. We have in mind the disturbed maternal attitudes which could result from the birth of a baby in either of our extreme abnormal groups. We produced evidence of such disturbances under the headings of maternal neuroticism, lack of discipline, and rejection of the child, which were most marked in the short-gestation group but were also present in the very light-for-dates group (see pp. 16-18). Clearly, the effects of these environmental factors should be allowed for before reaching any final conclusions.

Furthermore, we have not attempted to assess the possible effects of associated biological factors (see Table 2.2, p. 12), other than the child's sex, nor have we attempted to break down the powerful effect of the father's occupational social-class (which is most unlikely to be direct) into its presumably effective components (see Table 2.4, p. 13). These are areas in which clinical and social policies, if well directed, could help to mitigate the potentially harmful effects of both our abnormalities of

intra-uterine growth: and improved understanding of these factors and their general effects could be of more general application to improving the quality of our community's children.

To obtain this extra information to enable us to make due allowances for the independent effects of all the relevant, interrelated, biological and environmental factors which we have recorded—and so to reach firmer and more practical conclusions concerning the primary questions in which we are interested—we clearly need to carry out more complex forms of statistical analysis. This we have done, in two stages, and the results are recorded in the next two chapters.