

of an unknown and probably quite appreciable number of lesional variates.

Lesional variates occur whenever and for whatever reason the central nervous system is damaged. If we accept the multifactorial hypothesis, this means that such variates become incapable of developing the potentialities which are inherent in their genotypes. Realizing that such damage may be genetical, as in many gene mutations or chromosomal disorders effecting mental retardation, as well as traumatic, nutritional, chemical, infectious or other, I should like to postulate that such obstacles to intellectual development — on a global scale — are far more important than the cultural, socioeconomic, educational, and psychological obstacles which usually receive most of the attention.

Although much effort has been spent to obtain a reliable estimate of the heritability of human intelligence, the results have as yet not been generally accepted. All approaches which have been made so far remain open to rather serious criticism. It would seem that MZ twins reared apart were an ideal material, and data from 122 such pairs have been reported. They show that separation at an early age does not significantly lower the concordance of their IQs, although the partners were brought up in different homes. However, neither do the twins constitute a true sample of individuals from the general population, nor do the homes in which they were brought up constitute a true sample of homes in the general population, as the adoption agencies always try to provide what is considered a good home for the child. These and other deficiencies of the data can hardly be corrected by sophisticated mathematical analyses, so that it is not possible to put much faith into the published heritability indices. Ordinary twin studies suffer from similar or other faults.

Nevertheless, one must conclude that the data — in spite of their deficiencies — rather indicate important genetic contributions to the variability of intelligence. When environmentalists use the present difficulties of quantizing the results in order to minimize or zerosize the genetic variation, they are certainly making a major mistake which invites to serious social and economical repercussions.

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NATURE-NURTURE AND INTELLIGENCE: THE TWIN AND ADOPTION STUDIES AGREE

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Identical twins (even those separated near birth) are more alike in intelligence test scores than fraternal twins. This finding may mean that individual differences in intelligence are determined substantially by genetic differences between individuals. Critics of the twin method have suggested that twin results should not be generalized to the larger population of singletons, particularly if the trait is influenced by being born a twin. Since the average IQ of twins is at least a third of a standard deviation below the average IQ of singletons, data from other sources is needed before the twin results are generally accepted.

A large scale adoption study is underway at the University of Texas where IQ test scores are available for over 1200 women who gave up their children for adoption immediately following delivery. The adopted children and their adoptive families are now being located and tested and, if current trends continue, complete data should eventually be available on over 400 families. About half of these families will contain two or more adopted children or both adopted and natural children. At present, data is available for 56 families. The results are consistent with the twin data and support a genetic hypothesis. The biological mother-adopted child correlation is 0.51 whereas the adoptive mother — adopted child and adoptive father — adopted child correlations are only 0.33 and 0.20 respectively. There are 26 pairs of unrelated children reared together in this sample and the IQ correlation for these children is only 0.12.

When the study is completed the large sample size will make possible a number of informative analyses. The reaction range for intelligence can be estimated from the IQ scores of children with lower than average IQ biological mothers and higher than average IQ adoptive parents. The effects of selective placement, common family environment, parent-child influences, and genetic resemblance, can be separated and

estimated from the matrix of IQ correlations involving biological mothers, their adopted-away offspring, adoptive parents, and the natural children of the adoptive parents.

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TWINS: COGNITIVE PATTERNING AND DEVELOPMENT AS MEASURED ON THE WECHSLER PRESCHOOL AND PRIMARY SCALE OF INTELLIGENCE

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Cognitive patterning and development was appraised for 142 pairs of twins at 4, 5, and 6 years of age, based on their test scores on the WPPSI. Compared with singletons, the twins showed an initial lag at age 4, with V-IQ more depressed than P-IQ, but by age 6 the deficit was fully recovered. MZ twins displayed high within-pair correlations for V-IQ and P-IQ at age 4, and the correlations further increased by age 6 as the measures of IQ became stabilized. MZ twins also showed significant concordance for the patterning of subtest scores. DZ twins displayed moderate within-pair correlations for IQ which declined somewhat over age, and which fell significantly below the MZ correlations. Measures of family socioeconomic status and parental education correlated 0.28-0.32 with the twins' IQ at age 6. The results indicated that within a broad range of home environments, the genotype exercised a profound influence on childhood mental development. It was coded not only for a general factor, as represented in Full Scale IQ, but also for the differential strength of the composite abilities which were separately measured on the Verbal and Performance Scales. In addition, the genotype was coded for the patterning of relative strengths and weaknesses as revealed on the individual subtests.

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TWINS: CONCORDANCE IN INFANT DEVELOPMENT AS MEASURED ON PIAGET-TYPE SCALE

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Bayley's Mental Scale was examined to determine which items were comparable to those found on Piagetian-type instruments used to assess infant development. Fifty items were found appropriate for infants during the first year of testing (at 3, 6, 9, and 12 months), and 10 items were found for the second year of testing (at 18 and 24 months). Test data based on infant twins' responses to Bayley's Mental Scale were reanalyzed to determine if genetic influences could be found for infants' responses to a Piagetian-type scale. Within-pair correlations were obtained for 126 same-sex twin pairs (82 MZ, 44 DZ) during the first year, and 154 same-sex twin pairs (91 MZ, 63 DZ) during the second year. During the first year, the within-pair correlations for MZ and DZ twins were 0.83 and 0.55, respectively; during the second year, the correlations were 0.66 and 0.40. Despite the restriction in range of scores, especially during the second year, the data indicate that there are genetic influences on infant behavior assessed by Piagetian-type items analogous to those found for conventional infant mental tests.

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PSYCHOLOGICAL FOLLOW-UP STUDY IN TWINS FROM BIRTH TO FIVE YEARS

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Classical psychological twin studies, planned as investigations of the respective influence of nature and nurture, have yielded