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The Heritability of Intelligence in Japan

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Japanese data for 543 monozygotic (MZ) twins and 134 dizygotic (DZ) twins tested for intelligence at the age of 12 give correlation coefficients of .782 and .491, respectively, indicating a heritability of .582. Heavier twins at birth have significantly higher IQs at the age of 12, suggesting that prenatal nutrition exerts a significant effect on intelligence.

KEY WORDS: intelligence; twins; heritability; Japan; prenatal nutrition; birth weight.

Studies of the heritability of intelligence using the twin method have generally been thought to be confined to the United States and northwest Europe. For this reason it may be of interest to summarize data for Japan which are published in Japanese and, no doubt for this reason, have escaped the attention of Western students. The data provide an answer to the question of whether intelligence has any heritability in Japan.

Takuma (1968) has reported results for 543 monozygotic (MZ) and 134 same-sexed dizygotic (DZ) twin pairs tested for intelligence at the age of approximately 12 years in Tokyo between 1949 and 1962. A variety of Japanese intelligence tests was used. One of these was the Tanaka-Binet, a Japanese adaptation of the Stanford Binet. For this test the MZ correlation was .790 and the DZ correlation was .432 (n's = 62 and 14, respectively) giving a heritability of .716. The other tests were composite scales measuring reasoning, verbal, spatial, and memory abilities. In total, MZ and DZ correlations are given for 23 subtests, on all of which MZ twins showed higher correlations than DZ twins. There is no discernible tendency for the MZ–DZ differences to vary with the type of cognitive ability. The overall weighted correlation was .782 for the MZ twins and .491 for the DZ twins. Using the method of doubling the differ-

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ence between the MZ and the DZ correlations to give a heritability coefficient, the coefficient for Japan is .582. The report does not give data for assortive mating of the parents of the twins. These data can be compared with the studies summarised by Bouchard and McGue (1981), which do not include the Japanese data but consist of 34 studies of MZ twins and 29 studies of DZ twins. The weighted mean of MZ correlations is .86, and that of same-sexed DZ correlations is .62. This yields a heritability coefficient of .48. As Plomin and De Fries (1980) have pointed out, older studies in the West have indicated a heritability of about .70 but more recent studies indicate a heritability closer to .50. The Japanese heritability of .582 is clearly quite close to the Western figures.

In a further paper Takuma (1966) provides data bearing on the problem of why some MZ twins differ quite substantially in intelligence. Such differences must be due to environmental factors. Takuma's data suggest that one of these factors consists of differences in nutrition received by the foetus from the mother's placenta. These differences lead to differences in birth weight. Data are reported for 269 MZ twins with a mean birth weight of 2260 g. In 106 cases the birth weights were approximately equal to within 100 g. But in 80 cases, 30% of the sample, the birth weights differed by more than 300 g, and in 35 cases, by more than 500 g. In the latter two groups there was a statistically significant tendency for the twin heavier at birth to walk and talk sooner than the lighter and to have a higher IQ at the age of 12 years.

These results are consistent with the reports by Willerman and Churchill (1967) in the United States and Henrichsen *et al.* (1986) in Denmark, who also found that MZ twins heavier at birth tend to have higher IQs at the age of about 10 years. Thus the Japanese data add weight to the thesis that a significant factor affecting the intelligence differences between MZ twins consists of prenatal differences in nutrition, which probably affect the neurological development of the brain.

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