

Discuss research into the role of factors associated with the development of measured intelligence

According to Sternberg & Grigorenko (1997), almost all researchers accept that both heredity and environment contribute to intelligence, that they interact in various ways, and that extremely poor, as well as highly enriched, environments can interfere with how a person's intelligence develops, regardless of his/her heredity. Family resemblance studies examine the correlation in intelligence test scores (IQ or measured intelligence) among people who vary in genetic similarity. If genetic factors influence IQ, then the closer the genetic relationship between two people, the greater the correspondence (or concordance) between their IQs should be. Monozygotic twins (MZs) should show the greatest concordance of all. Studies by Erlenmeyer-Kimling & Jarvik (1963) and Bouchard & McGue (1981) are consistent with the genetic theory: the closer people's genetic similarity, the greater the similarity of their IQs. But as people's genetic similarity increases, so does the similarity of their environments. One way of trying to disentangle the effects of genetic and environmental factors is to compare MZs raised together (MZsRT) with MZs raised apart (MZsRA). Another comparison involved in twin studies is between MZsRA with same-sex dizygotic twins (DZs). Bouchard and McGue found that the former are still more similar. This suggests a strong genetic influence (Bouchard et al., 1990).

Another way of trying to disentangle the effects of genes and environment is adoption studies. Munsinger (1975), for example, compared the IQs of children adopted as babies with those of their adoptive and biological parents. The average correlation between adopted children and their biological parents was 0.48, compared with 0.19 between the adoptees and their adoptive parents.

One problem with twin studies is that the 'separated' twins aren't always truly separated. For example, in Shields's (1962) and Juel-Nielsen's (1965) studies, some of the separated MZs had been raised in related branches of the parents' families, attended the same schools, and/or played together. Even if the twins have been separated at birth, they've shared the same pre-natal environment for nine months. This alone could account for the observed IQ similarities (Howe, 1997). When twins are separated, they're usually placed in families that are as similar as possible, which could account for the high concordance rate. When their respective environments are substantially different, the correlations are much lower (Newman et al., 1937). These and other methodological limitations have undoubtedly led to an overestimation of genetic influences. But twin studies still implicate genes as the major source of IQ differences (Plomin & DeFries, 1980).

One problem with adoption studies is knowing how similar (or different) the environments of the adoptive and biological parents actually are. When their socio-economic status is roughly equal, adopted children's IQs tend to be much closer to the biological parents' IQ (Scarr & Weinberg, 1978). This supports the genetic theory. But when the environments are very different, the adopted children become much more like their adoptive parents. This was dramatically demonstrated in Scarr & Weinberg's transracial adoption study in the U.S., and two French studies (Schiff et al., 1978; Capron & Duyme, 1989).

Pre-natal environmental (non-genetic) factors account for the largest proportion of biologically caused mental retardation or learning difficulties. There are several known pre-natal teratogens (agents causing abnormalities in the developing foetus), such as alcohol and hard drugs, and certain toxins are produced by the mother's own faulty metabolism. Post-natal environmental influences on intelligence include malnutrition. Although Rutter et al.'s (1998) study of Romanian orphans concluded that malnutrition hadn't had an effect over and above the effects of psychological privation, others suggest

that periodic or chronic sub-nutrition can damage intellectual development in its own right (Pollitt & Gorman, 1994).

Studies of children raised in orphanages have shown that environmental enrichment can have beneficial effects (Skeels, 1966; Rutter et al., 1998). Operation Headstart (OH) (1965) was designed to give culturally disadvantaged pre-schoolers enriched opportunities in early life. Early findings indicated significant short-term gains, which generated considerable optimism. But these early IQ gains disappeared within a couple of years, and educational improvement was minimal. The Milwaukee Project (MP) (Heber et al., 1968), an intensive intervention programme involving mainly black families and lasting from birth till the children started school, also showed that relatively prolonged intervention can make a difference to severely disadvantaged children's cognitive performance. But much of the gain is lost in subsequent years (Rutter & Rutter, 1992).

The MP was one of the most ambitious pre-school programmes ever attempted. But if its benefits were only short-lived, we have to ask if there can be lasting benefits without the whole context of family and other social and school relationships radically changing. Once the programme ended, the children and their families returned to exactly the same poor housing, schooling and so on they'd experienced prior to the programme starting. According to Hunt (1969), OH didn't provide the children with the skills they'd failed to develop at home during their early years. It also overemphasised IQ as the criterion of success, overlooking social competence, adaptability and emotional health which are more valid criteria (Weinberg, 1989), and which tend to develop over a longer period. If a longer-term assessment is made, it seems that intervention programmes have produced lasting changes in children's cognitive abilities after all. A 'sleeping effect' means that their impact is cumulative.

Howe (1997) believes that even if most intervention programmes had failed to raise children's IQ, this wouldn't be conclusive evidence that intelligence was fixed (as claimed by the genetic theory). Given how little time children actually spend in intervention programmes, it's remarkable that there's any change in IQ at all. This is even more remarkable if we consider the cultural bias of the standard tests used to measure intelligence. There's also controversy regarding the validity of IQ tests, that is, what they actually measure, and this has considerable bearing on how the findings of any study using measured intelligence are interpreted.