

case "change comes not by a wholesale overthrowing of the past but by leaning against the past to gain a kind of leverage and add something new to it". A glance at another Young, G.M. Young, might have been useful here. Even so, Lord Young, who draws most of his analogies from biology, has some useful comments to make about history. In comparison economics throughout gets short shrift, even in the brief section "The Question of Progress", and even though economists have been particularly interested, as the author observes *en passant* earlier in the book, in cycles and in 'trends' (a term he does not use).

Nonetheless, Chapter 6, "The Metro-nomic Pulse", begins with economics although it is approached ritualistically rather than analytically, and later turns to a point made by a number of economists that "the axiomatic and automatic consequence of a rising standard of living is that time becomes scarcer". For Lord Young the position is more serious than they suggest, for "the symptoms of the famine are all around us" and (a memorable phrase) "the more deliberation there is, the more deliberation is necessary". The thought leads, in linear fashion, to the prescriptions of the last chapter — reintroducing "more of the cyclical into the evolutionary mix" and giving "a more prominent place once again to the cycles of nature". The penultimate section is called "Back to Circadian Rhythms", the last "Escape from the Grid". The titles speak for themselves. To anyone suffering from time famine the prescription is attractive, and there may be reasons different from those advanced by Lord Young for following it. He does not quite say, however, how to do so.

Within the book there are running arguments with sociologists about the nature of sociology, at least one dig at anthropologists, and freely acknowledged processes of borrowing from biologists. Indeed, while expressing distaste for sociobiology Lord Young shows himself to be an eloquent spokesman for his own version of social darwinism. He has great social concern, however, and is untouched by determinism. One word he never uses about human beings is curiosity — perhaps because he has so much of it himself.

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#### New in paperback

- *Medicine in China* by P.U.enschuld. Publisher is University of California Press, price is \$12.95, £7. For review see *Nature* 327, 198 (1987).
- *The Great Devonian Controversy* by Martin J. S. Rudwick. Publisher is University of Chicago Press, price is \$22.95, £15.95. For review see *Nature* 316, 491 (1985).
- *Duchenne Muscular Dystrophy* (revised edition) by A. E. H. Emery. Publisher is Oxford University Press, price is £17.50, \$35. For review see *Nature* 329, 594 (1987).

## Infant individuals

George Butterworth

**Nature and Nurture During Infancy and Early Childhood.** By Robert Plomin, John C. DeFries and David W. Fulker. Cambridge University Press: 1988. Pp 345. £30, \$44.50.

IN THIS book, Robert Plomin and his colleagues employ quantitative behavioural genetics to explore the origins and development of individuality during infancy and early childhood. They analyse "the nature of nurture" to study genotype-environment interaction and correlation, and the genetic mediation of environmental influences, rightly stressing that their methods yield totally different information to that obtained by research on group averages. The second approach consigns individual differences to error variance, whereas the first respects natural variation as being at the very foundations of individual development.

Behaviour genetics involves detailed and rather technical statistical analyses of twin and adoption studies. Twin studies, in which identical and fraternal twins are contrasted, enable estimates of the components of variability due to genetic or environmental effects. Adoption studies, on the other hand, allow the possible covariation between genes and environment to be teased apart. Genetically unrelated individuals adopted into the same family will resemble each other for environmental reasons only. The effects of the remainder of the non-shared environmental variance, such as differential maternal attention between siblings, can also be estimated.

Height and weight, obvious physical variables, are often used to 'anchor' cognitive and behavioural measures. Height, for example, shows a strong correlation from infancy to early childhood, with genetic and environmental effects differing at various times in development. Fraternal twins are actually physically more alike than identical twins at birth, but not at six months, perhaps because identical twins may be subject to greater intra-uterine competition for nourishment through the chorion. Adopted siblings also show significant correlations for height during the second year of life, although these values are not as high as for fraternal twins. Hence, for physical variables it is possible to distinguish genetic effects, effects of the shared twin environment and effects of non-shared environmental factors.

Cognitive or personality development is, of course, more variable than physical development. IQ scores are notoriously unstable from infancy to early childhood, at least in part because of the different sensori-motor and verbal items on the

tests. Genetic influences on IQ may be greatest between the ages of one and two years, while shared environmental factors, as assessed through adoptive siblings, may account for more of the variability between IQ in early childhood. The Colorado Adoption Project (CAP) analysed here also shows that shared environment may be of lesser importance for the development of temperamental characteristics than non-shared environmental effects. An odd, unexplained result of the CAP study was that the amount of television viewing at three and four years of age may have a heritable component; a significant correlation was found on this variable between adoptive siblings.

In the final chapter, the authors consider the "nature of nurture". The appropriate behavioural genetic design for such a study would involve quantifying the parenting behaviour of adult identical and fraternal twins as well as data from twin children and their parents. Genetically mediated differences in parenting, as revealed by differences between identical and fraternal twin parents, may have differential effects on their children. Genetic differences among children may also contribute, and the differential effects could be quantified because the children of identical twins are related to each other as half-siblings, whereas the children of fraternal twins are cousins. Parents and children share 50 per cent of their genes, regardless of whether their twin children are identical or fraternal, and this again yields the possibility of contrasting differential effects on development. Unfortunately, there are no data on these contrasts; in the book they seem to be mentioned as a behaviour geneticist's methodological ideal. But adoption studies do offer some evidence that maternal involvement — in encouraging development, for example — correlates more highly with IQ in non-adoptive siblings than in the adoptive child. The authors suggest that this may be explained as a genotype-environment correlation whereby the greater genetic match between the mother and her biological child facilitates development.

The book contains descriptions of many hundreds of observations on the complex inter-relationships between heredity and environment, and they illustrate well the ingenious ways in which the components of individual variation can be disentangled. The authors have made a great deal of progress beyond the stark genes versus environment dichotomy of earlier behaviour genetics. Whether the greater sophistication of partitioning will satisfy those who espouse a holistic approach to individual development remains to be seen; but at least the inter-penetration of nature with nurture has been acknowledged. □

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