



SPECIAL REVIEW

The Impact of Genetic Factors on Behaviour

ROBERT PLOMIN and GERALD E. MCCLEARN (Eds): *Nature, Nurture and Psychology* Washington: APA (1993). 499 pp. Harback. Illst. ISBN 1-55798-202-3

It is a sign of the times that a book on behavioural genetics is being published by the American Psychological Association. Even 10 years ago such an event would have been inconceivable; the forces of behaviourist environmentalism and political correctness would have been too strong. But in science the proliferation of new facts, methods and analyses, and the replication of earlier work on much larger samples, often extending into tens of thousands of twins, have forced the issue. Acknowledgment of the importance of genetic determinants in causing differences in intelligence, personality and social attitudes, mental disorders, criminality and many other behaviours is now universal, and may even reach our textbooks within the next 20 years or so. This book covers a wide range of topics, and may have a beneficial influence in spreading the word. It has many fine chapters—Kimble and McClearn on the history of development of behaviour genetics; McGue on the genetics of cognitive ability; Fulker on continuity and change in cognitive development; Cardon on the genetics of specific abilities; De Fries on reading disabilities; Brody on the differences in genetic research on intelligence and personality; McGuffin on depression; Gottesman on schizophrenia; McGue on alcoholism; Rutter on autism; Eaves on hyperactive attention deficit; Plomin on perspectives and future developments. These constitute an excellent introduction to the field, and the bibliographies will be found a good guide to students.

The book also has faults, and these must be mentioned. The first fault is the absence of a chapter outlining the main findings in the personality field. Brody and Rowe cover small areas of the field, but too much is left out. In particular, one misses a discussion of the light thrown on the causes of differential development of personality by the fact that the whole burden of causal environmental influence is thrown on within-family factors. This must discredit all traditional theories making family influences responsible for the major part of environmental determinants of behaviour. A thorough discussion of this issue would have been essential for most readers. It is an issue that demonstrates most clearly the fact that genetic studies go well beyond simply calculating heritabilities, but may have a major influence on theories of central importance to psychology and psychiatry.

Another issue that urgently needs a chapter or two is one adumbrated in the rather unsatisfactory Part Five of the books, dealing with the question "How"—how does DNA influence behaviour. There has been a great deal of work on the biological mechanisms intervening between DNA and cognition and temperamental behaviour patterns. Vernon (1993) summarizes some of the literature covering intelligence, Zuckerman (1991) personality. All this work remains in limbo, and instead we have a purely hypothetical discussion by Bronfenbrenner and Ceci which admittedly has no factual basis and gets us nowhere. It is difficult to understand such an omission, when the need for an answer to the "How" question is underlined by several contributors. Don't they know about the existence of such a literature?

Another lack is the failure to discuss at some length the role of measurement error. This appears in most formulae as part of the within-family environmental variance, unduly swelling that part of the variance breakdown and leading to an underestimate of the genetic variance. The point is mentioned in passing, but it is too important to leave it at that. Corrections of h^2 to estimate heritability as part of the 'true' phenotypic variance would make a great difference, particularly in the case of personality, and afford a better perspective in comparing the relative influence of genetic factors in intelligence and personality.

There are several oddities in the text that are perplexing. Kimble repeats a point originally made by Donald Hebb, who tried to make fun of the question of genetic contributions to intelligence by asking whether the area of a rectangle was determined by its height or width. As I pointed out to him when we were both teaching a summer course in Berkeley, looking at a single rectangle is not a meaningful comparison because it has no variance; if we look at a group of rectangles then it is perfectly meaningful to ask the question *for that group*, and an analysis of variance will give us a meaningful answer. Kimble also suggests that "environment accounts for the majority of variance", but that is quite contrary to the facts—he suggests 35% of the variance for "a broad range of traits and behaviours". Personality heritabilities and those of social attitudes are at or above 50% (Eaves, Eysenck & Martin, 1989), and IQ heritabilities a good deal higher. Even McGue argues for a much too low estimate of IQ heritability of 51%, saying that "happily, this estimate of IQ heritability fell midway between the estimate advocated by some of the more strident partisans in the debate." Apart from the fact that 'strident' is not a word I would have applied to such as David Fulker who argued for a value of 70%, on the basis of a large-scale analysis of all the evidence, it is not clear how McGue reconciles the 51% estimate with the 72% based on MZ twins brought up in separation. In fact, it seems rather meaningless to quote one overall figure when the evidence brought forward by McGue shows that IQ heritability is very age-dependent, being much higher (over 80%) in adults than in children.

Another curious point is the statement (often repeated) that the battle between nature and nurture was nonsensical, and that it had been resolved by searching for a numerical solution on the lines of how much, in what circumstances, for what trait. The assumption that there were 100% hereditarians among the behavioural geneticists will not stand up. Having been in the middle of that battle, and having known many of the leading participants, I cannot think of one who would have assumed anything so obviously silly as a 100% genetic determination of any behavioural variable. The imputation that there were any 100% hereditarians is simply untrue; there were, and are, 100% environmentalists, and they carried the day for many years, largely by ignoring the available evidence, or misrepresenting it. There never was a *scientific* argument of either-or; it was always one of how much.

Brody makes an important point in his comparison of genetic studies of intelligence and personality when he suggests that the latter have almost universally used questionnaires rather than laboratory tests; he states that "behavioural genetic analyses of covariance between personality trait measures and performance in laboratory contexts have not, as far as I know, been

reported." I tried to do precisely that in my early work (Eysenck & Prell, 1951; Eysenck, 1956), and I did find as Brody suggests, that calculating h^2 for a *factor* of neuroticism gave significantly higher values than are commonly found for questionnaires by themselves. This would seem to follow from the nature of a factor which is clearly more inclusive of the 'true' variance of the trait in question than any one measure. If this suggestion were to be taken up we might find that personality heritability was every bit as high as IQ heritability.

Where do we go from here? Some of the most interesting chapters in the book try to look into the future, foreseeing above all the impact of molecular genetics on the field. There is little concern about the necessary changes in the teaching and practice of psychology. Clearly it is unreasonable to have courses and textbooks on psychology that are silent as far as behavioural genetics is concerned, and that go on dishing out 'information' now definitely shown to be wrong. A factor that accounts for over 50% of the variance in behaviour can hardly continue to be discounted, or treated with disdain and ill-concealed dislike! It is curious that many of the contributors talk about 'modest' heritabilities—in correlating it with the target variable, 0.70 (equal to 50% of the variance) would be regarded as incredibly potent! This is false modesty with a vengeance. We should insist on a proper representation of behavioural genetics in our textbooks, and in our teaching, with a proper regard to methodology, statistics and results. Anything less is a betrayal of the scientific nature of psychology. Hopefully this book will have a beneficial influence on the wider dissemination of genetic knowledge among psychologists.

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