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978-0-521-03424-1 - Nature and Nurture During Infancy and Early Childhood

Robert Plomin, John C. DeFries and David W. Fulker

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and early childhood**

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ROBERT PLOMIN

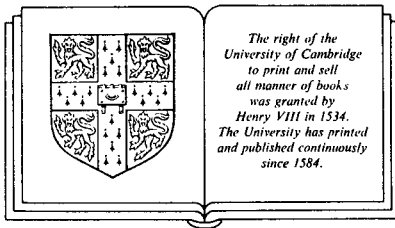
The Pennsylvania State University

JOHN C. DEFRIES

University of Colorado

DAVID W. FULKER

University of Colorado



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TO THE MEMORY OF RONALD S. WILSON

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Preface

Behavioral genetic theory, methods, and research provide a unique perspective on nature and nurture during infancy and early childhood, that is, on the genetic and environmental origins of individual differences in behavioral development. The words “nature” and “nurture” each have warm associations until they are brought together. One of our goals is to emphasize the conjunction “and” rather than the projective test provided by the dash in “nature–nurture” or the explicit hostility in the phrase “nature versus nurture.” We believe that the perspective of behavioral genetics is as useful for understanding environmental influences in development as it is for exploring the role of heredity, and we hope that this book will convince developmentalists of the importance of both genetic and experiential factors in the origins of behavioral differences during infancy and early childhood. At the simplest level, the components-of-variance approach – which we explore in terms of simple correlations as well as by means of model-fitting analyses – often indicates that genetic variance is significant and invariably shows that nongenetic factors are important.

The decomposition of phenotypic variance into genetic and environmental components of variance is the standard fare of behavioral genetic research. Somewhat newer is an emphasis on the decomposition of the environmental component of variance into two components, one shared by family members, which increases their phenotypic resemblance, and the other not shared; correlations for genetically unrelated children reared together in the same adoptive homes are especially powerful for detecting the “bottom line” influence of growing up in the same family. The importance of the distinction between shared and nonshared environmental influences becomes clear when we show that shared environmental influences increase in importance for cognitive abilities during infancy and early childhood but that nonshared environmental influences predominate for all other domains of development. Behavioral genetic analyses that incor-

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porate specific measures of the environment can be used to go beyond the decomposition of variance in order to explore such topics as the impact of environmental influences in adoptive families in which family members share environment but not heredity, genetic influence on measures of the family environment and on environment–development associations, and genotype–environment interaction and correlation. Some of the results of this research are surprising. For example, genetic influences on measures of the family environment appear to be substantial, at least in infancy. This finding has great implications for our study of the family environment, especially when we study family members who share heredity as well as family environment.

In addition to its emphasis on nurture as well as nature, another special feature of this book is its focus on the etiology of change as well as continuity during the first four years of life. The essential point is that genetics contributes to change as well as to continuity during development. The lifeblood of research on developmental change and continuity is the longitudinal study, and our contribution to longitudinal behavioral genetic research is the Colorado Adoption Project, which we refer to extensively in this book to illustrate issues of the genetic and environmental etiology of individual differences, change, and continuity during infancy and early childhood.

We dedicate this book to the memory of Ronald S. Wilson (1933–86), one of the founders of the subdiscipline of developmental behavioral genetics. His lasting memorial is the longitudinal Louisville Twin Study, the premier study in the field of human developmental behavioral genetics. Professor Wilson directed the project for nearly 20 years, during which time nearly 500 pairs of twins were studied in more than 5,000 test sessions from the first year of life through adolescence. This single study has been the major source of knowledge about nature and nurture during infancy and early childhood, and our book relies heavily on its results. Although Professor Wilson’s work on physical development and temperament has been influential, he is perhaps most well known for his concept of genetic influence on “spurts and lags” in mental development, a concept depicted vividly in his frequently reprinted figures of longitudinal profiles of scores for individual pairs of identical twins and pairs of fraternal twins. Infants and young children often show dramatic changes from year to year in their scores on mental tests; however, identical twins change in tandem, more so than fraternal twins. Professor Wilson’s work on this topic has succeeded in convincing many developmentalists of the possibility of genetic change as well as continuity during development. He had the vision to see the importance of a large-scale longitudinal twin study – longitudinal behavioral

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genetic studies alone can answer questions about change and continuity during development – and the determination, courage, and tenacity to fulfill that grand aim. It is a striking achievement that has been a model for us and, we hope, will be for future generations of behavioral geneticists.

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Because there are so few behavioral genetic studies on infancy and early childhood, this book relies heavily on the two major longitudinal behavioral genetic studies carried out during infancy and early childhood: the Louisville Twin Study and the Colorado Adoption Project (CAP). The Colorado Adoption Project, begun in 1974, involves 245 adoptive and 245 non-adoptive families in which adopted and nonadopted children have been studied in their homes at 1, 2, 3, and 4 years of age; the biological and adoptive parents of the adopted children and the parents of the nonadopted children have been administered a 3-hour battery of tests and questionnaires. The long-term, large-scale nature of this project has led to a lengthy list of people to whom we are indebted. We are deeply grateful to the parents and children for their participation, cooperation, and encouragement. Two adoption agencies and their administrators – John Califf and Jodi McElhinny of Lutheran Social Services of Colorado and James Mauck and Dolores Schmidt of Denver Catholic Community Services – made the study possible. We greatly appreciate Salley-Anne Rhea's efforts in coordinating the project, Diane Perry's work in conducting the home visits, and the diverse efforts of Anne Boland and Beth Shafer. As this book was being written, four students who worked on the study during their entire graduate careers received their doctorate degrees for dissertations based on analyses of CAP data: Robin Corley, Denise Daniels, Treva Rice, and Lee Thompson. Several other graduate students who contributed to analyses described in this book continue to be involved in the CAP research enterprise: Cindy Bergeman, Hilary Coon, Michele LaBuda, and Kay Phillips. The Institute for Behavioral Genetics has subsidized the project financially and, most importantly, with the day-to-day assistance of its excellent staff; we especially thank Agnes Conley, Dianne Johnson, and Rebecca Miles. We have profited from interactions with our colleagues at the Institute, especially from Steven Vandenberg, whose experience was very helpful in planning for the study. Our gratitude to many other indi-

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viduals who contributed earlier to the CAP was acknowledged in a book that reported CAP results in infancy (Plomin & DeFries, 1985a) – their contributions, and our appreciation, have been compounded during the 13 years of the CAP.

We are grateful for the continuous support of the National Institute of Child Health and Human Development since 1977 for the collection of CAP data at 1, 2, 3, and 4 years of age (HD-10333); NICHD also supports an extension of CAP to middle childhood (HD-18426). Since 1978, the National Science Foundation has awarded grants (BNS-7826204, BNS-8200310, BNS-8505692, BNS-8643938) that enabled us to collect videotaped recordings of mother–infant interaction at 1, 2, and 3 years of age and to study interactions among adoptive and nonadoptive siblings. The CAP was launched in 1976 with the aid of funds from the University of Colorado’s Biomedical Research Support Grant and a small grant from the National Institute of Mental Health (MH-28076); the project was supported in 1977 by the William T. Grant Foundation. The Spencer Foundation provided support from 1982 to 1985 for the purpose of testing younger adopted and nonadopted siblings of the probands at 5 and 7 months of age on a measure of novelty preference; the Spencer Foundation also launched an extension of the study into early adolescence. Finally, our research and thinking about nature and nurture during infancy and early childhood has profited immensely from our participation since 1982 in the Transition from Infancy to Early Childhood Research Network of the John D. and Catherine T. MacArthur Foundation.