

**Robert Plomin and John C. DeFries.**  
**ORIGINS OF INDIVIDUAL DIFFERENCES IN INFANCY:  
THE COLORADO ADOPTION PROJECT.**  
Orlando, FL: Academic Press, Inc., 1985.  
406 pp. \$39.95.

Questions of environmental and genetic influences on a child's development have tantalized our thought processes for centuries. Is the environment the principal factor in determining the intellectual, physical, and moral directions of a child; or is heredity the key? Locke believed that the child had to be nurtured to achieve its full potential. "I imagine the minds of children as easily turned this or that way as water itself. . . ." (Some thoughts concerning education, p. 211). In contrast, Rousseau postulated that all infants were born with innate senses and would develop naturally, given a modicum of guidance. "God makes all things good; man meddles with them and they become evil" (Rousseau, *Emile*, p. 1).

In an effort to understand the etiology of human development and of individual differences, many individuals have attempted to identify the genetic contributions and the environmental influences. In 1974, Robert Plomin and John DeFries created the Colorado Adoption Project to study the interface of heredity and environment. *Origins of Individual Differences in Infancy: The Colorado Adoption Project* is the first report from this project analyzing "[b]ehavioral individuality during infancy – its description, correlates, and causes. . . ." (p. 1).

The Colorado Adoption Project (CAP) was established as a prospective, longitudinal study of infants and their parents, both natural and adoptive. Studies of twins, reared together and apart, had been the more commonly used approach to examine the "nature-nurture" question. Plomin and DeFries reported, however, that adoption studies offer one of the best methods, because of the ability to separate and analyze independently the influences of the environment and of heredity. A full adoption design was used; that is, the biological mother and father (when possible) were also studied. This enabled the researchers to assess specific environmental factors, to identify parental characteristics, and to control for the effects of heredity in their search for environmental influences.

Data were collected from 182 adopted infants and their families, both natural and adoptive. One hundred and sixty-five non-adoptive infants and families were also studied. These families were matched to the adoptive families through age, occupation of parents, and education. The occupation of the grandfathers was also noted, to establish matches with the infants' biological mothers.

The infants were studied at 1 and 2 years of age in their home environments. Each assessment took 2-1/2 hours to complete; the measures included the following: health interview; Bayley Scales of Infant Development; Caldwell Home Observation for Measurement of the Environment; Moos' Family Environment Scale (altered to a 5-point scale); tester observations – ratings of the home and neighbourhood; interviews about the infant's productions of words, interests in objects, and developmental milestones; four subtests from the Uzzgiris-Hunt Ordinal Scales of Psychological Development; Colorado Childhood Temperament Inventory; three 5-minute mother-infant videotaping sessions.

Parents, biological and adoptive, were assessed once, in a 3-hour long session. The measures were designed to ascertain general and specific cognitive abilities and personality traits; and to collect information on medical and social history, aptitudes, and interests. The researchers even asked about television viewing habits and food preferences.

Multivariate analyses were used to derive conclusions about genetic and environmental influences on these infants. Ten chapters in the book present the results of analyses based on the measures that were used. Plomin and DeFries discuss in considerable depth their findings about the environment, intellectual development, communicative development, personality and temperament, behavioural problems, motor development, and gender differences. Outlined below are a few of these findings:

1. Genetic influences are found to affect infant mental development, language acquisition, certain characteristics of temperament, motor development, and physical growth.

2. The data suggest that the genetic correlation between scores on the Bayley Mental Scale (for infants) and the battery of measures used to assess adult IQ is about .75.

3. The results suggest that infant communicative development is genetically related to adult intelligence as measured.

4. Genes which affect the character in infancy are found to continue to affect character in adulthood. Genes also appear to be programmed to influence change during the later stages of development.

5. The personality of parents is not useful in predicting most characteristics of infant temperament or personality. The study does, however, discover the possibility of a genetic mediation on sociability and and emotionality.

6. The researchers' analyses of the home environment suggest the possibility of genetic mediation on environmental influences, as differences are noted for the IQ related factors of parental education and economic status.

7. Gender has a negligible impact on individual differences in infancy.

8. Genetic and environmental factors usually account for less than ten percent of the variation. Infant development is seen to be "... so tightly programmed by evolutionary canalization that variability is curtailed" (p. 344).

The study and the results, impressive by any measure, can be questioned from several perspectives. Ninety percent of the families were Caucasian. Only middle class families were used; extremes in environmental conditions were not encountered. The parent-infant design did not permit the testers to consider the role that siblings might play. Adults were tested only once; infants, twice. The effects of infant motivation and perseverance were not considered.

Nevertheless, the project has gathered an incredible amount of useful, interesting data. CAP plans to continue assessing the infants at 3, 4, 7, 11, and 16 years of age, and to broaden the study to include the siblings, adoptive and non-adoptive. The authors present lengthy reviews of literature for every topic of concern. Terms are clearly explained; measures are described and evaluated.

The Plomin and DeFries study strengthens the argument for the impact of heredity on infant development. The authors are sensitive to the political controversy that envelops questions of environment and heredity. "These fears often stem from unexamined assumptions that genetic effects are immutable and that nothing can be done about them" (p. 14). They reason that the more that is known about the conditions of nature and nurture, the better we will be able to treat any of the problems so related.

The CAP is an extensive, ambitious undertaking, exploring the genetic and environmental influences on infant characteristics. For educators concerned with the course of human development, the book provides an important contribution to its understanding. Its analyses and findings will be cited in the years to come in any serious discussion about the effects of heredity and environment.

**Judith Pollard Slaughter**  
McGill University

**REFERENCES**

- Locke, John. (1947). *On politics and education*. Roslyn, NY: Walter J. Black, Inc.
- Rousseau, John Jacques. (1790). *Emile*. (B. Foxley, Trans.). London: J.M. Dent & Sons Ltd.

**Eleanor Duckworth.**

**THE HAVING OF WONDERFUL IDEAS AND  
OTHER ESSAYS ON TEACHING AND LEARNING.**

**New York, NY: Teachers College Press; 1987.**

**168 pp. \$13.95.**

One of the goals of this slim volume is to show that children's intellectual development is based on the "having of wonderful ideas." Most important, Dr. Duckworth lucidly demonstrates how certain teaching approaches can provide the opportunities for these ideas to develop and mature. A second goal is to present Jean Piaget's overarching ideas on children's intellectual development in a way that is meaningful for the school curriculum.

These goals stem from Dr. Duckworth's personal experiences: her early work with Piaget, whose influence spanned the years of her own development and career as a scholar; her work with two science programs (Elementary Science Study and the African Primary Science Program); her primary school teaching experience, and more recently, as a researcher and educator at Massachusetts Institute of Technology and Harvard Graduate School of Education, respectively. These are impressive credentials, but the most important quality of this work is the clear, succinct presentation of theories of teaching and learning. These are supported with sufficient examples from the real world of children and teachers.

"The having of wonderful ideas" is a series of ten essays, some of which have been published previously. Nevertheless, Dr. Duckworth weaves the essays together to reinforce the theme. It is introduced and summarized in the opening essay by the comment that one (meaning educators) should be "willing to accept children's ideas" – something teachers are not always ready to do – and provide a real setting for these ideas to percolate.

The second and third essays present Piaget's thoughts and findings on the development of language in young children. Dr. Duckworth