

settings, and no single default rule is likely to be appropriate. Also, in this context one should note the author's narrow and specific meaning of the term "commons," which his functional perspective presents as "a type of resource management strategy." That contrasts with the broader, more expansive scope of the term, encompassing a wide variety of governing arrangements, that many scholars, including Nobel laureate Elinor Ostrom, have used in studying common pool resources.

The book provides a new and productive way of analyzing all forms of infrastructure, especially those that are sources of major social value. Frischmann helps us recognize the importance of understanding how different types of policies balance provision and use. With its many fresh ideas, *Infrastructure* itself is likely to generate social value through additional research and the creation of innovative policies.

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GENETICS

Similarities Despite Separation

Dorret I. Boomsma

No study of twins has generated as much publicity, media attention, and discussion in the field of behavior genetics as the Minnesota Study of Twins Reared Apart (MISTRA). This milestone study, founded and directed by Thomas Bouchard Jr., included 137 pairs of twins who were separated in infancy and reared apart. It was the first project of its kind to include both monozygous (MZ) and dizygous (DZ) twins (81 and 56 pairs, respectively). No other single study has produced results that are as important in evaluating one of the crucial assumptions of classical twin study design: the equal environments assumption, "the premise that the environmental factors affecting similarity in a given trait ... are the same for MZ and DZ twin pairs."

The study, which ran from 1979 to 1999, brought twin pairs, some of whom had not previously met, to Minnesota for a week of

Born Together—Reared Apart: The Landmark Minnesota Twin Study

by Nancy L. Segal

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Together again. A 1987 reunion of British reared-apart twins.

assessments. The protocols recorded a wide range of phenotypes, including personality, physiological and dental traits, brain function, lifestyle, happiness, attitudes, and, of course, IQ and cognition. In a landmark 1990 paper, Bouchard and colleagues summarized the resemblances observed in 60 pairs of monozygotic twin pairs reared apart and compared them with resemblances measured in monozygotic twins reared together (1). Importantly, they also reported the reliability of the traits (the correlation between two testings of the same individual). They found no large differences between the two groups of twin pairs, validating the equal environments assumption. For example, correlations in mental abilities (IQ and some subscales) ranged between 0.64 and 0.78 for the twins raised apart, while those for twins raised together were between 0.76 and 0.88.

In *Born Together—Raised Apart*, Nancy Segal offers a comprehensive account of MISTRA. Segal (California State University, Fullerton), who has been involved with the project for most of its duration, documents its procedures, funding, and results. Online (2), she also provides a complete list of the assessments. She proceeds chronologically, from "early findings" to "twin studies of the future." However, reflecting shifts in the researchers' focus, individual chapters tend to concentrate on a few traits (e.g., "Sexual orientation, cognition, and medical traits" and "Psychopathology and religiosity"). The chronological organization does lead to some repetition, as results based on smaller sample sizes are presented in earlier chapters and then discussed again based on the larger data sets.

In the 1980s and 1990s, MISTRA was the

largest study of reared-apart twins. Nonetheless, sample sizes often turned out to be too small to allow firm conclusions. For example, to test Frank Sulloway's birth-order theory (firstborns in a family tend to be more traditional), Segal compared MZ twins having different birth order in their adoptive families (3). Even with the combination of data from MISTRA and the Swedish Adoption and Twin Study of Aging, she found no meaningful differences. However, this example illustrates another of the book's strong points: throughout, Segal includes and discusses data and findings from the few other studies on twins reared apart. These include earlier works by Horatio Newman, Frank Freeman, and Karl Holzinger on 19 U.S. pairs (4); by James Shields on 44 pairs in Great Britain (5); and by Niels Juel-Nielsen on 12 pairs from Denmark (6). Segal omits the work by Cyril Burt, who has been accused of fabricating data. After briefly discussing the charges against and defenses of Burt, she concludes that the affair is currently unresolved.

Segal writes very well. Much of the material may be familiar to twin researchers and behavioral geneticists, although they will enjoy the recollections by MISTRA's major investigators. All readers will find *Born Together—Raised Apart* a highly valuable account of the entire project.

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