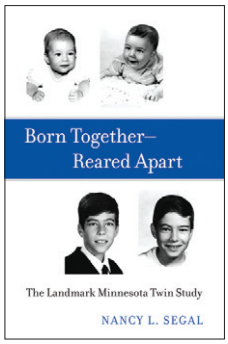
Book

Twins and science: a tale of determination



Born Together—Reared Apart: the Landmark Minnesota Twin Study
Nancy L Segal.
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"Genes and glands are obviously important, but social learning also has a dramatic role. Imagine the enormous differences that would be found in personalities of twins with identical genetic endowments that were raised apart in two different families." So wrote Walter Mischel in a textbook of psychology in the 1970s. This quote is used by Nancy Segal in *Born Together—Reared Apart* to illustrate the prevailing mood of the time—that of the importance of parenting, social factors, and culture on personality. It's a view that was challenged and ultimately found to be flawed by twin studies.

The study of "the two Jims"—identical twins reared apart in Ohio—started a media frenzy that led to the birth of the Minnesota Study of Twins Reared Apart in 1979. The Jims found each other at the age of 39 years, after being separated as infants. They had been adopted by separate families and lived about 40 miles apart. After an emotional reunion, strange similarities emerged. They both named their first-born sons James, hated spelling and enjoyed maths at school, loved carpentry and Salem cigarettes, and had worked in law enforcement. Thomas Bouchard, a Psychology Professor at the University of Minnesota, quickly got the funds to study them in detail and used the worldwide publicity generated to attract other twins to the study, which ran for 20 years.

Segal was a postdoc who arrived soon after the study started. In *Born Together—Reared Apart*, she has written a meticulous and fascinating account of the study that involved a total of 137 pairs of twins, including 81 identicals raised apart, mainly from the USA and the UK. It wasn't the first study of its kind, but it was the largest and certainly the most influential. Twins who had been separated were tracked down and invited for an often emotional reunion that lasted a week, during which they were given an exhausting battery of tests, including over 15 000 questions about their lives and habits.

Looking back from the age of the Human Genome Project and ENCODE, it's hard to imagine the hostility twin behavioural researchers faced at that time—they were still recovering from accusations of data fixing over the controversial estimates of IQ heritability produced by Sir Cyril Burt. As Segal explains, Bouchard and the Minnesota study suffered from this environment and never received steady US federal or institutional grants, and so existed on a shoestring budget. In part this was because aggressive reviewers didn't believe that genetic influences could be that strong, and because many of the data were presented anecdotally—which the media loved, but academics hated. When the money ran out, Bouchard turned to the Pioneer Fund, a private charity that was tainted by indirect associations with racist research. The study was later criticised for producing few peer-reviewed papers, instead focusing on books and media reports. Segal has tried to address this retrospectively by presenting much of the old data and tables together in the new book. This is great for twin and behavioural researchers, but the detail makes it tough going for general readers—who may prefer the style of her previous books on the same theme, such as *Entwined Lives*.

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By today's standards the number of twins studied was modest. However, the results stand the test of time, with heritability results usually close to data from twins reared together. Significantly, the Minnesota study showed that normal twin studies were not biased to any meaningful degree by parental behaviour or sharing environments differently. It also supported the evolving view that the role of family environment in most personality traits and IQ had been exaggerated. Scientists now accept the validity of twin studies in showing heritability of virtually all traits tested, the main argument is whether they still overestimate genetic effects or not.

30 years later twin researchers no longer ask why identical twins are so similar—which they are superficially in looks, habits, and tics—but instead ask why they are different? The "giggle twins" from the UK were part of the Minnesota experiment and feature in Segal's books. When I met them for our studies they did, indeed, have identical mannerisms and their trademark laugh. Sadly, one died recently, emphasising that mortality and longevity are still unpredictable at the level of individuals. Why do most identical twins raised together, sharing identical genes, parents, schools, cohort effects, early diets, and many other factors, die of different diseases and usually not share chronic conditions or cancers? Epigenetics—the study of how gene effects can be modified by environment—may hold many of the answers and is one of the fastest expanding and most exciting uses of twin research. But the current studies wouldn't be here without the pioneers who bravely kept twin studies from extinction.

Tim Spector is the author of *Identically Different: Why You Can Change Your Genes* (Weidenfeld & Nicolson, 2012).

Tim Spector
tim.spector@kcl.ac.uk