nature via nurture theme finds its most persuasive and instructive elucidation in this portion of the book (pp. 125–176). I read it three times, and continued to learn on each run.

Having praised the book’s merits, what might be said in criticism? I feel that his enthusiasm leads Ridley to underestimate the extent of the attachment to the nurture-only point of view. The American Anthropological Association, for example, has adopted a statement on race which declares, directly contrary to Ridley’s view, that ‘human cultural behaviour is learned, conditioned into infants beginning at birth, and always subject to modification … . Our propensities, dispositions, and personalities, regardless of genetic propensities, are developed within sets of meanings and values that we call ‘culture’. Studies of infant and early childhood learning and behavior attest to the reality of our cultures in forming who we are … it is a basic tenet of anthropological knowledge that all normal human beings have the capacity to learn any cultural behavior’ (http://www. aaanet.org/stmts/racepp.htm). This is exactly where Franz Boas positioned anthropology 80 years ago. It is a perspective that optimizes the meliorist vision. But what if all normal persons cannot learn algebra or excel in sport? What if there are indeed heritable race differences in behaviour? The struggle isn’t over yet.

Endnote

1 While this review was in press, Bruce Lahn and associates published two articles in Science on Microcephalin and ASPM variants, showing that they arose 37,000 and 5800 years ago, respectively, probably under strong selection pressure. This exceptional finding is likely to figure in future investigations of the evolution of intelligence.

Hiram Caton
Griffith University, Brisbane, Australia

Indivisible by Two: Lives of Extraordinary Twins

Nancy L. Segal


Nancy L. Segal, Distinguished Professor in Humanities and Social Sciences and Director of the Twin Studies Center at California State University has delivered a second delightful book about twins that will appeal to anyone fascinated by the similarities and differences of those who are genetically identical. In her first book, Entwined Lives: Twins and What They Tell Us About Human Behavior, published in 1999, Nancy Segal compiled a unique mix of research findings and personal stories. In Indivisible by Two, Professor Segal focuses on 12 diverse case studies of, almost exclusively, monozygotic (MZ; or identical) twins or higher multiples. Each example is so unique in its own way that the reader is left to wonder at the extensiveness of Professor Segal’s case notes that she is able to create a book with so many examples that are so different. It is a credit to her that so many twins and their families are willing to share their experiences with her, invite her into their lives and agree to have their stories included in a book. Her attention to detail, humor and chatty style will ensure the book’s appeal to a far-reaching audience.

Indivisible by Two is divided into four sections, each of three chapters. In the first section, ‘Separated at Birth’, we meet three sets of twins who have been reunited after being reared in different families. All three examples have been reported elsewhere, including by Professor Segal herself. Nonetheless, these examples are so interesting that the repetition is justified and it is nice to have the breadth of detail allowed by this book. First, we meet Mark and Gerry, who grew up 30 miles apart and first met in their early 30s after both entering the fire service. Later we meet Oskar, raised a Catholic by his mother in Hitler’s Germany, and Jack, raised a Jew by his father in Trinidad. Their extremely different cultural environments made their first meeting in 1954, aged 21, difficult. They were finally brought together 25 years later by the University of Minnesota ‘Twins Reared Apart’ program. Their story was the subject of the 1995 documentary Oskar and Jack. In both these cases, it is the numerous ways in which these twins are similar that makes such fascinating reading — the pinky held under the beer can for Mark and Gerry, the obsessive sensitivity to germs of Oskar and Jack. Of course, cynics might say that if you took two unrelated people and compared enough habits that you
would find that they shared some trait by chance alone. However, the volume of shared characteristics described by Nancy Segal and the sheer quirkiness of some of the examples (how many people do you know who flush the toilet both before and after use?) that one is left with an overwhelming rush of ‘wow, even in our most unusual habits we seem to be greatly influenced by our genes!’

The third case study in this section was much more thought-provoking reading, and my 12-year-old twins found the story quite distressing when we discussed it around the dinner table. It is the story of identical twins George and Brent, whose parents were unable to care for them in the first 2 months of their lives. They were cared for in a foster home, but when the parents came to collect them, a series of administrative blunders resulted in them taking home not George and Brent, but George and Marcus. Brent was adopted by another family and grew up only 10 miles away. The boys met aged 21 and for a long time and trying to work out what exactly it was that made them the ability to study differences in the way in which the genes of MZ twins are expressed, even though they have the same genetic blueprint. These techniques may herald a new era in the value of MZ twins discordant for disease or other phenotypes in their contribution to finding genes that are causal for these traits. This is a rapidly evolving field that will provide Professor Segal with important material for future publications as results emerge.

The last two sections called ‘Extraordinary Circumstances’ and ‘Everyday Wonders’ contain stories of six sets of twins (or multiples), each of which is unique in its own way. We meet Stepha and Annetta, identical Jewish twins who escaped the gas chamber in World War II through selection for the scientific studies of Dr Josef Mengele, who had intended to inseminate then with sperm from identical twin men to see if they would conceive identical twins. It is easy to forget how truly unethical twin research was under the Nazis. We learn of the death of Brenda in the Twin Towers tragedy and the feelings of loss felt by her twin Linda, who, through this book, has been given an opportunity to commemorate and celebrate her sister’s life in a lasting way. We learn of Gillian and Lily, now 6, adopted separately from China by two Canadian families, who later discovered their MZ relationship and celebrate her sister’s life in a book, has been given an opportunity to commemorate and celebrate her sister’s life in a lasting way. We learn of Gillian and Lily, now 6, adopted separately from China by two Canadian families, who later discovered their MZ relationship and then enter the lives of MZs Craig and Mark who married MZs Diane and Darlene. Interestingly, all four twins insisted that the alternate partner pairings would have been disastrous! Each couple has two children who are all, therefore, genetically full siblings. Last, but certainly not least, we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin Trace’s two children, and then we meet Marce who became the surrogate mother for her MZ twin
another dimension. One of the boys has cerebral palsy and so his development is considerably delayed compared to his genetically identical twin. This is one of the cruel twists of fate that is not infrequently dealt to families with twins: the daily and lifelong reminder of what their disabled child might have been like, if it were not for the problems encountered in those few hours around the multiple birth. The story of the quads, I am sure, will be followed both by Nancy Segal and by the media as they grow up.

If twins or their families, who willingly give up their time (and blood!) to contribute to twin studies, were to ask for some examples of the benefits of twin research, I would direct them to Nancy Segal's first book *Entwined Lives* as it clearly demonstrates the value and breadth of twin research and considers the genetic insight gained from both DZ as well as MZ twins. By contrast, *Indivisible by Two* provides a depth of investigation into the cases studied. It is a great read that should appeal to all those fascinated by the power of our genes and is guaranteed to provide plenty of topics for dinner table conversation!

Naomi R. Wray  
Queensland Institute of Medical Research,  
Brisbane, Australia