

## Nature's clones: what twins have taught us

by Tim Dean

*Is it our experiences or our genes that make us who we are? Studying twins has revealed unexpected, and often unnerving, insights into the nature versus nurture debate.*

IMAGINE RECEIVING A PHONE CALL out of the blue. You find the voice on the other end eerily familiar as it tells you some life-changing news: you are, in fact, a twin. And when it comes time to meet face-to-face, you find it's like gazing into a mirror. You share a similar dress sense, hairstyle and even idiosyncratic gestures and expressions you thought were uniquely yours.

In 2004, Paula Bernstein found herself in exactly this situation when she was contacted by Elyse Schein, who broke the monumental news that they were twins, separated at birth and raised apart.

They met for the first time at a New York café, where nerves and trepidation soon gave way to warm conversation. "We had 35 years to catch up on," says Bernstein. "How do you start asking somebody, 'What have you been up to since we shared a womb together?' Where do you start?"

"It was really surreal," agrees Schein. "It was like meeting an alternate version of myself." She found the similarity in mannerisms particularly spooky. "I always had the idea that [the way] I gesticulated – raised my eyebrows and so on ... was due to my environment, but now I know it's inherited.

We joke sometimes that we want to turn off each other's mannerisms, because it's unnerving to see them echoed back."

AND IT WASN'T ONLY idiosyncratic gestures that the two had in common. Despite being raised by different families in disparate parts of New York City, they both followed an uncannily similar path in life.

"We were each editor-in-chief of our respective high school newspapers and then went on to study film theory," says Bernstein, who is now a journalist, while Schein went on to become a writer and film-maker.

Cases like that of Bernstein and Schein are rare these days, but they give a compelling insight into the role that genes play in shaping the fundamentals of who we are. "Twins really do force us to question what is it that makes each of us who we are," says Bernstein. "Since meeting Elyse, it is undeniable that genetics play a huge role, probably more than 50%."

In fact, Bernstein and Schein, who documented their experience in their book *Identical Strangers*, were separated as a part of a secretive scientific study of nature versus

nurture conducted by child psychiatrist Peter Neubauer in the late 1960s. Such experiments wouldn't be possible today for ethical reasons, but identical, or monozygotic twins still represent an incredibly valuable resource to science.

"They are a beautiful natural experiment," says Nicholas Martin, geneticist at the Queensland Institute of Medical Research and editor of the scientific journal, *Twin Research and Human Genetics*. According to Martin, identical twins give scientists the perfect opportunity to tease out genetic and environmental variables from factors such as personality or susceptibility to diseases including asthma, depression, alcoholism and attention-deficit hyperactivity disorder (ADHD). And it's all because identical twins are effectively natural clones.

AS MARTIN POINTS OUT, it's long been observed that certain traits and diseases run in families, whether it be height, or asthma or even the preponderance of a particular profession. But it's not always easy to draw conclusions from these facts alone.

"The trouble is that something running in the family is not sufficient to show it's because of genes," he says. "A high incidence of melanoma might be due to habits of being out in the Sun, because families share both genes and the environment."

The trick is to disentangle the environmental influences from the genetic component. And this is where twins come in. The classic twin study uses both monozygotic and dizygotic (non-identical) twin pairs who have been raised together by their respective families.

This allows the researchers to eliminate shared environment – such as days on the beach in the hot Sun – as a variable, because it should affect both twins equally. The researchers can then compare the variations between the two types of twins, knowing that the monozygotic twins share all their genes while the dizygotic twins share only 50%.

FOR EXAMPLE, IT COULD be found that when one monozygotic twin develops melanoma then it's 80% likely that the other twin will also develop melanoma. In contrast, if one dizygotic twin develops melanoma, there might only be a 40% chance the other twin will also develop melanoma. As a result, it becomes clear that genes are playing a significant role behind the scenes of this particular disease.

Twin studies of this kind have yielded some startling insights into how influential genes are in shaping our behaviour. "Well conducted twin studies are able to completely change the way we view problems and to reorient entire research programs," says Martin. "For instance, autism had been attributed to a variety of causes, such as emotional coolness in the mother, until a landmark twin study found much higher concordance in monozygotic than dizygotic twins."

But it's not only diseases that have been scrutinised by twin studies. Twin studies have also been used to shed light on the influence that genes have on our very personality.

What could be more central to our identity than our personality – our beliefs, dispositions, quirks and all those little things that distinguish us from everyone else? It seems self-evident that much of who we are is shaped by our past experiences. This was the view in the social sciences for much of the 20th century. Spanish philosopher José Ortega y Gasset summed it up in a 1941 essay when he wrote, “Man is what has happened to him, what he has done”. And that humans have no ‘nature’, all we have is ‘history’.

YET TWIN STUDIES PLACE such a perspective on shaky ground. Recent twin studies have found a significant genetic component to a broad spectrum of behavioural and social dimensions, to the point where it seems experience plays only a bit part in shaping our destinies. Studies have revealed this phenomenon at work in attributes such as alcoholism, voting habits or even whether you’re a tea or coffee drinker. “We almost got sick of finding behavioural traits that are genetic,” says Martin. “Everything from social attitudes, socialism, free sex, trade unions, apartheid – all those things the sociologists tell us are shaped by the social milieu – well, lo and behold, they’re more genetic than environmental.”

One 1996 study in the journal Psychological Science even found that happiness appears to be primarily determined by our genes. It discovered that socio-economic status, education, income, marital status or even religiosity could account for no more than three% of the variance in happiness. Genes, on the other hand, appeared to account for around 50%.

### **Questions:**

- 1) Why are twin studies so important to the nature nurture debate?***
- 2) Does twin studies support ‘nature’ or ‘nurture’? What evidence does it provide.***
- 3) Do you find twin studies to be a valid source of evidence? Why or why not?***