

Growing up as twins: the perspectives of twin researchers

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7.1 Introduction

The investigators who have contributed short papers to this chapter are all twins. In addition, four of the five board members of the Hungarian Twin Registry (HTR) are identical twins. The investigators include identical twins, Drs. Ádám Tárnoki and Dávid Tárnoki, the founding members of the HTR, as well as Dr. Júlia Métneki, one of the pioneers of Hungarian twin research. Some twin researchers are fraternal, such as Dr. Nancy L. Segal who has a fraternal twin sister. These individuals highlight the importance of twin research as twins, based on their personal perspectives.

7.2 Adam & David Tarnoki (MZ twins or Identical Twins)

The motivation to become a twin researcher arose during our academic years, when we gave a lecture on the diseases of twins and the heritability calculation using twin research design. This event took place in Sarasota, FL, USA, in 2007. The lecture caught the attention of Istvan Luczek M.D., a gynecologist of Hungarian descent practicing in Ohio, who recommended that we visit the Twins Days Festival in Ohio, in 2008, where we conducted our first questionnaire-based data collection. The rest is history.

When our mother learned that she would deliver twins, she was very surprised. This happened during her academic years when she was studying medicine. Adam was in a vertex position (head down), and David was in a breech position (feet down). Luckily, since our mother studied gynecology at that time, she was aware that her obstetrician preferred to deliver babies naturally. However, she was adamant that she have a Cesarean section as per textbook indications, which considered natural delivery as a contraindication in such cases due to its risk. Accordingly, Adam and David were born three minutes apart with a C-section, Adam was the firstborn twin (Fig. 7.1).



FIG. 7.1 Adam (L) and David (R) Tarnoki, at about age one year.

Courtesy: Drs. Adam and David Tarnoki.

We studied in the same class except for one semester, when the teachers tried to separate us. One semester later we were back in the same group, and our efficiency showed no difference due to being apart. According to psychologists, it is worth considering having twins in separate classes if they have very different abilities. Thus, the negative effects of constant comparison are less pronounced, and they are less likely to fail. However, our abilities were closely matched, and we enjoyed being together (Fig. 7.2).

It was not easy to prepare for our application to universities. We applied to the same specialties, and, after successful written and oral exams—with similar points—we were both admitted to medical university. During the first years, we wanted to start student scientific work. Due to our twinship, we chose the following topic: “Twins’ diseases.” We began looking for a mentor who was a twin researcher from Hungary, and thanks to the Internet, we found Dr. Júlia Métneki, who was a twin



FIG. 7.2 Adam (L) and David (R) Tarnoki in kindergarten.

Courtesy: Drs. Adam and David Tarnoki.

herself. Our first twin study was on the heritability of how weather changes affect Hungarian twins. Later, we gave our first scientific presentation in the United States. As previously mentioned, Dr. Luczek, a famous gynecologist from Ohio, attended the presentation, and subsequently invited us to the Twins Festival, which was very close to his home in Solon, OH. A few years later, we returned to Twinsburg with some Hungarian researchers, to conduct a comprehensive cardiovascular twin study on atherosclerosis. Since 2007, we have been working with Dr. Metneki. We suppose that, as twins, daily work as twin researchers is much more meaningful for them than it is for non-twins.¹

We discussed everything with each other, and we spent the daytime mostly with each other, except when we had to work separately. Adam (the firstborn twin) was the “leader,” while David, the second born twin, has always had more practical skills. Therefore, we can work very well together because we complement each other during the whole day (Fig. 7.3).

Twins have a constant companion from the very beginning, and they develop close relationships with each other. After marriage, the relationship between us naturally became a little less involved, as more attention was paid to the spouse at the expense of the twin brother. Finding a partner was not easy for us as we had spent a lot of time together during our childhood as well as our university years. Due to our similar taste, our choice fell on two ladies of the same occupation, who had graduated from the same law school but did not know each other. However, it tells a lot about the kind of relationship, including our taste in partners. We both met our wives online a few months apart because they look different, there was no problem distinguishing between them. The extant research presents a mixed picture regarding whether or not identical twins choose similar mates.^{2,3} When Adam’s little daughter



FIG. 7.3 Adam (L) and David (R) Tarnoki, at about age three years.

Courtesy: Drs. Adam and David Tarnoki.

was born, she often had trouble figuring out who her father was when we stood next to each other—this is a situation that many young twins confront. However, by the age of several months, she could differentiate between us.

As university teachers, we have worked with several twin medical students who were also interested in twin research. One of them became a pediatrician and another is a PhD student. A Japanese twin pair, who studied medicine in the English faculty of Semmelweis University in Hungary, wrote their theses on twin research under our supervision. They returned to Japan after graduation and are in contact with the Osaka Twin Registry (Fig. 4).

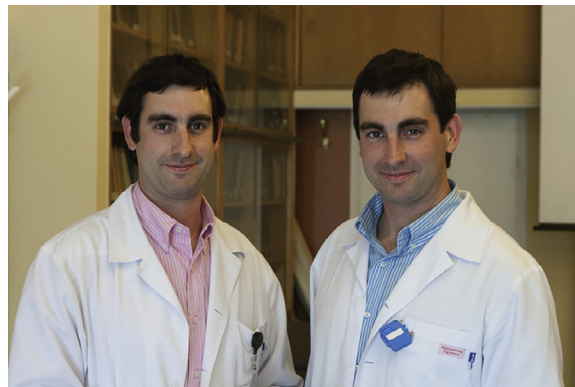


FIG. 7.4 Adam (L) and David (R) Tarnoki at Semmelweis University, Budapest.

Courtesy: Drs. Adam and David Tarnoki.

In Hungary, experience shows that it is much easier for twins to recruit twins for research, as it seems more credible for them to be invited to a twin study by twins. This way, it is easier to inform potential participants about how we the researchers saw the research, for example, what kind of examinations/tasks need to be done, how long they will take, and what the purpose/outcome of the study is.

As part of a cardiovascular twin study performed in 2009, we wanted to involve a dizygotic female twin pair; however, only the older sister's phone number was available. She was willing to come for the research but only alone. Surprisingly to us, she did not know her sister's phone number. The reason why she wanted to come alone was that she and her twin sister had quarreled before and had not talked to each other for many years. Shortly afterward, her sister's phone number was found and she asked to arrange for her sister to come on a separate day as she did not wish to meet her. Her sister also wanted to participate, but on a separate day. Several years later, fortunately, they reconciled thanks to the research and they participated in subsequent studies together.

The great advantage of being twins during research is that they can share tasks with each other. During the research, the brother or sister can always assist and help, thus the examination time can be reduced. We find that this is always true for us.

7.3 Julia Metneki (MZ twin)

I am working on twin research as a biologist, but I am also a twin myself. In elementary school, I took part in a twin study with my sister Esther, having been the subject of extremely exciting twin studies. This event made a great impact on me.

I was born after World War II, in 1946—it was only while giving birth, after I was born, that my mother found out that she had been pregnant with twins. My parents were flabbergasted, not knowing whether to be happy or worried about the double 'child-blessing.' We were born underweight at just 1700 g each. The incubator was replaced by hot water bottles in our cradle, and in the absence of infusion, we received mother's milk with an eyedropper every half hour, which we sometimes threw up. It was not until the age of 3 months when we reached the average birth weight of healthy babies. Our parents planned to name Esther for their future baby girl, but since I had a less favorable life expectancy as a firstborn, my second-born sister got the previously planned name (Fig. 5).

I have some visual memories from my childhood, and in those, I never see myself alone, but always with my sister. Usually, we referred to ourselves as "us," even when the other was not present. (The same thing happened with Adam and David.) As identical twins, we were extremely similar to each other, so much so, that even our father, relatives, and the family's best friends confused us quite often. The feeling of discomfort caused by the similarity was obviously increased by the fact that our parents dressed us in exactly the same way.

As the only pair of twins at our school, we undeniably aroused interest from our peers. In class, we often sat in the double desk, side by side, and had the same



FIG. 7.5 Julia Météneki (L) and her twin sister (R), Esther at age 4 years (1950) and 67 years later (2017).

Courtesy: Julia Météneki.

friends. We were anxious girls, but the constant presence of the other twin gave us a tremendous sense of security and reassurance. Therefore, if one of us was ill, the other one often simulated illness, so neither of us would have to go to school alone. Sometimes we changed roles, and when called to answer, we responded instead of the other, which initially seemed like fun, but it did not really make much sense, because whatever I knew, so did Esther, and vice versa.

While we were young, we did not recognize this high degree of similarity, but now we often cannot identify who is who in childhood photos. We were confused on several occasions and in certain situations. For example, as adults, at the first twin ball organized in Budapest, in 1983. Esther went to the restroom and saw me come face to face with her. Esther was just about to tell me something, when she hit the wall mirror. It was shocking for her not to recognize her own reflection.

What was so typical of our childhood was that we internalized each other's experiences as our own, as if those things had happened to us, as well. For example, when Esther was called to answer at school, I was almost more excited about her success than she was. If she got a bad grade, it hurt me even more, and when Esther cried, my eyes filled with tears, too. Our hope for each other's success was mutual.

Another family legend demonstrates the commitment of my sister. At the age of 10, Esther had warts on her hands that were to be burned off by a dermatologist. During the treatment, while she was quietly enduring the pain like a real hero, I was screaming outside the door, feeling Esther's pain. (Later, interviews with twins confirmed my earlier guess that empathy is much stronger for twins than for siblings and for singletons.) Not all researchers, such as Dr. Nancy Segal, find persuasive evidence that twins feel each other's physical pain at the same time without knowing that the brother or sister is in real pain. Of course, I knew that Esther was going through a difficult procedure which may explain my response.

We were used to the same things happening to us, whether we were good or bad. When I was unexpectedly operated on with appendicitis at the age of 14 years, Esther hardly found her place during my one-week absence. She felt it was "unfair" to miss out on something.

Beyond the similarities in our looks, our thoughts and interests were also the same. We both played the piano (there were several four-handed pieces in our repertoire), we liked the same dishes, and we were passionate about the same poems, actors, and music. Our father was a medical doctor who orientated our interest toward healthcare and medicine. In our most common childhood games, we played at being doctors, examining toy dolls, injecting them, and operating on them. Later in life, we both ended up working with diseases, just in different professional areas.

Esther and I understood each other almost without words. From each other's eyes and movements, we discerned what the other one wanted or needed. Of course, we sometimes quarreled and even hit each other, but after our mother separated us. Then, we started looking for each other's company within minutes. As I remember vividly, we laughed a lot and were often suffocating with laughter. Today, we spend time together much less frequently, but we cannot giggle with anyone as much as we used to with each other, and we sometimes relive this carefree part of our childhood.

Typically for most firstborns, I was the dominant twin, the one who initiated our games and activities, that is, the 'spokesperson'. The more peaceful and accepting Esther did not resent me in any way since it was convenient for her to have me handle everything, as if I were her secretary.

This close relationship was natural for us until our final exams and high school graduation, and we had a wonderful time in this symbiotic relationship. We mostly

enjoyed the benefits of twinning and noticed its drawbacks less than may result from constant comparisons. Despite our idyllic relationship, our parents clearly saw the disadvantages of this twin situation. They advised us to continue our studies at different schools, a decision that came to us unexpectedly. We simply could not imagine our lives without each other's constant presence. Sadly, we finally resigned to the situation. My more practical sister applied to the Faculty of Dentistry at the Medical University, and I started my studies at the Faculty of Biology at the University of Sciences. At that time, I was already thinking that this training in biology could give me a good foundation for realizing my dream: to carry out twin research in the future.

In time, I finally agreed with my parents' decision. It was the right time to start our independent lives. But then, at the age of 18, I felt as if I was one half of a human being cut in two. I felt the lack of my sister physically, too. She was not walking alongside with me on the street, and she was not there to confirm my decisions. Half a century has passed since then, but in a sense, I feel her absence even today.

After completing our university studies, Esther began practicing as a dentist in a small rural town, 120 km away from Budapest. Her decision scared me—I did not understand why my twin sister wanted to leave our common home to move to a strange city where she did not know anyone. “How will she do it alone?” I asked. I was also thinking that all of this may have happened due to my dominant nature. In the end, it was proven that our separation became beneficial in all respects.

It was only in the 1990s that—by studying the twin literature—that I could finally understand what must have been behind Esther's decision. Regine Billot, the French author of *Les Jumeaux* (1991), wrote about the difficulty of separating twins.⁴ She supposed it was logical that the suppressed twin wanted to become independent, and therefore exited from the close twin relationship to avoid situations that were often disadvantageous. Paradoxically, twins would be looking for a partner earlier, would get married sooner than their twin sibling, perhaps because stronger emotions were at work to gain their freedom. I believe this refers mostly to identical twins.

Returning to my career choice, my childhood dream was finally fulfilled, and over the past nearly half-century, I have done a number of national and international twin studies with my mentor, Professor Andrew Czeizel. Initially, my research work was mostly theoretical, so, in fact, I rarely had any personal contact with twins—this gave rise to a strong feeling that something was missing. Change did not occur until the early 1980s when 100 twin pairs were involved in an international adult twin study concerning the heritability of lactose intolerance.⁵ On the day of the examination, the twins showed an amazing amount of enthusiasm—in fact, the atmosphere resembled that of a folk celebration. Following up on the initiative of the participants, we created a “twin club,” and the atmosphere of the monthly gatherings was intimate and family friendly from the start. The most successful and attractive events were the “twin festivals” and the “twin balls,” where the stars of the party were, of course, twins. These successful events further increased interest in twin research (Figs. 6 and 7).

In 1989, at the Twin Congress in Rome, I met Dr. Elizabeth M. Bryan, a British pediatrician, and I purchased her book *Twins in the Family*.⁶ While reading this book, I realized how important it would be to write a similar handbook in Hungarian that



FIG. 7.6 A group of identical twins at the foundation of the Budapest Twin Club. Budapest, (1982).

(Photo credit; Imre Benkő).



FIG. 7.7 Leaders of the Hungarian Twin Club (Ildikó Busi and Teresa) with the Presidents of the American Twins Association (Judy Stillwagon and Julie Kirk, and Lew and Lee Vaughn), at the Twin Ball held in Budapest, in 1983)

(Photo credit; Imre Benkő).

would provide theoretical and practical knowledge from conception to adulthood for parents expecting and raising twins. After a long “labor,” my *Book of Twins* was published in 1997, and the revised version was released with up-to-date information in 2005.⁷

In 2006, I published another book about conjoined twins, in cooperation with a physician. In the book, nearly 200 such Hungarian cases detected from the 14th century until the early 2000s are described and evaluated. This work is an overview of the ethical, legal and religious aspects of conjoined twins, documented with interesting illustrations.⁸

Finally, one more thought about the twin situation. Most psychologists agree that the twins must eventually separate. However, since I met the radiologist twins, Ádám and Dávid Tárnoki, I am not sure of this advice, because they have been extremely successful in their field of expertise and in twin studies, following a common path, helping and complementing each other. “One and one is not always two, sometimes the double”—as their example shows.

7.4 Nancy L. Segal (DZ twin)

7.4.1 Personal background

I am passionate about twin research. Twin studies offer many elegant ways for examining the interplay between genetic and environmental influences as they affect human development. I am also intrigued by twinning as a phenomenon—what it is like to be an identical or a fraternal twin, how we can best raise and educate twins, and why there is universal interest in twins.

My fraternal twin sister, Anne, and I were born in Boston, Massachusetts, the only children in the family. My mother was shocked to discover that she was carrying twins when she went for her five-month pregnancy checkup. Part of her surprise came from the fact that there are no twins on the maternal side of our family. However, one of my father’s uncles had been born a twin, although his twin brother died shortly after birth. Of course, the twin type of his singleton twin uncle is unknown, because zygosity testing was not routinely performed (and still is not done unless twins are enrolled in research) and DNA analysis had not been developed, given that. In addition, my father had first cousins who were identical female twins; they were considered to be identical based on their matching physical appearance. Even today, the transmission of twinning in families has not been fully worked out by geneticists. We do know that fraternal twinning seems to run in families, and that identical twinning seems to run in some families.⁹ Fraternal twinning has also been positively associated with factors such as older maternal age, heavier maternal weight, taller maternal height, African ancestry, and increased coital frequency.¹⁰

My family lived in Boston for a very short time before moving to Philadelphia when I was less than one year old. At age four, my sister and I were assigned to different kindergarten classes at the local elementary school—Anne adjusted easily,

while I was traumatized and missed her terribly. Today, at least in the United States, most educators believe that young twins should be placed apart in school or they will not develop separate identities. However, research does not support this claim and many studies indicate that young twins perform better together.¹¹ Given the foregoing and my own experience as a young twin, I believe that each pairs' school placement should be considered on a case-by-case-basis, and that parents deserve to contribute to this decision. A year later, when I was five, my family moved to New York City and remained there for the rest of my growing up years. My sister and I were placed together in kindergarten, first grade and second grade. We were then placed in separate classes from the third grade on and attended different schools from the seventh through twelfth grades, but we were ready to be apart (Fig. 8).

An assignment in a senior-level psychology class at Boston University drew my attention to twin studies. The professor asked for an essay on personal adjustment and I immediately thought about my experiences at school as a twin. The studies I read for this assignment were informative, insightful and enjoyable like no other



FIG. 7.8 Dr. Nancy L. Segal (R) and twin sister with their mother, at about age four years.

Photo Credit: Alfred M. Segal, Courtesy, Dr. Nancy L. Segal.

topic I had previously investigated. I knew that twin research would be the focus of my future academic career.

Upon graduating from Boston University, I completed a master's degree in Social Sciences at the University of Chicago, in 1974. My thesis was an overview of methods and findings in twin research. I went on to obtain my doctoral degree at the University of Chicago, in 1982, with a dissertation on cooperation and competition between young twins. Some summers and semesters during my graduate school years were devoted to twin studies. I spent the summer of 1974 at the National Institutes of Health, in Bethesda, Maryland, working on follow-up data from an earlier study of the identical Genain quadruplets—all four sisters suffered from schizophrenia.¹² I was a visiting student at Indiana University in Bloomington, Indiana in the spring of 1975, working on twin studies with Drs. Richard J. Rose and Walter E. Nance. In the summer of 1975, I attended a National Institute of Mental Health-sponsored program at the University of Colorado's Institute for Behavioral Genetics.

7.4.2 Professional history

After graduating from the University of Chicago I became a post-doctoral fellow and research associate at the University of Minnesota (1982–1991). During this time, I worked on the Minnesota Study of Twins Reared Apart (MISTRA), directed by Professor Thomas J. Bouchard, Jr. In 1985, I was appointed Assistant Director of the Minnesota Center for Twin and Adoption Research. Those 9 years were a highpoint of my career because I was so fortunate to meet the separated twins—I learned their personal stories at the same time that I helped gather their behavioral and physical data. In 1991, I joined the psychology department at California State University, Fullerton. One of my first tasks was establishing the Twin Studies Center to support student and faculty research with twins. Over the years, several individuals have donated books, journals, photographs and funds, making this center, especially its library, a unique resource.

My current twin studies address tacit coordination, social closeness, twin loss, personality and appearance, genetic and environmental influences on ability, personality, adjustment, and sexual orientation and identity. I study MZ and DZ twins, young Chinese twins reared apart, virtual twins (same-age unrelated children reared-together), twin-families, twins switched at birth, and unrelated look-alikes.

7.4.3 Professional activities

I have written seven books on twins¹³ and have co-edited a conference volume.¹⁴ My book, *Born Together-Reared Apart: The Landmark Minnesota Twin Study* (2012), describes the origins, methods, findings, and implications of the Minnesota Study of Twins Reared Apart. My seventh book about twins is titled, *Deliberately Divided: Inside the Controversial Study of Twins and Triplets Adopted Apart*.¹⁵ This book is a detailed investigation of the 1960s and 1970s study conducted in New York City, in which twins and triplets were purposefully placed apart and studied until they turned

twelve. The twins' adoptive parents were never told that they were raising a singleton twin child. This study was featured in two documentary films, *The Twinning Reaction* (2017) and *Three Identical Strangers* (2018).¹⁶

I strongly believe that twin researchers have a responsibility to maintain close ties with the public, and not publish their findings solely in the scientific literature. It is for this reason that I write a regular column for the journal *Twin Research and Human Genetics*. Each of my contributions surveys an area of interest to twin studies, summarizes findings from several timely twin studies and reports a number of human interest stories about twins, of which there are many. These articles are sometimes adapted for publication in my *Psychology Today* magazine blog, *Twofold*. I have authored or co-authored three articles for the *New York Times's* Gray Matter column, two of them on twins. One of them concerned the social ties between twins and the other concerned the breastfeeding of twins in male-female pairs.¹⁷

One of the greatest pleasures of being in twin research is watching separated twins meet for the first time. Most memorable is my witnessing of reunions between two 6-year-old identical twin girls and two 78-year-old fraternal twin women. One of the young twins had been adopted by a family in the lively capital city of Sacramento, California, while her twin sister had been adopted by a family from the tiny village of Fresvik, Norway. Their adoptive parents met in China when they went to pick up their daughters. The mothers immediately recognized the physical resemblance between their babies and stayed in touch. They decided to have the girls' DNA tested and compared, and the results revealed that they were identical twins. One of the mothers contacted me and I arranged for the *BBC* to have the twins meet and to film their meeting. It was heartwarming to watch the twins jump up and down at the first sight of each other. Despite speaking different languages, the two girls got along beautifully with one another.

The older pair, which I wrote about in one of the Gray Matter columns, also lived in different countries—England and the United States. I was able to obtain funds to fly both twins to California where they met each other in a hotel room near my campus. It was lovely to see them recognize some common features, even though they looked fairly different. Unfortunately, one of the twins passed away approximately eight months after they had met.

A recent twin project of great fascination for me involved two sets of identical male twins, from Colombia, South America. It happened that one twin in each pair had been inadvertently exchanged with a twin in the other pair when the babies were less than one week old. Each pair of boys grew up thinking that they were fraternal twins when, in fact, they each had an identical twin brother they did not know about. The truth was revealed when the twins living in the country moved to the city and one of the twins was mistaken for his identical brother. They were twenty-five years of age at the time—the revelation was shocking and disturbing at first, but all four brothers and their families have come to terms with it. The twins now regard themselves as a group of four—one family. I traveled to Bogotá twice to test and interview the four young men. I wrote about my research and the story of their lives in my 2018 book, *Accidental Brothers*.¹⁸

7.4.4 Closing statement

Twin research has undergone significant change in that many researchers are turning their attention to the molecular bases of behavior. A question of great interest is why one identical twin may become affected with a disease and the other will not. Another question concerns how such information can be used to help the general public. However, twin research remains as vibrant today as it was in 1875 when Sir Francis Galton first recognized the power of twin research to tell us how we come to be the people that we are.¹⁷

I am very happy to be a twin for a number of reasons. At an early age, twinship gave me appreciation for genetic influences on development. Being a twin has also helped me invite twins as participants in research, as we come to the task knowing that we share something very important. Finally, twinship has given me my sister Anne, whose friendship and support I treasure above all others. This accident of birth has made me aware of what I have enjoyed and what has been lost by twins who did not grow up together.

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TWIN RESEARCH FOR EVERYONE

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