

# Twins Switched at Birth: A Case from the Canary Islands / Research Reviews: Twin Study of Materialism; Twins and Clones; / In the News: ART and Premature Twins; A Pair of College Presidents; Twins in Real Estate; Tribute to a Twin

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**M**onozygotic (MZ) twins switched at birth represent a rare class of twins who are reared apart and reunited (MZA). Background data and descriptive findings from a case study of such a pair, born thirty-six years ago in the Canary Islands, are presented. The next section reviews a twin study of materialism and an essay addressing relations between MZ twinning and human reproductive cloning. This article concludes with summaries of several newsworthy, twin-related items. They include the multiple birth consequences of artificial reproductive technology, the friendly rivalry between identical twin college presidents, a joint venture in real estate and a tribute to a deceased twin.

## Twins Switched at Birth: Canary Islands Case

Monozygotic (MZA) and dizygotic (DZA) twins separated at birth and reunited have been the focus of several major psychological and medical investigations (Bouchard et al., 1990; Juel-Nielsen, 1965; Newman et al., 1937; Shields, 1962) and case reports (Popenoe, 1922; Segal & Hur, 2008; Sudarsky et al., 1983). Most twins in these studies were separated due to illegitimate birth, fragile newborn health, maternal complications, maternal death, and/or financial hardship. With the advent of artificial reproductive technology (ART), some twins and other multiples have been relinquished for adoption because family planning did not allow for more than one infant (Associated Press, 1988).

Not all reared-apart twins are aware of their multiple birth status. However, most twins meeting for the first time

are delighted to have discovered one another. Reunited twins share their life histories and learn more about their biological family background. Reunited twins also feel socially closer to one another than they do to the unrelated siblings with whom they were raised (Segal et al., 2003). Most reunited twins also acquire in-laws, nieces and nephews of whom they were previously unaware.

There is another rare circumstance that explains why some twins grow up apart. Errors on the part of hospital staff assigned to newborn nurseries can (and have) led to the accidental switching of one twin infant with a non-twin infant, sending two children home with the wrong parents. Such mistakes, when detected, bring unimaginable suffering to the families involved. Reactions include shock, disbelief,

anger and depression. Parents are denied the opportunity to love and care for a wanted child, twins are deprived of the social and biological benefits unique to twin relationships, and 'pseudo twins' fear rejection by the families who raised them. Lawsuits are typically filed in such cases, although deciding the damages is an extremely complex task. Little is known about the emotional effects of discovering (as an adult) that family relationships are not as they appear to be — and that everyone has been living good faith lies.

Psychological and medical research has greatly benefited from comparative

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study of genetically and environmentally informative kinships — for example, twins and adoptees. However, switched-at-birth twins create a special class of unusual relatives that have rarely been studied. They include singleton twins, alleged ‘DZ twins,’ unrelated parent–child pairs and unrelated non-twin sibling pairs. Alleged DZ twins are especially interesting from a research perspective because they are really virtual twins (i.e., same-age unrelated siblings reared together) who believe they are fraternal twins. Parent-child relationships are also intriguing because, while they mimic adoptive parent-child relations in terms of non-shared genes and shared environments, each person believes that they are biologically connected. Such beliefs may function in one of two ways: (1) family members may try to minimize their phenotypic differences by emphasizing similarities, or (2) family members may simply see the differences as reflecting the unpredictability of different inherited genes.

There have been only five documented cases of switched at birth twins. One pair was described in a recent article in *Twin Research and Human Genetics* (Segal, 2009) and a second pair was discussed in a recent book chapter (Segal, 2007). Three other pairs have been mentioned in legal documents and in the press. Then, in May 2008 a sixth case was revealed. Identical female twins met each other for the first time at the age of twenty-eight years after discovering that they had been inadvertently separated in the premature baby nursery. The twins and the unrelated sister, then aged 35, had brought a lawsuit against the hospital to compensate them for the severe emotional anguish that they and their families endured. The twins live in Las Palmas, the capital and largest city of Spain’s Canary Islands, located off the western coast of Africa. A series of chance encounters led to their reunion.

### **The Separation and Reunion in Brief**

The three babies — twins and non-twin infant — had been born prematurely and placed together in the premature nursery for 11 days. At some point, one of the twins was

removed for a medical procedure, then apparently placed in the wrong crib when she was returned. When the babies were released, the twins’ parents received one of their twin daughters and the unrelated infant, while another set of parents received the other twin.

The exchange went unnoticed until one of the twins (T1) was called by the wrong name while she was on a shopping trip. A shop assistant, certain that T1 was her friend (T2), greeted her, then wondered why she was being ignored. T1 returned to the store several days later, this time with her unrelated ‘twin’ sister (US). The same shop assistant who had called T1 by the wrong name approached them and wanted to know why T1 had ignored her. US told the assistant their names and explained that they were fraternal twins. However, the shop assistant insisted that the physical resemblance between T1 and T2 was remarkable and suggested that they meet. This was not the first time T1 had been confused for someone else.

The twins and several family members and friends met later that evening. T1 and T2 looked too much alike to deny that they were MZ twins. The possibility of a baby switch became a difficult reality. DNA tests eventually confirmed a lack of genetic relatedness between the twins’ mother and US. The twins (T1 and T2) underwent DNA testing some time later, establishing their monozygosity.

The twins’ attorneys, Sebastian Socorro and José Peregrina, graciously granted me access to the twins and their family members. They have received hundreds of inquiries from journalists eager to acquire the twins’ story, but I was the only psychological investigator who approached them. The attorneys have agreed to some media appearances and interviews, but are most interested in assisting the twins and supporting scientific analyses of the issues involved. Both lawyers acknowledged that their responsibilities are complicated by the fact that there have been no comparable cases in Spain. Family members have declined to be interviewed by the press with one exception — one of the twins spoke with a reporter under the

condition that her identity not be revealed.

I visited Las Palmas in September 2009 for 11 days. There were two objectives to my visit. One was to examine the emotional upset of the twins and their family members upon learning of the switch. Another was to compare behavioral and physical similarities and differences between the reared apart MZ co-twins and unrelated ‘DZ’ co-twin. I did this partly through personal interviews with T1 and T2, US, several non-twin siblings and three parents; one father was deceased. I also met with the two attorneys and two psychiatrists working on the case. The twins and unrelated sister completed several behavioral inventories and questionnaires; IQ tests are currently being arranged.

James Shields, author of the 1962 reared-apart twin study conducted in England, recognized two approaches to the study of reared-apart twins: biometrical and case history. He favored combining them in the same investigation. Shields was referring to large studies of reared-apart twins, but the present case includes both quantitative and qualitative data, so is consistent with his view. Some early descriptive findings relating to the twins’ physical appearance and social relationship are presented below; results from the behavioral protocols will be presented at a later date. Other timely issues raised by this case are also described.

T1, T2 and US were interviewed separately on different days. Interviews were conducted in Spanish by a local professional interpreter, Jessica Crespo. All interviews were tape-recorded and are being transcribed.

The twins’ biological family is light-skinned, while US’s biological family is dark-skinned. These differences reflect the diverse population of the Canary Islands. Consequently, both T2 and US looked very different from the families who raised them. However, both sets of parents had reasoned that their (unrelated) daughters inherited their skin tones from distant relatives. In contrast, T1 and T2 have the same fair-skinned complexion. T1 and T2 also have the same hair color and texture, eye color, hands and nails, and walk in the same unusual way.

**Table 1**

Height, Weight and BMI Data for Reared Apart MZA Twins, Unrelated Sister and Female Siblings

Individual	Height (cm)	Weight (kg)	BMI
T1	159	54	21.36
T2	165	63	23.14
US	160	69	26.95
S1	167	80	28.69
S2	169	80	28.01

Self-reported height and weight data were collected from T1, T1, US and US's two biological sisters (S1 and S2) who were raised with T2. These data are summarized in Table 1.

It can be seen that the body mass indices (BMI) of the MZA pair (T1 and T2) are closer than those of the alleged DZ pair (T1 and US). The differences are 1.78 and 5.59, respectively. US's BMI is much closer to those of her two biological sisters, S1 and S2. The weight difference of 9.00 kgs (nearly 20 lbs) between T1 and T2 deserves comment. T2 suffered from leukemia at age 16, leading to a series of drug treatments and surgeries. She is currently in remission, but the weight gain appears to be tied to her health history. She was slimmer when the twins met 8 years ago.

Twin concordance for leukemia is greatest in childhood, but declines with age. Concordance figures range between 5–25% in children between the ages of 1 and 15 years; eliminating infants yields a concordance figure of 10% (Greaves et al., 2003). T2's biological family had a history of cancer; her biological father passed away from lung cancer when the twins were 6 years old. It is believed that some factor in discordant twins' early environment (either before or after birth) triggered the condition in the affected co-twin. This raises the possibility that some feature of T2's rearing home could be associated with her disorder.

The reared apart twins felt an immediate rapport with one another. They claim to hold similar opinions on many issues, something that T1 does not share with US. However, T1 is very close to her sister and insists

that her reunion with T2 has not changed that. Male twins in another switched-at-birth cases described their twin and pseudo-twin relationships in similar ways (Segal, 2007). The social circumstances involving the three sisters are complex and will be addressed in a future paper.

Switched-at-birth twin cases raise other important issues. One concerns maternity uncertainty. Human birth processes assure a mother that a child she bears belongs to her in a biological sense, but this is not true for a father. Hidden ovulation, internal fertilization and continuous female receptivity mean that a male can never be fully certain that he is the biological father of a child delivered by his partner (Buss, 2004). This phenomenon, known as paternity uncertainty, has been the focus of considerable research attention by evolutionary psychologists. However, switched-at-birth twin (and non-twin) cases raise the question of maternity uncertainty. New mothers are able to identify their newborns by their smell or sound with greater than chance accuracy, but these processes are not perfect. Infant identification can be further compromised by the fact that infants born in hospitals are often separated from their mothers, especially when medical attention is required. ID bracelets usually link mothers and babies born in hospitals, but they leave room for error. Only one of the mothers in the documented twins' cases suspected that she had received the wrong child.

Determining the appropriate compensation for families receiving the wrong child is a difficult task for judges and attorneys. The Canary Islands case was decided in May 2009, but the settlement was rejected and is currently under appeal. The lawyers had requested 3,000,000 euros, but a sum of only 900,000 euros was offered: 540,000 for T2 and 120,000 each for T1, US and the twins' mother. These different amounts reflected each person's relative degree of suffering, as determined by the judge and members of the national legal panel who render such decisions. A key question that has not been addressed to the attorneys' satisfaction is whether or not emo-

tional damages are specific to the years subsequent to the discovery, or if they are relevant to the entire life times of the individuals involved. (The attorneys have argued for the latter and I agree.) Resolution of the appeal is expected in approximately one year.

I have served as an expert witness on cases involving the wrongful death, injury and custody of twins. I have also addressed situations in which faculty members and administrators have accused MZ twins of cheating because their answers on standardized tests, course examinations and homework assignments are closely matched. My evidence to support the twins has variously included data from twin loss surveys, personal interviews, existing documents and relevant twin-based studies. A more 'twin-centered' approach to the Canary Islands case might improve its outcomes. For example, the twins' separation denied T2 the opportunity for a transplant from an ideal donor, T1. However, T2 was also denied the emotional support of her twin sister, a factor that could have negatively affected her psychological health. Further efforts at systematically linking the twins' differences in intelligence, educational status, personality and life style to specific features of their rearing circumstances, via standardized methods, would be beneficial to the case. This is a future goal of the present project.

Switched-at-birth DZ twins are less likely to be identified because mistaken identity is far less probable than for MZ twins. (Only one DZA twin pair who participated in the Minnesota Study of Twins Reared Apart met due to confusion by others.) It is, therefore, unlikely that the true number of such cases will ever be known. Improved methods for linking mothers and newborns will, hopefully, prevent such errors from occurring in the future. International efforts along these lines have been undertaken by Dr. Antonio Garrido-Lestache (2000), in Madrid. Readers with knowledge of other switched at birth cases involving twins are encouraged to contact Dr. Nancy L. Segal at [nsegal@fullerton.edu](mailto:nsegal@fullerton.edu).

# Research Reviews

## Twin Study of Materialism

The first twin study of materialism was recently reported by investigators from the University of Western Ontario, in Canada (Giddens et al., 2009). Materialism has been defined as the importance given to owning and acquiring material possessions with reference to fulfilling personal goals. Two hundred and forty MZ and DZ twin pairs completed the Material Values Scale (MVS), an inventory that yields an overall score and scores on three materialism components: centrality, success and happiness. The MVS was developed by Richins (2004).

A surprising result was that shared and nonshared environmental factors were able to account for individual differences in the overall materialism score and in the centrality and success components. Happiness was the only component that showed genetic effects (.46). The happiness score correlated

significantly with the happiness facet of the Trait Emotional Intelligence Questionnaire. It also correlated significantly with centrality and success, a finding most likely explained by shared environmental factors, such as the media. This study will, hopefully, encourage further efforts toward understanding the bases of materialistic attitudes and values.

## Twins and Clones

Ever since the 1996 birth of Dolly, the cloned Scottish lamb, debates over the advisability of human reproductive cloning have ensured. From the beginning, I argued that the psychological situation of clones and donors could be assisted by reference to the behavioral literature on MZ twins (Segal, 1997, 2006, 2007). A recent paper by Morales (2009) revisits many of the issues that have been raised, and relies on twin studies to a significant degree.

Morales make many excellent points. He argues that cloned individuals would not be deprived of uniqueness given that experience cannot be replicated. He further notes that clones and donors would enjoy different life experiences because they would be born into different generations. I would, however, take exception to the view that 'radical differences [in personality]' between MZ co-twins are caused by nonshared environmental influences. This may be true in individual cases, but would not characterize most MZ twins who show considerable personality similarity, albeit not perfect similarity. In fact, the article emphasizes MZ co-twins' behavioral differences, with much less attention to their similarities. One could imagine that behavioral resemblance between clones and donors could be advantageous for facilitating empathy and cooperation, as it seems to for MZ twins.

# In the News

## ART and Premature Twins

An excellent comprehensive overview of the multiple birth consequences of artificial reproductive technology (ART) appeared recently in the *New York Times* (Saul, 2009). The article centers around the identical Mastera twins, Max and Wes, born 9 weeks early and weighing three pounds, one once each. The twins were conceived via in-vitro fertilization.

The problems outlined in the article are not new, but the figures are current. The average pregnancy length is 35 weeks for twins, as compared with 39 weeks for singletons. Evidence of eventual learning problems among children born between 34–36 weeks is increasing. Pregnancy complications from multiple births are also more likely. For example, extra pressure on the cervix can affect placement of the amniotic sac, as in the case of Ms. Mastera. The financial burdens posed by twins can be prohibitive. Pre-term births cost ten times more in the first year of life, relative to term births. Finally, despite the greater hazards

associated with multiple pregnancies, infertile couples are willing to risk multiple implantation to increase the chances of a having a child. Physicians who perform such procedures generally comply with patient wishes because of financial considerations — there are now many more clinics available to families than in the past.

## A Pair of College Presidents

Identical 59-year-old twins, Steven and Kenneth Ender, are also college presidents (Krishnamurthy, 2009; Moltz, 2009). Steven is president of Grand Rapids Community College in Grand Rapids, Michigan and Kenneth is president of Harper College in suburban Chicago. The twins assumed these positions in the Spring 2009. Prior to that, they held the presidencies of Westmoreland County Community College, in western Pennsylvania and Cumberland County College in southern New Jersey, respectively.

The twins did not know that their new mid-western presidencies made them football rivals. Grand Rapids

beat Harper 33-9 in what is now known as the 'Twin Bowl.' The twins sat side by side during the game, wearing their respective school's colors. One team's win was not a mutual victory, but it was accepted graciously.

## Twins in Real Estate

Creative websites can be lucrative. Identical twins Jodie and Diane Fanelli have developed Tri-State Property Exchange, a site that will match people who want to sell homes in New Jersey or Connecticut before buying property in New York (Abelson, 2009). This process would eliminate a role for brokers, so would be financially sound for all parties involved. Prior to this joint venture, the twins had roles in several films, one starring Catherine Zeta-Jones.

## Tribute to a Twin

Ray (R. H.) Greene's new novel, *Incardine: The True Memoirs of Count Dracula*, is gaining attention. It gained my attention because of the person to

whom the book is dedicated: Baby B. Baby B was the author's identical twin brother, Tom, who recently passed away from a fall due to an epileptic seizure. Greene was interviewed on National Public Radio's program, 'On Ramp,' November 7, 2009. The twins were 'best pals,' inseparable in the early years when they attended grade school, played football and built monsters together. Tom was excited about Ray's forthcoming novel and it was Ray's wish to present his twin brother with the first edited edition. Ray concluded his tribute by saying said that he will never get over it [Tom's death], he will only get used to it.

## References

- Abelson, M. (2009, November 9). Stiletto Gatsby. *New York Times* (Education), pp. 28–29.
- Associated Press (1988, April 23). Surrogate mom has twins: Girl taken, boy rejected. *Minneapolis Star & Tribune*.
- Bouchard, T. J., Jr., Lykken, D. T., McGue, M., Segal, N. L. & Tellegen, A. (1990). Sources of human psychological differences: The Minnesota Study of Twins Reared Apart. *Science*, 250, 223–228.
- Buss, D. M. (2004). *Evolutionary psychology: The new science of the mind* (3rd ed.). Boston, MA: Allyn and Bacon.
- Garrido-Lestacle, A. (2000). Identification of new-born babies by fingerprints. *International Criminal Police Review*, 481, 19–24.
- Giddens, J. L., Schermer, J. A., & Vernon, P. A. (2009). Material values are largely in the family: A twin study of genetic and environmental contributions to materialism. *Personality and Individual Differences*, 46, 428–431.
- Greaves, M. F., Maia, A. T., Wiemels, J. L., & Ford, A. M. (2003). Leukemia in twins: Lessons in natural history. *Blood*, 102, 2321–2333.
- Juel-Nielsen, N. (1965). *Individual and environment: Monozygotic twins reared apart*. New York: International Universities Press.
- Krishnamurthy, M. (2009, October 27). *Grand Rapids snatches Twin Bowl Cup from Harper College*. Available at [www.dailyherald.com/story/?id=221577](http://www.dailyherald.com/story/?id=221577)
- Moltz, D. (2009, October 27). *Twin ambition*. Available at [www.insidehighered.com/news/2009/04/22/twins#at](http://www.insidehighered.com/news/2009/04/22/twins#at).
- Morales, N. M. (2009). Psychological and ideological aspects of human cloning: A transition to a transhumanist psychology. *Journal of Evolution and Technology*, 20 (online).
- Newman H. N., Freeman, F. N., & Holzinger, K. J. (1937). *Twins: A study of heredity and environment*. Chicago: University of Chicago Press.
- Popenoe, P. (1922). Twins reared apart. *Journal of Heredity*, 5, 142–144.
- Porter, R. H. (2005). Mutual mother–infant recognition in humans. In P.G. Hepper (Ed.), *Kin recognition* (pp. 413–429). Cambridge: Cambridge University Press.
- Richins, M. L. (2004). The material values scale: Measurement properties and development of a short form. *Journal of Consumer Research*, 209–219.
- Saul, S. (2009, October 11). The gift of life and its price. *New York Times*, pp. 26–27.
- Segal, N. L. (1997). Behavioral aspects of intergenerational cloning: What twins tell us. *Jurimetrics*, 38, 57–67.
- Segal, N. L. (2002). Human cloning: A twin-research perspective. *Hastings Law Journal*, 53, 1073–1084.
- Segal, N. L. (2006). *Psychological features of human reproductive cloning: A twin-based perspective* (invited paper). *Psychiatric Times*, XXIII, 20, 22.
- Segal, N. L. (2007). *Indivisible by two: Lives of extraordinary twins*. Cambridge, MA: Harvard University Press.
- Segal, N. L. (2009). Twins reared apart: A forgotten case. *Twin Research and Human Genetics*, 12, 123–126.
- Segal, N. L., & Hur, Y. M. (2008). Reared apart Korean female twins: Genetic and cultural influences on life histories, physical and health-related measures, and behavioral traits. *International Journal of Behavioral Development*, 32, 542–548.
- Segal, N. L., Hershberger, N. L., & Arad, S. (2003). Meeting one's twin: Perceived social closeness and familiarity. *Evolutionary Psychology*, 1, 70–95.
- Shields, J. (1962). *Monozygotic twins: Brought up apart and together*. London: Oxford University Press.
- Sudarsky, L., Myers, R. M., & Walshe, T. M. (1983). Huntington's disease in monozygotic twins reared apart. *Journal of Medical Genetics*, 20, 408–411.