

**NEWS, VIEWS AND COMMENTS**

## *Twinsters* the Movie: Reared Apart Twins in Real Time/Research Reviews: Heteropagus Twin; Schizophrenia Liability; Twin Study of Epigenetics and Homosexuality; Transgender-Discordant Twins/In the News: The Passing of Jack Yufe; An Unusual Twin Father; Identical Twin Models I; Identical Twin Models II; Twin Marines of World War II

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The 2015 documentary film *Twinsters*, tells the story of reared-apart MZ female twins, Samantha (Sam) Futerman and Anaïs Bordier. Born in South Korea, the twins were adopted separately as babies by couples living in the United States (Sam) and France (Anaïs). Their chance discovery of one another and their subsequent reunion and relationship are beautifully captured in the 2015 documentary film, *Twinsters*. Recent interviews with some of their family members are presented in *Twin Research and Human Genetics* for the first time. This is followed by brief reviews of recent twin research on a heteropagus twin, schizophrenia liability, epigenetics and homosexuality, and transgender-discordant twins. Finally, some newsworthy items are summarized, including the passing of reared-apart MZ twin Jack Yufe, an unusual twin father; identical twin models I; identical twin models II; and a pair of twin marines.

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## *Twinsters* the Movie: Reared Apart Twins in Real Time

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I learned about Samantha (Sam) Futerman and Anaïs Bordier in 2013, the same year that they learned about each other. These reared-apart monozygotic (MZA) female twins were born on November 19, 1987 in Busan, South Korea, but were adopted separately as infants by families in Verona, New Jersey (Sam) and Paris, France (Anaïs). Their families did not know that they were twins. Then, in 2012, Sam, an actress living in Los Angeles, posted a video of herself on Youtube. This video was viewed by one of Anaïs's friends,

who noticed the striking physical resemblance between the two women. Sam and Anaïs were put in touch and eventually corresponded by email, text messages, and Skype.

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**FIGURE 1**

(Colour online) MZ reared-apart twins, Anaïs (left) and Samantha. Photo credit: Jamie E. Munson, Research Assistant, Twin Studies Center, California State University, Fullerton.

The two were astonished to discover their long list of physical and behavioral similarities, among them short stature (58.75 inches/149.22 cm and 59.50 inches/151.13 cm), multiple allergies, and dislike for carrots. At my urging, they had their DNA analyzed to know with scientific certainty that they were MZ twins. The movie *Twinsters*, released in 2015, is their unique gift to twins, twin researchers and the interested public — it is a brilliant documentary film that uniquely tracks their discovery of one another, their subsequent meetings and their evolving relationship, all in real time. I was fortunate to have attended two special showings of the film in Los Angeles. *Twinsters* won the 2015 awards for Editing of a Documentary Feature at the 2015 South by Southwest Film Festival (SXSW) in Austin Texas and Best Documentary Feature at the 2015 Los Angeles Asian Pacific Film Festival. *Twinsters* was also nominated for the Grand Jury Award at SXSW. The film is now available from various Internet film services, having played around the country and been shown internationally. Many people have contacted me to say how much they enjoyed it.

I invited the twins to my laboratory in Fullerton to complete a comprehensive battery of cognitive tests, personality inventories, and medical forms. The findings were published as a comprehensive case report (Segal & Cortez, 2014) and are also summarized in a book written by Anaïs and Sam, titled *Separated@Birth* (Bordier & Futerman 2014). Figure 1 shows the twins on the day that they visited the Twin Studies Center at California State University, Fullerton, in June 2013.

I was particularly interested in knowing how the twins' immediate families reacted to the news that their adopted twin daughter (and sister) was now part of a pair. After many

years of reared-apart twin research, I am aware that the perspectives of other family members are often overlooked or given inadequate attention. Over the last several months, I was able to speak with Sam's mother, Jackie, her father, Judd, and her two older brothers, Matthew and Andrew, as well as e-mail Anaïs's mother Patricia; Patricia and her husband Jacques raised Anaïs as an only child.

Sam's mother, Jackie Futerman, had always wanted to adopt a baby. Having given birth to two sons, she had hoped for a daughter, but the adoption agency required that she agree to accept a male or a female infant. Jackie was also willing to take twins, and said that Anaïs's mother was, as well. Jackie was delighted when an infant girl became available.

When Jackie first saw the photos of Sam and Anaïs at age 26 years, she thought it was a joke — she did not believe that they looked so much alike. However, she changed her mind when she examined the two sets of baby pictures that matched so closely and began to believe that they could, in fact, be twins. Still, Jackie was cautious at first — she could see how much twinship meant to her daughter and worried that events were moving too quickly. Sam and her colleagues were raising money for a documentary film before a DNA test had been done. Jackie was eventually upset at the thought that Sam and Anaïs's separation had denied them the pleasures and benefits of being a twin.

In the spring of 2013, I received an email message from a colleague about Sam and Anaïs. When I learned that Sam lived in Los Angeles, I contacted one of her associates and offered to assist them in any way that I could. Like Jackie, I was concerned that the twins had not completed a DNA test, and I arranged for them to do this as quickly as possible.

There was a chance that they were unusual look-alikes with no genetic connection, and it was critical to know this before proceeding further — I had already worked with several look-alike individuals who proved to be unrelated. The film *Twinsters* shows the twins preparing their saliva samples together on Skype, and my announcement of the results several weeks later. The samples were analyzed by Affiliated Genetics, in Salt Lake City, Utah.

Sam's and Anaïs's family members arrived in London to be present for the twins' reunion. One of Jackie's concerns was meeting Anaïs's parents: 'It's like meeting in-laws — you are stuck with them.' But, according to Jackie, the families get along beautifully, as do the twins. The two mothers are in contact on a daily basis, and the families, which have grown a great deal in size, celebrate some holidays together and see each other whenever they can.

Anaïs's mother, Patricia, answered, 'Yes!' when I asked her if she had thought that Anaïs and Sam were twins, based on their photographs. Among their greatest similarities she cited their laughter, their reactions to things, and their sensitivities — 'just as if they had been raised together'. This is an isolated observation, yet it concurs with twin research showing that MZA twins are as alike as MZ twins raised together (MZT) across personality traits (Tellegen et al., 1988) and various other measures.

I was interested in hearing about some of the twins' early behaviors. Jackie told me that Sam and Anaïs's extreme distaste for carrots had a shared history — as children, both twins agreed to eat cooked soup, but not before their parents picked out every single carrot. Jackie also remarked that the twins laugh alike, enjoy being silly to a point, and chew their hair during nervous moments. They look so much alike that Jackie confuses them on occasion. But most importantly, 'they really get along'. Jackie loves Anaïs, seeing her as an extension of Sam. Patricia described the twins' relationship as 'fusional'.

Most multiple birth mothers read books about twins while they are pregnant or when they are raising their very young pair. Jackie, whose daughter is now 28 years of age, is just starting.

Sam's eldest brother Matthew (Matt) is 5 years older than Sam and works for a national self-storage company in New Jersey. Back in 2013, Sam texted Matt to tell him that she might have a twin and Matt believed it immediately when he saw the pictures — even before the DNA test was done. Matt first met Anaïs in London when the twins got together in 2014. 'Anaïs is definitely a sister to me,' Matt commented. 'I felt like I knew her — it was comfortable.' By then, Matt had had a number of chats and conversations with his sister's twin and was able to describe their similarities and differences. 'I felt like Anaïs was a physical copy of Sam, except that Anaïs has a more "European look". But their personalities differ, maybe because of their different cultures.' He found Anaïs and her parents somewhat more reserved than Sam and his own parents. But he said that the twins share a

lot of quirks when it comes to their attitudes and feelings, and they display the same sense of humor and sarcasm. Sam and Anaïs have also been 'superclose' as sisters from the start. Matt believes that Sam has changed positively as a result of meeting her sister, showing greater maturity and professionalism.

Sam's brother Andrew is 2 years older than she is. He is currently a law student at Lewis & Clark University in Portland, Oregon. Andrew received the same text message as Matt, informing him that Sam might be a twin. 'I was the only one who was skeptical,' he admitted. 'It could have been a coincidence and I did not want Sam to get hurt. I wanted to see real [DNA] evidence.' But by the time Andrew flew to London, the DNA test results were available, demonstrating that Sam and Anaïs were MZ twins.

'In some ways I feel like they are the same person,' Andrew told me. Still, he is aware of some differences, noting that Sam has a bit of an edge, whereas Anaïs is 'softer'. He explained this by noting that Sam had been raised with two brothers so family life was more fast-paced, whereas Anaïs was an only child. Andrew can also tell the twins apart easily, although he is not sure of the precise cues he relies on. An interesting similarity that Andrew described is Sam's tendency to playfully 'hit' her brothers during conversations — Anaïs does that too. Andrew is delighted that all the siblings have become close, communicating with each other in some form on a daily basis.

Sam's father, Judd, was the last of Sam's immediate relatives with whom I spoke. He recalled the day that Sam told him she might have a twin. It was his birthday, February 21, 2013. Sam sent him a small photo of Anaïs attached to a text message — based upon their matching birthdays, birthplaces, and physical features, Judd was convinced that the two were twins, even without DNA evidence. In fact, the first two times he met Anaïs he thought he was seeing Sam, but now that he knows them both well, Judd can easily tell them apart. In my experience, parents raising twins together have little difficulty distinguishing between them because mothers and fathers are sensitive to subtle physical and behavioral differences between their twins. This explains why some parents of MZ twins honestly believe that their twins are DZ — and why someone meeting twins for the first time is a better judge of their zygoty than the people who have always known them.

Sam and Anaïs are among the most identical of twins I have seen. I often confuse them in photographs. But, as a researcher, I would not pronounce them as twins without the DNA test results in hand.

Despite their similar actions and laughter, Judd sees some differences between the twins. His own daughter, Sam, is more casual ('more LA') than Anaïs who is more formal ('more European'). He explained that if they were to sit in a chair, Sam would slouch, whereas Anaïs would sit upright. 'It's the way they were brought up,' Judd believes. Judd also spoke about how well Sam and Anaïs get along with one

another. They show no jealousy and are genuinely proud of each other's accomplishments.

Anaïs, who works for her father crafting leather goods, has designed a beautiful new handbag — *the Anaïs*. She had been working on it while she and Sam were beginning

to explore their possible twinship. Anaïs's next bag will be called *the Sam* or *the Samantha*. To read more about the story behind *the Anaïs* bag and to see a photo of the twins carrying the bag, please visit <http://jean-rousseau.com/en/magazine/the-anais-bag-a-remarkable-story>.

## Research Reviews

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### Heteropagus (Parasitic) Twin

Physicians from Loma Linda, California and Addis Ababa, Ethiopia presented a case study involving surgical treatment of the world's oldest heteropagus conjoined twin (Gokcen & Wamisho, 2015). Heteropagus twins are variants of conjoined twins, in that there is a functioning autosite (the larger of two conjoined twins and able to function independently) and a parasitic twin that is nourished by the autosite. It has been estimated that such twins occur in only one in one million births. The individual in question was a 17-year-old female at the time of surgery. Born in a rural Ethiopian village, she concealed her condition for years because physical deformities are considered shameful and because treatment was unavailable. The parasitic twin was attached to her abdomen and pelvis with two rudimentary upper and lower extremities. The patient's brother finally sought medical attention for his sister, given that walking and other daily activities were too difficult for her to perform.

A multidisciplinary team was assembled and surgery was performed at the CURE Ethiopia Children's Hospital in Addis Ababa. The patient continues to recover and is pleased with the outcome. The authors of this report hope that their information will add to the knowledge base of heteropagus twins, which is quite limited given their rarity.

### Schizophrenia Liability

Genetic influence on schizophrenia has been well established, but many important questions about this disorder remain. A number of such questions are addressed in a new study of Danish twins, published by an interdisciplinary team (Klänning et al., 2015). These questions concern the genetic structure of schizophrenia, its genetic links to other psychotic disorders, and contributions to the disorder from environmental effects. The population-based sample included 13 MZ and 31 DZ twin pairs (both same-sex and opposite-sex). The data were collected as part of Klänning's doctoral dissertation.

The best model of schizophrenia liability included additive genetic variance and unique environmental variance; however, this model did not differ from one that also included non-additive genetic factors. Genetic links to other

disorders were observed, but to a lesser degree for broad psychiatric categories. A decline in environmental variance was also found, possibly explained by better diagnoses, improved prenatal/perinatal care, and the reduced prevalence of schizophrenia in the region.

### Twin Study of Epigenetics and Homosexuality

The journal *Science* described recent twin research linking epigenetics (DNA methylation) with sexual orientation (Balter, 2015). If confirmed, this work would help to explain why MZ twins show less than complete concordance for homosexuality. MZ male twins have an estimated 20%–50% chance of being homosexual if their co-twin is homosexual. This work comes from the laboratory directed by Dr Eric Vilain at the University of California, Los Angeles.

Based on prior research by William Rice at the University of California, Santa Barbara, Vilain's post-doctoral fellow, Tuck Ngun, examined methylation patterns in 37 MZ male twin pairs discordant for sexual orientation. Ngun identified five regions that seemed closely associated with being heterosexual or homosexual. He then organized these twin pairs into two groups to see how well he could predict sexual orientation in group two, based on the relationship between epigenetic markers and sexual orientation in group one, and was correct in nearly 70% of the cases.

This work is an exciting approach to understanding the origins of sexual orientation. Clearly, the study requires replication using an independent twin sample. The question of why MZ twins' epigenetic markers differ remains a challenge, but could be associated with events in their prenatal environment.

### Transgender-Discordant Twins

I recommend a recent book, *Becoming Nicole* (Nutt, 2015), which describes the life history of a set of transgender-discordant twins. Born male as Jonas and Wyatt, Wyatt identified as a female from a very early age, gravitating toward pink dresses and dolls. Despite having a supportive mother, Wyatt suffered from the taunts of some fellow students and school policies restricting bathroom use. The book focuses on Wyatt's transition to Nicole, mostly from

a psychological perspective, although the sex reassignment surgery and hormonal treatments that took place are described. The family's fight to change legislation in order to accommodate transgender individuals is admirable.

The book includes little information findings from twin studies that bear upon gender identity. An excellent overview of this area with respect to twins is provided in Diamond (2013).

## In the News

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### The Passing of Jack Yufe

Many people will remember Jack Yufe and Oskar Stoehr, identical twins raised apart in Trinidad (Jack) and Nazi Germany (Oskar). The twins were born in 1933, in Trinidad, to a Jewish Romanian father and a Catholic German Mother. The twins were 6 months old when their parents separated, each taking a different twin to raise. The twins met briefly when they were in their twenties, but left each other with little desire to meet. They did get together again in 1979 when Jack's wife learned about a study of separated twins at the University of Minnesota, directed by Professor Thomas J. Bouchard, Jr.

Jack and Oskar became widely known once they participated in the Minnesota Study of Twins Reared Apart. Despite their very different rearing circumstances, they were very closely matched in intelligence, personality, appearance, and unusual habits such as reading books back to front and wearing rubber bands around their wrists. They eventually developed a close relationship with another, although tensions arose as a result of their different political and historical beliefs and understandings.

Oskar passed away in 1997 from lung cancer at age 64. Jack passed away on November 9, 2015 at age 82 years (Langer, 2015). He leaves behind a wife, several children, and nieces and nephews. Additional information about these twins is available in Segal (2007; 2012).

### An Unusual Twin Father

A Washington state couple who conceived a child via in vitro fertilization was surprised to learn that their child's blood was incompatible with their own blood types (Wang, 2015). However, Stanford University geneticist Barry Starr noted that the child and father showed a 25% genetic relationship — that of uncle and nephew. It was eventually discovered that the father had resorbed a twin in utero (vanishing twin syndrome), incorporating some of his cells as his own — the man's sperm was composed of 90% of his own sperm and 10% of his twin's. In a sense, the man's twin had fathered his child.

Other examples of such occurrences have been reported. In June 1999, a man was admitted for surgery for removal of a tumor from his stomach, but it was a case of fetus-in-fetu — the rare occurrence of a fetus becoming trapped

inside a co-twin (ABC News, 1999). In April 2015, a woman underwent surgery for a brain tumor, but was later informed that the tumor was her embryonic twin (Hooper, 2015).

### Identical Twin Models I

Sixteen-year-old Amalie and Cecilie Moosgard from Ikast, Denmark have been successful as models, having been chosen to represent several top designers (Schneier, 2015). They appear to be identical, based on their appearance. However, the twins claim not to know their twin type and have little interest in finding out if they are identical or fraternal twins. Unfortunately, this attitude sends a misguided message to teenage twins and their families. In a letter published recently in the *British Journal of Obstetrics and Gynecology*, colleagues and I argued in favor of zygosity testing for all same-sex twins (Craig et al., 2015). The benefits include, but are not limited to, more informed medical decisions, lifestyle choices and sense of self.

### Identical Twin Models II

Nineteen-year-old identical twin models, Ruth and May Bell from Deal, England, have also been described in the news (Schneier, 2015). The twins have modeled since 2013, but received little notice until Ruth changed her hairstyle. She decided to trim her long blonde hair with an electric razor and now wears it cut very close to her head. She has been a popular model ever since, working for top designers, while her sister May has been attending college. The twins still model together occasionally — like other identical twins, they have the rare advantage of seeing different sides of themselves that non-twins can only imagine.

### Twin Marines of World War II

Fraternal twin brothers, James P. and Michael J. Reilly, were born on November 9, 1923 (Semple & Speere, 2015). After joining the marines in 1942, they were part of a unit that stormed the beach of Betio, a Japanese-held island in the Pacific Ocean. It was during this battle that James was shot and killed, yet his remains went undiscovered for years. Meanwhile, after the war, Michael joined the New York Police Department and retired in 1973; he passed away in 2005. Ten years later, in 2015, James's remain were identified and returned to his family. The twins are now both

buried 60 feet from one another in the Florida National Cemetery.

Michael spoke very little about his twin brother after the war. However, shortly before his death he admitted to his wife that he thought about James every day.

## References

- ABC News. (1999). Man with twin living inside him — A medical mystery classic. *ABC News*. Retrieved from <http://abcnews.go.com/Health/man-twin-living-inside-medical-mystery-classic/story?id=2346476>.
- Balter, M. (2015). Can epigenetics explain homosexuality puzzle? *Science*, 350, 148.
- Bordier, A., & Futerman, S. (2014). *Separated@Birth: A True Story of Twin Sisters Reunited*. New York: G.P. Putnam's Sons. (written with Lisa Pulitzer).
- Craig, J. M., Segal, N. L., Umstad, M. P., Cutler, T. L., Keogh, L. A., Hopper, J. L., ... Harris, J. R. (2015). Zygosity testing should be encouraged for all same-sex twins. *BJOG: An International Journal of Obstetrics & Gynaecology*, 122, 1641–1641.
- Diamond, M. (2013). Transsexuality among twins: Identity concordance, transition, rearing and orientation. *International Journal of Transgenderism*, 14, 24–38.
- Gokcen, E. C., & Wamisho, B. L. (2015). Delayed presentation of a heteropagus (parasitic) twin: A case report of a 17-year-old patient. *Journal of Pediatric Orthopaedics B*, 24, 567–572.
- Hooper, B. (2015, April 22). Los Angeles surgeons find brain 'tumor' was embryonic twin. *United Press International*. Retrieved from [http://www.upi.com/Odd\\_News/2015/04/22/Los-Angeles-surgeons-find-brain-tumor-was-embryonic-twin/1781429717584/](http://www.upi.com/Odd_News/2015/04/22/Los-Angeles-surgeons-find-brain-tumor-was-embryonic-twin/1781429717584/).
- Klänning, U., Trumbetta, S. L., Gottesman, I. I., Skytthe, A., Kyvik, K. O., & Bertelsen, A. (2015). A Danish twin study of schizophrenia liability: Investigation from interviewed twins for genetic links to affective psychoses and for cross-cohort comparisons. *Behavior Genetics*. Advance online publication.
- Langer, E. (2015, November 13). Jack Yufe, who achieved fame along with separated twin brother, dies at 82. *The Washington Post*. Retrieved from [https://www.washingtonpost.com/national/jack-yufe-who-achieved-fame-along-with-separated-twin-brother-dies-at-82/2015/11/13/c0a19ef2-8950-11e5-be8b-1ae2e4f50f76\\_story.html](https://www.washingtonpost.com/national/jack-yufe-who-achieved-fame-along-with-separated-twin-brother-dies-at-82/2015/11/13/c0a19ef2-8950-11e5-be8b-1ae2e4f50f76_story.html).
- Nutt, A. E. (2015). *Becoming nicole: The transformation of an American family*. New York: Random House.
- Schneier, M. (2015, November 12). A star is shorn. *New York Times*, D9.
- Segal, N. L. (2007). *Indivisible by two: Lives of extraordinary twins*. Cambridge, MA: Harvard University Press.
- Segal, N. L. (2012). *Born together — reared apart: The landmark Minnesota twin study*. Cambridge, MA: Harvard University Press.
- Segal, N. L., & Cortez, F.A. (2014). Born in Korea — adopted apart: Behavioral development of monozygotic twins raised in the United States and France. *Personality and Individual Differences*, 70, 97–104.
- Semple, K., & Speere, L. (2015, November 11). Torn asunder in 1943 battle, twins are reunited under Florida soil. *New York Times*, A25.
- Tellegen, A., Lykken, D. T., Bouchard, T. J., Jr., Wilcox, K. J., Segal, N. L., & Rich, S. (1988). Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology*, 54, 1031–1039.
- Wang, Y. (2015). Man's unborn twin was father of his child. *Orange County Register*, 12.