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NEWS, VIEWS, AND COMMENTS

Reflections on Twin Relationships: Twins Reared Apart and Twins of Opposite Sex / Research Reviews: Second Language Acquisition; Twin Research on Political Behavior; Twinning Rate in Cândido Godói / Human Interest: Twin 'Cousins' Separated at Birth; Chinese Quadruplets; Genetic Testing; KÀ (Cirque du Soleil)

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The complexities of twin relationships posed by separate rearing and by opposite sex are considered. Unusual cases may highlight unique social-interactional processes and outcomes occurring in these pairs. Research reviews include recent twin studies on second language acquisition, political behavior, and multiple birth rates. Items of more general interest include twin 'cousins' reared apart, indistinguishable monozygotic quadruplets, a genetic testing dilemma, and a performance about separated twins.

Reflections on Twin Relationships: Twins Reared Apart and Twins of Opposite Gender

Twins Reared Apart

I visited Mexico City in early September 2012 to attend the premiere of *Oskar y Jack* (*Oskar and Jack*), a new play by Andrés Roemer (2011). The twins' story is famous — Oskar and Jack were born in 1933, in Trinidad, to a Romanian Jewish father and German Catholic mother. The parents separated when the twins were 6 months old. The decision was made for Jack to be raised by his father in Trinidad and for Oskar and his elder sister Sonya to be raised by their mother and grandmother in Germany. The twins met briefly in Germany at age 21, but the meeting did not go well, due to their opposing backgrounds and beliefs. The twins reunited once more in 1979, at age 46, to take part in the Minnesota Study of Twins Reared Apart (MISTRA). Then, from 1979 until Oskar's death in 1997 the twins met periodically, fascinated by their similarities (e.g., reading books back to front; hand-washing before and after visiting the men's room) and repelled by their differences (e.g., political views; historical understandings; Segal, 2007, 2012). The new play does not recreate their story, but uses it to explore issues of identity and free will.

Differences in how monozygotic (MZ) and dizygotic (DZ) co-twins relate to one another are intriguing. This information is meaningful at both theoretical and applied

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levels. At the theoretical level it helps us interpret the social-interactional processes and outcomes that emerge when individuals share varying degrees of genetic relatedness. Elsewhere, I have shown how psychodynamic, social-genetic, and evolutionary psychological perspectives are all compatible with the consistent finding that MZ twins are generally socially closer than DZ twins. At the applied level, parents, teachers, and others concerned with twins' welfare can better understand, and even anticipate, relationship differences among the various types of twins.

Most reared apart MZ (MZA) twins get along well, somewhat better than reared apart DZ (DZA) twins, mirroring what is found in twins reared together. In fact, most MZA and DZA twins feel closer to their newly found co-twin than they do to the unrelated siblings with whom they were raised (Segal et al., 2003). However, many questions remain unanswered: Why do some reared apart twins get along so well while others, who initially got along well, become estranged from one another. How often do reared together twins sever their relationship? I have received inquiries from some reared-together twins who want to participate in twin loss studies because their twin is lost to them, albeit still alive. No one has documented the frequency with which either of these situations occurs, but they deserve attention.

Thinking back over certain pairs I knew in the MISTRA and beyond, I believe that marked changes in lifestyle on the part of one twin explain the disruption of the relationship. Such changes variously included one twin getting married, one twin becoming religious, and one twin accepting serious employment, leaving the other twin single, unaffiliated and unemployed. These events can also create differences within reared-together twins, but they do not end the relationship — or do they? Perhaps it is easier for reared apart twins to end their association because they did not grow up experiencing it. It may also be that rearing status (together or apart) is unrelated to whether or not twins can withstand events that challenge their twinship. Perhaps the answer lies in the twins' personalities, causing two strong-willed twins to clash in ways that cannot be overcome. Twin studies have taught us that divorce has a heritable component, perhaps residing in a suite of personality or temperamental traits that place individuals at risk (Jockin et al., 1996). The key point is that we know relatively little about the frequency and motivation for why twins of both types choose to be apart.

MZ twin professors who were both hired by the same academic department believed that this situation is more workable than hiring a married couple. One twin reasoned that twins cannot divorce if conflicts arise, whereas married couples can. I am not so sure.

Twins of Opposite Sex (OS)

The first international gathering of adult OS twins took place on for September 22–23, 2012 at the Lancaster Hotel, in London. Organized by Olivia Lousada (opposite-sex twin and author of *Hidden Twins*, Lousada, 2009) in collaboration with Richard Oliver, the event offered workshops and discussions of the unique features of male–female twin pairs. Both Lousada and Oliver are members of the London Psychodrama Network.

This effort should be applauded. OS twin pairs are often overlooked as an interesting phenomenon (with attention given mostly to identical twins), and as a control group (with preference give to same-sex [SS] fraternal pairs). However, special features of brother–sister twin pairs have been known for some time. Young OS males as a group appear somewhat feminized in their behavior (Koch, 1966). Females from OS pairs tend to outscore females from SS pairs in sensation-seeking measures (Resnick et al., 1993). Female twins from OS pairs show an average reduction in otoacoustic emissions (tones given off by hair cells in the ear to assist audition), similar to males (McFadden, 1993). The 2D:4D ratio (ratio of the second to fourth finger) has shown masculinizing effects in females from OS pairs (van Anders et al., 2006). Some studies (Lummaa et al., 2007), but not all (Medland et al., 2008), report reduced fertility in OS female twins. The mixed evidence on fertility and on other biological and psychological measures suggests that the consequences for females of having a male co-twin are complex and unlikely to have a single explanation (Loehlin & Martin, 2000).

Other than the young pairs studied by Koch, psychological and interactional features of OS twin pairs, especially among adults, have been largely overlooked. A recent news report on the topic, inspired by the London meeting, suggested that OS twins may gain greater understanding of the OS by virtue of being in such a twinship (Barkham, 2012). That is possible, and in the course of the September gathering, evidence of this and other previously unsuspected characteristics unique to OS pairs, most likely emerged.

Research Reviews

Second Language Acquisition

Given increased globalization and the greater ease of travel, more needs to be known about factors affecting the learning of a new language. A recent twin study of instructed second language acquisition (ISLA) adds immeasurably to our knowledge and understanding of this process (Coventry et al., 2012). MZ and DZ twins were identified from the Australian Twin Registry and provided ratings of their skill at speaking, listening, reading, and writing in a second language. Twins' teachers provided a class ranking of each twin's second language proficiency, and rated each twin's

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skill across four areas of assessment. Twins and their parents provided information about languages spoken in the home and responded to items in a zygosity questionnaire.

Achievement in ISLA showed additive genetic effects for teacher ratings (72%), class rankings (68%), and twins' self-ratings (38%). Shared environmental effects were small or negligible for ratings from these three sources. Separate genetic effects were identified (1) for speaking and listening, and (2) for reading and writing. Unique environmental influences on ISLA explained up to 25% of the variance in teacher rankings and up to 50% in twins' self-ratings. The reason for the discrepancy between these sets of findings is speculative, but the authors suggested that it could reflect the twins' reliance on relatively less heritable factors, such as how much they enjoyed learning a second language or how much motivation they brought to the process. Further analyses of this issue and the effects of age, gender, and teaching methods on ISLA are planned.

Twin Research on Political Behavior

Research on political attitudes, political ideologies, and voting behavior has increased rapidly in recent years as some political scientists have incorporated a twin-based perspective into their studies. This research is summarized by Hatemi and McDermott (2012) in a review paper exploring the history, methods, findings, and implications of this work, as well as the academic collaborations and clashes that have arisen. A key point in their review is that:

'Studies are only now beginning to combine the entire suite of tools, which include twin and kinship studies, genome-wide studies, candidate gene approaches, genetic pathway analysis, copy number variants, neural pathways, gene expression, next generation sequencing, rare variants, hormonal levels, and gene-behavior experiments, such as those using identical twins to serve as genetic controls, to examine the influence of environments on outcomes' (p. 532).

Gene-behavior experiments promise to be especially thought provoking. MZ twins show substantial agreement on most measured political traits, yet an informative sample would include twins whose political attitudes differ, as well as twin politicians whose attitudes coincide, but whose careers followed different paths. Terry and Jerry Kilgore (who appear to be MZ, based upon inspection of photographs) are both Republicans, but Terry has held the first district house seat in Virginia since 1993, while Jerry was Attorney General of Virginia from 2002 to 2005, and an unsuccessful gubernatorial candidate in 2005 (Staywell, 2012). Identical twins Julian and Joaquin Castro are both Democrats, but Julian is Mayor of San Antonio, Texas and Joaquin is a member of the Texas House of Representatives and a 2012 candidate for the United States Congress. Other well-known identical political twins are the former President and Prime Minister of Poland, Lech (deceased) and Jaroslaw Kaczyński. The within-pair social interactions and other factors that placed all these twins on different political trajectories would be important to discover.

Hatemi and McDermott (2012) note both the power and pitfalls of the classic twin design. The twin method's explanatory power derives from the simple contrast of genetically identical and non-identical twin pairs. The equal environments assumption has undergone considerable challenge, but has been widely upheld. However, separating additive genetic variance from other sources of variance (e.g., epigenetic effects, idiosyncratic influences) remains a key challenge to investigators using twins.

Twinning Rate in Cândido Godói

Genetic factors affecting twinning have been of interest, especially when they concern small populations with unusually high twinning rates. Cândido Godói is a small town of 6,700 residents located in southern Brazil. The town was founded in the early part of the 20th century by individuals of German ancestry. The twinning rate of Cândido Godói is 1.5% as compared with 1% in the rest of the country (Tagliani-Ribeiro et al., 2012). Based on samples of 42 mothers of twins and 101 mothers of non-twins, the researchers found a higher number of pregnancies and higher frequencies of the P72 and T alleles among the mother of twins than the mothers of non-twins. (These alleles are two of the five alleles from the p53 pathway that were investigated; p53 is a tumor suppressor protein.) The P72 allele had a stronger effect on twinning risk, while number of pregnancies and the T allele had relatively weaker effects.

The researchers suggested that the P72 and T alleles are associated with infertility, but that low levels of P72 especially may affect implantation, improving the chance of a multiple pregnancy. They also noted that because the findings were based on a very small population they require repeated analysis and replication.

Human Interest

Twin 'Cousins' Separated at Birth

Twins are reared separately for many reasons, including inadequate family finances, illegitimate birth, maternal loss, and accidental switching of one twin with a non-twin infant, to name a few. The story of identical twins Del Block and Dale Siems is not unusual in this respect — the twins were

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the sixth and seventh children born to Ella and August Siems in Hansell, Iowa and their parents could not afford to raise them both (Rascal, 2012). However, this case is unusual because Del was raised by his mother's brother who ran a successful farm, transforming him into Dale's 'cousin'. The twins saw each other from time to time at family events and played against each other in school basketball games. They assumed they were cousins despite their similar appearance.

When the twins were nearly 22, Del decided to get married. He went on to obtain his birth certificate, only to learn that his real last name was Siems, not Block, and that he and Dale were twins, not cousins. Despite their rearing differences — Dale slept on mattresses and had a poor diet, while Del enjoyed better living conditions and had a healthy diet — both twins were professionally successful. Dale became owner of one of the largest tree and plant suppliers in the Midwest, while Del became general commercial manager of Alliant Energy in Cedar Rapids, Iowa. These twins exemplify the concept of active gene-environment correlation, namely that individuals create their environments from the resources available to them, a process guided partly by their genes.

Dale and Del reminded me of the characters in the *Patty Duke Show*, a fictional television series about identical cousins that was popular in the early 1960s. I enjoyed this show while growing up but, perhaps because I am a twin, I felt frustrated by the inaccuracy of watching cousins who looked exactly the same. The story of Del and Dale are living proof that that cannot happen.

It seems curious that Del and Dale did not recognize their true relationship until they were in their 20s, especially since they probably celebrated their birthdays on the same day. In fact, many identical twins do not think they look alike, focusing on the small physical and behavioral differences between them. Interestingly, the MISTRA included a pair of identical male twins who were switched at birth and reunited at age 20, due to mistaken identity (Segal, 2012). They were close friends for approximately 1 year until they considered the possibility that they were twins (Segal, 2007).

Chinese Quadruplets

Six-year-old identical male quadruplets, Jiang Yunglong, Jiang Yun-Shao, Jiang Yunhan, and Jiang Yunlin are indistinguishable to many people, including their parents (Jackson, 2012). Consequently, their mother decided to shave the numbers 1, 2, 3, and 4 on the tops of their heads so their teachers would be able to tell them apart. The quads' mother, Tan Chaoyun, relied on ankle bracelets for the quads' first 18 months in order to know who was who. Presumably, like most mothers of identical twins, she has become sensitive to subtle physical and behavioral differences between her children now that they are older.

There was no mention of older or younger siblings in the quads' family, but my experience is that most identical twins' singleton siblings distinguish between them quite easily. Studying these brothers and sisters might offer information as to the specific cues children use to tell identical twins, triplets, and quadruplets apart.

Genetic Testing

Dor Yeshorim, established in the 1980s, is a confidential genetic test for Orthodox Jews wishing to marry (Center for Jewish Genetics, 2012). Abortion is prohibited under Jewish law, so *Dor Yeshorim* was developed to prevent the birth of children with a genetic defect. The test is intended to identify carriers (individuals carrying one copy of an allele for a given trait) of 10 recessive disorders occurring with elevated frequency among Ashkenazi Jewish populations: Tay-Sachs disease, cystic fibrosis, Canavan disease, familial dysautonomia, Fanconi anemia type C, Bloom's syndrome, Gaucher disease type I, mucolipidosis type IV, glycogen storage disorder type I, and Niemann-Pick disease. Individuals receive an identification number linking them to their results, but they do not receive the results to avoid embarrassment or ostracism. When men and women meet or plan to marry they submit their identification numbers to the laboratory to determine if they are compatible marriage partners. Compatible couples may both be carriers, but not carriers of the same disorder.

A young MZ female twin (A) informed me that she and her twin sister (B) had a single test done for both of them, using B's blood, because they are identical twins. (I had previously arranged DNA testing for them and the technicians identified them as such based on their very similar appearance, and noted this.) The results were placed in B's file in the laboratory. A wished to marry first, but the laboratory refused to link her potential spouse to her sister's file, due to confidentiality agreements. A was required to obtain the test which costs $200. 'I think it is insane that I need to do the test, but there is no way out. Don't you agree?' she asked. I do.

KÀ (Cirque du Soleil)

KÀ is the second Cirque du Soleil performance to include twins; the first was *Viva Elvis* that included a moving musical number, 'One Night', that played while two identical twins (representing Elvis Aaron and his twin, Jesse Garon, who died at birth) moved together and apart across a giant metal guitar suspended on stage (Lewis, 2010). *KÀ* is the first Cirque du Soleil performance to include a storyline, namely the separation of the OS Imperial Twins, due to an attack on their palace (Fontein, 2012). The twins are separated while trying to escape, but they are eventually reunited and reclaim their palace.

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