

News, Views and Comments

Justifying Separate Experiences for Twins: Dorothy Burlingham's Classic Twin Study/Twin Research Reviews: Monozygotic Twins with Maturity-Onset Diabetes, Gene Editing of Chinese Twins, Educational Disadvantage of Early-Born Twins and Developmental Trajectories of Movements in Fetal Twins/In the News: Twins with Nearly Identical License Plates, Rare Case of Fetus-in-Fetu, Twin Brothers Killed at Pearl Harbor, Death of a 96-Year-Old Twin Holocaust Survivor, Death of Male–Female Twin Toddlers in a Heated Car and Confusion of Identical Twin Politicians

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Abstract

This article explores the justification for providing separate experiences for twins. The focus is on Dorothy Burlingham's (1952; *Twins: A study of three sets of identical twins with 30 charts*. London, UK: Imago) classic, in-depth study of three identical twin-pairs. Implications for how twins are raised currently will be examined. Reviews are presented of twin research concerning monozygotic twins with maturity-onset diabetes, gene editing of fetal Chinese twins, educational disadvantage of early-born twins, and developmental trajectories of twins' prenatal movements. Some unusual experiences and situations involving twins that warrant media attention are also summarized. They include twins with nearly identical license plates, a rare case of fetus-in-fetu, twin brothers killed at Pearl Harbor, the death of a 96-year-old twin Holocaust survivor, the accidental death of male–female twin toddlers in a heated car and confusion over identical twin politicians.

Keywords: Burlingham; separation; twin relationship

Justifying Separate Experiences for Twins: Dorothy Burlingham's Classic Twin Study

The rearing and educating of twin children are of great concern to parents, teachers, physicians and anyone who work closely with the members of multiple birth sets. Being a twin means being variously subject to unique developmental circumstances, such as shared parental time, comparison with a same-age sibling, and rivalry over common resources. This article revisits lessons from a classic twin study, namely Dorothy Burlingham's (1952) work titled, *Twins: A Study of Three Sets of Identical Twins with Thirty Charts*. Her study is especially noteworthy because it provides highly detailed descriptions of three monozygotic (MZ) twin-pairs, two

female and one male, based on observations made between the years 1940 and 1945. Consequently, this article also focuses on the situation of MZ twins and the implications of Burlingham's findings for providing MZ twins with separate experiences.

First, some background. Dorothy Trimble Tiffany was a child psychoanalyst and educator. She was born in October 1891, the last of four children, to Louis Comfort Tiffany and his second wife Louise Wakeman Knox (Burlingham, 1989; the author is Dorothy's grandson). Tiffany was an artist and decorator and the heir to Tiffany & Co., founded by his father. He is best known for his famous Tiffany lamps (Gorlinski, 2019). His first two daughters, Julia and Louise, born in 1887, appear to be identical from family photos and are described as such. It is suspected that Dorothy Burlingham's interest in twins stemmed largely from her envy over the close relationship that her sisters shared (Burlingham, 1989). She was also aware of the widespread fascination with twin children, even among people who knew twins or had twins in their families. She suggested that two identical individuals have a certain appeal and that observers identify with them, wishing that they also had a twin. However, she suggested that adult twins lack this appeal and are considered 'oddities and curiosities' (Burlingham, 1952, p. 8).

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Dorothy married surgeon Robert Burlingham in 1914 and raised two boys and two girls. She separated from her husband in 1921 and moved to Vienna in 1925 with her children where she met Anna Freud. Following the Nazi invasion of Vienna in 1938, Burlingham left for the United States before moving to London where she lived close to Anna Freud (Encyclopedia.com, 2019). During the war, they founded the Hampstead Nurseries, a residential home for children between the ages of 10 days and 10 years. Plans allowed job opportunities to be arranged for mothers if they wished to be near their children. Of the 191 children who spent various amounts of time in the nursery were four sets of identical twins, two sets of nonidentical twins and one set of non-identical triplets. Three sets of identical twins were chosen for observation (Burlingham, 1952), although it is unclear why the other pairs were not.

The methods by which the zygosity of the three chosen sets was assigned were not specified, although observations of their near physical identity are consistent with monozygosity. Even the twins' mothers and nurses confused them, which is unusual. However, in these cases, the twins' mothers did not reside at the nursery and saw their children only during visits. In addition, while nurses seemed to have more regular contact with the twins, they had other children to care for and nursing staff changed from time to time. In my experience, mothers and nontwin siblings of identical twins are better able to distinguish between them than most other people, even wrongly claiming that an MZ pair is DZ. That is because family members become highly sensitized to subtle physical and behavioral differences between MZ co-twins (Segal, 2017).

The three twin-pairs studied by Burlingham (1952) were Bill and Bert, Bessie and Jessie, and Mary and Madge:

Bill and Bert were born to a single mother and remained with her in a baby hostel until the age of 4 months. They were then transferred to the Hampstead Nurseries at which time their mother returned to work. Bessie and Jessie were born to a mother whose father was in the army. They were evacuated from the maternity hospital with her at 1 month of age and arrived at the Hampstead Nurseries when they were 4 months old. Mary and Madge were born to working class parents who had two older children. They were evacuated to a nursery in the provinces when they were 10 months old. The parents became estranged from the twins, given that visits were allowed only once per month, so they brought the twins back home. At this point, the twins were difficult to manage; after they ran away from home, they entered the Hampstead Nurseries at age 3 years, 7 months.

It is impossible to condense the rich details of Burlingham's study into a few journal pages. I will, therefore, present selected findings concerning the twins' early relationship with one another, the author's discussion and my own conclusions. Clearly, each pair demonstrated love and concern for one another, interrupted by efforts toward independence and individuality. A unique aspect of this study is a record of what may be the beginnings of the twin relationship. However, it is important to bear in mind that these observations are filtered through the eyes of the attending nurses.

Bert first noticed Bill at age 7 months, when he smiled at his brother, although Bill did not respond. At 8 months, when they were in the same cot, Bert would fall asleep and Bill would disturb him to the point that separation was sometimes warranted. Jessie and Bessie became aware of one another at age 8 months when Jessie placed her hand in Bessie's cot. Bessie repeated this behavior toward Jessie 1 month later. When they were 10 months old, Jessie watched Bessie, although Bessie did not watch her. (These early observations are unavailable for Mary and Madge who arrived

at a much later age.) However, twins' awareness of one another may actually start sooner. An insightful article on twins by the late prominent pediatrician, T. Berry Brazelton, observed that at ages 3–4 months, an infant MZ female twin appeared disoriented when her twin sister was taken from the room. When this happened, she stopped moving or feeding when she heard her sister's voice (Brazelton, 1980). Research shows that infants as young as 6 months of age show social interest in one another, but, as indicated, this can occur even earlier for twins (Brownell & Brown, 1992; Eckerman & Peterman, 2001).

Mutual understanding and consensus were evident between the twins in all three pairs. Bill and Bert engaged in copying games at ages 13–15 months. These games consisted of hand clapping, brick banging (on a table), and assumption of various body postures. These behaviors evoked considerable laughter from the twins. After a while, it was not possible to determine who initiated the different actions. Bessie and Jessie shared emotions with one another, even if one did not feel that emotion initially, such as fear of bathing with in a big tub. At age 2 years, Bessie was fearful of bathing, Jessie was not, but Jessie expressed fear upon seeing her sister's response. However, in other situations, their emotions appeared to be expressed simultaneously, for example, fear of ducks and fear of sheep, also at age 2. When they were two and a half years old, they seemed united in their quest to provoke their mother who came for a visit. They cooperated by taking turns making demands, insisting that the demands be met and acting similarly. These behaviors apparently came easily for them — twin research shows that fear of strangers and other emotions have a partial genetic basis, even in infancy (Freedman & Keller, 1963; Van Hulle et al., 2007; Zahn-Waxler et al., 1992). When two individuals are matched behaviorally, it would seem easier to accomplish a shared goal.

Mary and Madge are the sole focus of a chapter titled 'Twins as a Team.' When they first arrived at the Hampstead nurseries at age 3 years, 7 months, they constantly held hands and copied one another in crying and in other behaviors. The nurses worried that their twin relationship would inhibit their formation of other social contacts, although eventually they did form other associations, but as a unit. With time, they showed more independence when they were at peace, but when they were upset they turned to their twin.

Each set of twins showed unfavorable behaviors; we are given the impression that such behaviors were most likely linked to the twins' relationship with one another. When Bert and Bill were separated due to Bert's illness, Bill often used the term 'gone' or the words 'all gone.' It was reported that he used the words with increasing violence, evidence of his strong feelings at being separated from his twin. Bessie and Jessie sometimes directed blame and criticism toward each other, more often than to other children. They managed their jealousy by recognizing the occasional superiority of the other, using it to their advantage. Mary and Madge often sided with one another, but the behavior of one twin occasionally bothered the other twin, resulting in disagreements. They vacillated between love and jealousy.

Burlingham concluded that twins experience more intense rivalry than nontwins, even while they are supposed to get along. She notes that some parents try to alleviate the situation by severing the twin relationship, or sending one twin away to be raised elsewhere. (She does not cite a source for these extreme decisions.) She disagrees with such practices, noting that "This is an inadequate method of solving the situation. Twins cannot avoid the difficulties which are inherent in their twinship, just as ordinary children cannot help being influenced by the fact of their being an eldest,

youngest or a middle child' (p. 88). She urges insight into twins' relationship issues, to help parents promote their individuality, handle co-twin differences and allow the twins pleasure in their association. She also stresses that when twins maintain a healthy tie to the parent this can help keep co-twin dependence and identity in proper perspective.

The twins in Burlingham's (1952) study were not representative of identical twins, in general, given that they were raised in a nursery and were largely isolated from their parents. Nevertheless, her work provides an informative snapshot of the earliest features of twins' social relations with one another, both positive and negative. I agree with her view that twins do encounter unique developmental situations — as do all individuals — and that there are ways in which they may be addressed appropriately. Unfortunately, her work has been used to justify raising twins apart, a practice that she clearly does not endorse (see Abrams 1986).

There is no single formula for raising pairs of twins or pairs of nontwin children. Identical twins thrive in many different settings and situations, some by remaining together in school, others by separating; some by dressing alike, and others by dressing differently. The primary concerns are that twins remain healthy and happy and that they celebrate their relationship as they see fit. Twins in their own ways will let parents know what is best for them.

Twin Research Reviews

MZ Twins with Maturity-Onset Diabetes

A case study of MZ female co-twins who showed similarities and differences in symptoms of maturity-onset diabetes (young type 5 or MODY 5) indicates that both genetic and environmental factors are involved (Ohara et al., 2019). This particular form of diabetes implicates a mutation in the gene identified as *HNF1β*. The proband was a 30-year-old Japanese woman who had not been previously diagnosed with the disorder, but had experienced thirst and polyuria (abnormally large volumes of dilute urine). Her twin sister was also examined.

Both twins showed the condition, but some of their features differed. The proband had a marked defect in insulin production and mild renal dysfunction, whereas her sister showed the reverse pattern. Both twins showed hypoplasia (underdevelopment) of the pancreas, but pancreatic volume was more reduced in the proband. According to the investigators, the only other report of MZ twins concordant for this form of diabetes found that their symptoms were the same. It was suggested that the twins in the present case may have differed due to copy number variations, mitochondrial differences and/or heteroplasmy (presence of more than one mitochondrial DNA variant). Unfortunately, the methods by which the zygosity of the pair was established were not provided.

Gene Editing of Chinese Twins

In 2018, the Chinese scientist He Jiankui stunned the medical genetics world by editing the genome of a pair of Chinese twins prior to their birth. This procedure was done with the intention of protecting the twins from HIV infection. His decision met with considerable criticism, given that such procedures are currently considered risky. Since then, two other scientists suggested that the twins may experience a reduced lifespan due to the gene editing. This later charge is, however, also controversial as it is based on genes linked to longevity in a British population. It was also pointed out that the alleged reduction in lifespan is based on having two copies of the edited gene; in the twins' case, only one twin had

two copies of the relevant allele, whereas her co-twin had one. Regardless, these events underline the caution required in this field, given that a great deal has yet to be learned (In the News, 2019).

Educational Disadvantage of Early-Born Twins

Researchers in Australia pointed out that twins are at greater risk for poor neurodevelopmental outcomes than nontwins (Zeltzer et al., 2019). They were specifically interested in knowing whether these deficits are tied to twin-specific factors or other risk factors, such as shorter gestational age and small size for gestational age. In an attempt to answer this question, they examined the 2008–2014 ability scores (reading, writing, grammar, spelling and numeracy) of children from the pool of all live births in New South Wales, in which infants were born at or before 24 weeks' gestation. Upon controlling for various maternal factors, the twins were at increased risk of falling behind national standards in the different ability areas, compared to the nontwins. The most significant factor behind these results was the twins' shorter gestational age, with their small size for gestational age also contributing to the outcome.

This research was presented as a conference abstract, so it is unclear how many twin-pairs were MZ and how many were dizygotic (DZ). This is important because monochorionic MZ twins are delivered earlier than dichorionic MZ and DZ twins. The findings also conflict with results from recent Dutch and Danish twin studies showing that twins do not differ from nontwins on tests of mental ability (see Segal, 2017).

Developmental Trajectories of Movements in Fetal Twins

A collaborative study involving investigators from Portugal and the Netherlands published a unique developmental twin study of prenatal movements (Tendais et al., 2019). The initial sample of 45 pairs included 17 female–female sets, 13 male–male sets and 12 male–female sets that were mostly dichorionic. However, the intrauterine death of one or both twins reduced the sample size to 42 pairs.

Fetal movements were assessed by routine ultrasound procedures at 12–15, 20–23 and 28–32 weeks' gestation. Each 20-min session was recorded on DVD for later analysis by two different raters. Each fetus's head, trunk and upper limbs were visible, as was the contact area between the twins. It was found that developmental trajectories for general and breathing movements were unrelated between co-twins and unrelated to gestational age and birth weight. Sex differences were detected, with male fetuses spending more time engaging in general movements at 21 weeks, and showing a steeper decline in time spent making general movements during the second half of pregnancy, relative to female fetuses. Despite the strengths of their study, the researchers noted that the sample size was small, simultaneous observations did not occur for one-third of the twins and factors, such as diurnal rhythms (activity based on a 24-h cycle), and prandial effects (factors relating to a meal) may have affected the results.

Media Coverage

Twins with Nearly Identical License Plates

Identical twins, Andy and Chad Baker, were driving their own separate cars, both blue Teslas, when a police officer directed them to the side of the road (Fox News, 2019). The brothers had left their home in Nashville, Tennessee and were heading to the annual Twins Days Festival, in Twinsburg, Ohio. They were puzzled, knowing that they had not been speeding. The officer informed

the twins that their cars had the same license plate, causing him concern. The twins then explained that the plates were similar, but not identical, that is they read as SUBJ TO and SUBJT0; the difference was that the first one ended in a letter and the second one ended in a number. The term SUBJ TO is used in the real estate business in which both twins are involved. It is defined as the existing financing that a homeowner has set up that is taken over by an investor. It is basically paying for a mortgage that is in place through an agreement with a homeowner (Cohen, 2015).

The twins were not ticketed because they had not violated any rule or regulation. However, the year before, while making the same trip to Ohio, they were both given tickets for exceeding the speed limit.

A Rare Case of Fetus-in-Fetu

A 17-year-old teenager with abdominal pain and a lump was referred for medical treatment (Hein, 2019). It was determined that the lump had fat density areas, soft tissue and many calcified components in the shape of vertebrae, long bones and ribs. The diagnosis was fetus-in-fetu, a rare occurrence in which a malformed fetus is detected in the body of a living twin. This event is estimated to happen in 1/500,000 live births and to affect mostly young males. In this particular case, reported from India, the patient was female.

Twin Brothers Killed at Pearl Harbor

Identical twins Leo and Rudolph Blitz enlisted in the US Navy in 1938, at age 17 years (Gearty, 2019). Leo, a Machinist's Mate Second Class, and Rudolph, a Fireman First Class, were on board the USS Oklahoma during the attack on Pearl Harbor on December 7, 1941. Some survivors from their ship recall seeing Rudolph running below the deck in search of his twin. In May 2019, the twins' remains were identified based on DNA samples provided by their sister, nieces and nephews. They were buried in Nebraska with full military honors.

Readers interested in the stories of twins and brothers who perished at Pearl Harbor might wish to read *Brothers Down* by Borneman (2019). I read this book with great interest and only wish that more could have been told about the lives of each twin and sibling pair.

Death of a 96-Year-Old Twin Holocaust Survivor

Stepha Heller, a member of the oldest twin-pair to survive Dr Josef Mengele's horrific twin experiments at the Auschwitz concentration camp, passed away on September 11, 2019. She was 96 years of age. She is survived by her identical twin sister Annetta and several children, grandchildren, great-grandchildren, nieces and nephews. I first met the twins in Jerusalem, at the 3-day public hearing on Dr Josef Mengele's war crimes, held in 1985. I visited them next in 2004 in their Melbourne, Australia homes, spending several days with them and their families. I was there to learn more about them as twins and as Holocaust survivors for a book I was writing (Segal, 2005). The title of their chapter is a phrase they repeated often to describe their relationship: 'Two Bodies and One Soul.'

The last time I saw Stepha and Annetta was in December 2014, while I was in Melbourne participating in a conference, 'Healthier Kids: Insights From Twin Research,' sponsored by the Royal Children's Hospital. The twins attended part of the day and joined me for a book signing, shown in Figure 1. I met them later for dinner and drinks, along with Annetta's son, Danny. I was so privileged to know them.



Fig. 1. Dr Nancy Segal, Stepha Heller and Annetta Able (L to R) at the book signing event, held at the 2014 Melbourne conference. Photo courtesy: Nancy Segal.

Death of Male-Female Twin Toddlers in a Heated Car

In the summer 2019, Juan Rodriguez, the father of 1-year-old male-female twins Mariza and Phoenix, inadvertently left his children in a heated car while he was at work. (The female twin has been identified as Luna in others article about this case; see ABC News, 2019). He had first dropped off his older son at day care. Rodriguez was described as a loving father who was attentive to his children. Rodriguez was charged with manslaughter and criminally negligent homicide (Schweber & Salcedo, 2019).

It seems unthinkable that a parent would forget placing his or her child in the back seat of a car. Dr David Diamond, Psychology Professor at the University of South Florida, has explained that people form routines that they perform automatically. This is a function of the brain's basal ganglia. The hippocampus, in contrast, is concerned with new information. If you normally drive to work from home and you do not normally have a child in the car, it may be possible to forget that on a given day a child was present. Diamond asserts that the two areas of the brain may be in competition (Rosenblatt, 2017).

Confusion of Identical Twin Politicians

Julián Castro, former US Secretary of Housing and Urban Development, is one of a number of candidates competing in the Democratic primary to become the presidential candidate of his party. His identical twin brother Joaquin is in the US Congress. Joaquin has recently grown a beard in order to distinguish himself from his twin. They are often confused for one another, such as in June 2019 when Joaquin was mistaken for Julián on the national MicroSoft National Broadcasting Company television news program, *Morning Joe* (Darrah, 2019).

Joaquin once substituted for his twin when Julián was mayor of San Antonio, Texas and could not attend the annual San Antonio river parade. The twins were criticized by some people for this decision (Kaczynski, 2012).

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