

2.2 Frank J. Sulloway (弗兰克·苏洛韦)

Birth Order, Family Niches, and Evolutionary Psychology



The author, doing field research inside the caldera of one of the six volcanoes that form the island of Isabela in the Galápagos Archipelago. A venting fumarole is visible at the top, left. Photograph by Eric Rorer.

Frank J. Sulloway 是美国著名学者、作家和自由撰稿人。他在进化心理学方面最突出的贡献在于对出生顺序的研究。他将进化理论应用于理解家庭动力学如何影响人格发展、创造天赋的研究中,认为出生顺序效应的确存在,影响着人们的人格与智力。其影响机制是通过家庭、同胞之间的互动产生的,即是因为社会因素而非生物因素。出生顺序对人格有影响是由于长子资源竞争中天生占有优势,于是长子和幼子们会发展出不同的人格来应对。出生顺序对智力有影响是因为随着孩子数量的增多,有限的资源被稀释得越来越少,进而获得最多资源的长子智力发展最好。他的研究通过演讲和电视被广泛传播,包括探索频道、“Today Show”、“Dateline NBC”,等等。

1965 至 1969 年,Sulloway 于哈佛学院 (Harvard College) 获得“科学与历史”的学士学位;1970 至 1978 年,于哈佛大学 (Harvard University) 获得“科学历史”的硕士与博士学位。他的任职经历丰富,在多个知名大学担任过讲师、客座教授、访问学者:1981 至 1982 年在哈佛大学心理学系担任博士后;1984 至 1985 年在哈佛大学心理学系担任访问学者;1985 至 1986 年在哈佛大学心理学系担任讲师;1986 年在达特茅斯学院担任讲师;1989—1998 年在马萨诸塞州科技研究院担任访问学者;1999 至 2001 年在加州大学伯克利分校 (University of California, Berkeley) 心理学系担任客座教授;2001 年至今任加州大学伯克利分校人格与社会研究所的访问学者。

Sulloway 的研究兴趣主要在三方面:弗洛伊德与精神分析学,生物进化,出生顺序与人格、社会态度、智力表现之间的关系。

Sulloway 在 1979 年出版的《弗洛伊德,思维的生物学家:超越精神分析的传统》(*Freud, Biologist of the Mind: Beyond the Psychoanalytic Legend*)一书中,重新分析了精神分析学的起源和有效性,并获得了科学社会历史领域的 Pfizer 奖。

在生物进化方面,Sulloway 发表很多篇论文,主要研究的是动物(鸟雀、象龟)的习性与进化的关系。

Sulloway 在 1995 年发表了他在出生顺序研究领域的第一篇文章《出生顺序与进化心理学:一个元分析的综述》,文章对以往认为出生顺序的效应并不存在的研究结论进行了反驳,通过进化理论分析了出生顺序对长幼子人格的影响。

随后,Sulloway 在 1996 年出版了《天生反叛:出生顺序、家庭动力学与创造天赋》(*Born to Rebel: Birth Order, Family Dynamics, and Revolutionary Genius*)一书,该书在 1996 年亚马逊畅销书排行榜上位居第 35 名,被《纽约时报》挑选为“年度值得注意的书”。这本书回答了这样一个问题:为什么来自同一个家庭的孩子们的人格差异并不比来自不同家庭的个体差异小? Sulloway 认为出生顺序在其中起了很重要的作用。首先,出生顺序表明了同胞之间一系列差异:年龄、体型、力量、优势地位。在家庭环境中长子和幼子们会分别发展出不同的策略来竞争资源、父母的关爱,进而发展出不同的人格:占有优先地位的长子更认同父母的权威和价值观,而幼子们会更为叛逆和愿意作新的尝试和挑战长子的优势地位。Sulloway 还统计了 1700 至 1875 年间 600 多名科学家对进化理论的接受程度。结果显示,平均而言,幼子们对进化理论的接受程度是长子们的三倍。这表明幼子们更容易接受颠覆性的科学观点。

2007 年 Sulloway 在 *Science* 上发表一篇关于出生顺序与智力的关系的文章。文章论述了出生顺序与智力的关系,并试图解释长子比幼子们有更高的智商的现象。Sulloway 认为同胞之间智力的差异是由于社会因素、家庭间成员的互动因素造成的。因为随着孩子的增多,家庭内有限的资源(比如父母的关爱)分配给每个孩子的越来越少,长子成长过程中是平均获得资源最多的,因而智力发展也最好。

在本书中 Sulloway 讲述他如何重走达尔文的研究之路,并从中形成自身的有关人格进化的理论。

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Birth Order, Family Niches, and Evolutionary Psychology

Frank J. Sulloway^①

I was initially drawn to the field of evolutionary psychology by a roundabout route, in an effort to understand the intellectual path by which Charles Darwin (1809—1882) came to accept the heterodox theory that species evolve over time. As a college undergraduate, I had retraced Darwin's footsteps in South America during his five-year voyage on H. M. S. *Beagle* (1831—1835) and had made a documentary film about Darwin's journey. In the course of working on this film, I realized that Darwin had not become an evolutionist, as legend had maintained, as an immediate consequence of his visit to the Galápagos Islands—the archipelago whose remarkable species of animals and plants are such a paradigmatic example of evolution in action.

When visiting the Galápagos Islands in 1835, Darwin had initially found some of the most convincing evidence for evolution—namely, “Darwin's finches”—too puzzling to persuade him that these birds had evolved from a common ancestor. Darwin's field notes show, for example, that he mistook the “warbler finch” for a wren or warbler. He was also misled by the widely divergent beaks of 12 other finch species into thinking that these birds were members of four different avian families (Sulloway, 1982). It was only after Darwin returned to England that John Gould, an insightful curator of birds at the London Zoological Society, convinced Darwin that these diverse Galápagos finches were all members of one closely related subfamily (Figure 1). This taxonomic assessment led Darwin (1845) to conclude that these species must have evolved from a single ancestor. Gould also convinced Darwin that several “varieties” of what appeared to be the same species of mockingbird were actually three distinct species, confined to different islands in the Galápagos group (Sulloway,

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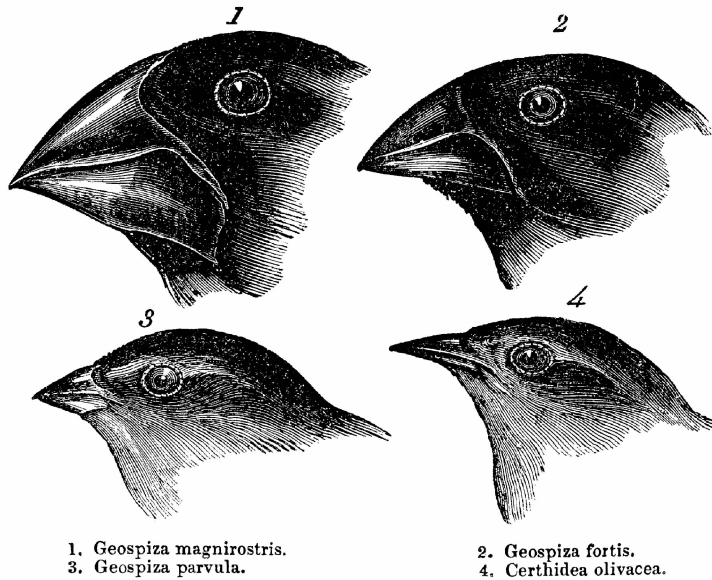


Figure 1 Four species of “Darwin’s finches” from the Galápagos Islands. Top left, the large ground finch; top right, the medium ground finch; bottom left, the small tree finch; bottom right, the warbler finch.

2009a). Based on this evidence, Darwin theorized that the multiplication of new species is facilitated by the geographic isolation of previously undifferentiated populations.

Once I had reconstructed this historical evidence, which flew in the face of the Darwin-Galápagos legend, what particularly puzzled me was a further historical observation. Darwin and Gould publicly presented this same Galápagos evidence before dozens of other scientists in the spring of 1837, 22 years before Darwin published the *Origin of Species* (1859). In the wake of these public presentations, not a single scientist who attended these meetings, or who later read the published proceedings, is known to have converted to the theory of evolution. Even Gould—who in many ways understood this ornithological evidence better than Darwin did—remained a creationist.

In an effort to understand why Darwin alone was willing to accept such a radical interpretation of his Galápagos evidence in 1837, I turned to the field of psychology and to the study of individual differences in personality and cognitive style. I reasoned that even compelling scientific evidence is not always sufficient to prompt scien-

tists to accept a particularly radical and socially dangerous theory such as evolution, which contradicted not only the accepted scientific paradigm that species are immutable but also religious doctrine. Instead, it seemed that something that might be called “revolutionary temperament” was needed for someone to be able to interpret such evidence in an unorthodox manner. This conclusion led me to the study of family dynamics, including family roles and niches, patterns of attachment to parents, and other aspects of family life.

From my extensive biographical research over the next two decades I came to realize that siblings are a lot like Darwin’s famous Galápagos finches. This is to say, siblings tend to diversify in an effort to minimize direct competition. Like separate species that compete for the same limited resources, siblings compete for parental investment and, in doing so, exploit unoccupied niches within the family system (Suloway, 1996). These differing niches correlate with differences in age, physical size, power, and gender, as well as with other individual attributes. Siblings, then, generally achieve in ontogeny the kind of adaptive radiation that species attain during phylogeny.

This way of thinking about siblings turned out to be in fortuitous agreement with new evidence that was beginning to emerge in the field of behavioral genetics. By the mid—1980s behavioral geneticists had come to realize that siblings raised together in the same families are almost as different as people plucked at random from the population at large (Plomin & Daniels, 1987; Dunn & Plomin, 1990). Based on studies of twin and nontwin siblings raised together and apart, behavioral geneticists have determined that about 40% of the total variance in personality is genetic and that another 20% can be allocated to errors in measurement (Loehlin, 1992). The remaining 40% of the variance has its sources in environmental influences. Only about 5% of this environmental variance, however, is generally attributable to the shared environment, which is mainly represented by the home in which we grow up. This means that the nonshared environment explains about seven times as much variance in personality (35%) as does the shared environment. The most important conclusion from these behavioral genetic findings is not that parents and the family have little influence on personality, as some commentators have maintained (Rowe, 1994; Harris, 1998), but rather that the family is not primarily a shared environment.

Birth order is one of a variety of potential influences that causes siblings to experience the family environment in differing ways. For example, when younger siblings

are present within the family system, firstborns generally occupy the niche of a surrogate parent (Sulloway, 1996, 2001). As a consequence, eldest children tend to be more conscientious and responsible than their younger siblings. In addition, because older siblings arrive first within the family and receive undivided parental investment, including cognitive and linguistic stimulation, they have higher I. Q. s than their younger siblings and also do better scholastically (Kristensen & Bjerkedal, 2007; Sulloway, 2007). Efforts by elder children to please their parents by getting good grades at school, as well as to teach what they know to their younger siblings, may also help to explain these well-documented differences in intellectual performance (Zajonc & Sulloway, 2007). By contrast, younger siblings seek to endear themselves to parents in other ways—for example, by being cute, fun-loving, and affectionate.

Parents sometimes favor firstborns over their younger siblings. Many social customs around the world, including inheritance practices, have long borne witness to such patterns of biased parental investment (Rosenblatt & Skoogberg, 1974; Hrdy & Judge, 1993). Parents who do favor their eldest child are generally pursuing an adaptive Darwinian strategy. At any given point during childhood, firstborns are always older than their younger siblings and have consequently survived more of the childhood diseases that can cut life short before offspring are able to transmit their parents' genes to the next generation. Older children are therefore better Darwinian bets than younger offspring. There is one notable exception to this Darwinian calculus. As mothers approach the end of their childbearing years, the youngest child is the last one they are likely to bear. When young and still vulnerable offspring cannot be replaced, it makes Darwinian sense for parents to favor such offspring in order to increase their chances of survival (Sulloway, 1996; Salmon & Daly, 1998). Research has confirmed this hypothesis, while also showing that middleborns typically receive the least parental investment (Hertwig, Davis, & Sulloway, 2002; Rohde et al., 2003; Salmon & Daly, 1998).

Evolutionary biology also helps us to understand the sources of sibling rivalry. Biologists distinguish “ultimate” causes, which explain evolved traits and behaviors, from “proximate” causes, which consist of various ontogenetic, physiological, and environmental influences operating during the lifetime of the individual (Mayr, 1961). The ultimate causes of sibling rivalry lie in the fact that siblings are genetically different, sharing, on average, only half their genes. According to the theory of kin selection developed by William Hamilton (1964a,b), full siblings should tend to

compete for scarce resources as long as the benefits of doing so are more than half the costs to another sibling.

Biologists have documented the widespread nature of sibling competition among animals and even plants (Mock & Parker, 1997; Mock, 2004). To give just one example, among blue-footed boobies (*Sula nebouxi*) parents are sometimes able to raise two or three chicks if the food supply is abundant. When, during an unfavorable breeding season, the body weight of an eldest chick drops to 80% of normal, this chick directs siblicidal pecking against its younger nest mates (Drummond & García-Chavelas, 1989; Mock, Drummond, & Stinson, 1990). If the food supply remains scarce, the eldest chick will ultimately exclude all other chicks from the nest, resulting in their death (Figure 2). Parents do not intervene in these lethal sibling battles, and it is not in their genetic interests to do so.



Figure 2 A blue-footed booby chick pecks at its younger sibling, which protects its head by turning away. Older chicks maintain dominance over younger chicks and, when the food supply is insufficient, will evict younger chicks from the nest, causing their death from exposure and starvation. Photograph by Hugh Drummond.

In our own species, mortality rates around the world are generally higher among younger siblings, who must share limited parental resources with their older siblings (Hertwig et al., 2002). Darwinian theory leads to the prediction that younger siblings will engage in greater risks in order to discover latent talents that can be developed to their advantage, thereby causing parents to recalibrate parental investment in

their favor. Laterborns, for example, are 1.5 times more likely than firstborns to engage in dangerous sports, such as sky diving, downhill skiing, rugby, and football (Sulloway & Zweigenhaft, 2010). In within-family studies—which are generally preferable to between-family studies because they control for confounds created by between-family differences—research has shown clear differences in personality by birth order when assessed in terms of the Five Factor Model (Paulhus, Trapnell, & Chen, 1999; Healey & Ellis, 2007; Sulloway, 1996, 2001, 2010). This model of personality encompasses the dimensions of Conscientiousness, Agreeableness, Extraversion, Openness to Experience, and Neuroticism (Costa & McCrae, 1992).

Firstborns tend to be more conscientious than laterborns, whereas laterborns (particularly middle children) tend to be more cooperative and agreeable. Findings for extraversion depend on the particular facet of this personality dimension that is being examined. Compared with laterborns, for instance, firstborns tend to be more extraverted in the sense of being dominant, whereas laterborns are more extraverted in the sense of being sociable, fun-loving, and willing to take risks. Like extraversion, openness to experience exhibits a mixed pattern of results. Some aspects of openness reflect intellect, and firstborns and only children score higher than laterborns on this attribute. By contrast, laterborns are more open to experience in the sense of being unconventional, nonconforming, rebellious, and liberal. Finally, on the Big Five personality dimension of neuroticism, personality differences by birth order are minimal. This last finding makes sense because most birth order differences in personality reflect adaptive sibling strategies, and neurotic behaviors are not particularly adaptive, at least in the context of family dynamics.

Although only children tend to be adult oriented and hence similar in this respect to firstborns who have younger siblings, they also tend to be intermediate between firstborns and laterborns on most other aspects of personality (Sulloway, 2001). This outcome follows from the fact that only children are the ideal controlled experiment in birth order studies. They represent what it is like to grow up without the influence of siblings, sibling rivalry, or specialized niche differentiation in an effort to minimize direct competition. Contrary to certain stereotypes about only children, which assert they are selfish and maladjusted because they do not grow up interacting with siblings, only children learn well-adjusted ways of interacting from their parents and peers (Ernst & Angst, 1983).

Birth order differences in personality are typically modest in size. In within-fami-

ly studies, these differences generally amount to weighted mean correlations of about .10 (Sulloway, 2010). By comparison, the weighted mean correlation for sex differences in personality is about .15 (Feingold, 1994; Hyde, 2005). Many interesting birth order differences entail even smaller effect sizes than $r = .10$, especially in between-family studies. For example, the typical difference in I. Q. between a firstborn and a secondborn is about 2.9 points, which represents a point-biserial correlation of .09 (Kristensen & Bjerkedal, 2007). Similarly, meta-analysis of 24 studies on birth order and participation in dangerous sports ($N = 8,340$) produced a weighted mean correlation of .08 (Sulloway & Zweigenhaft, 2010); and another meta-analysis of 27 studies of birth order and social attitudes found a weighted mean correlation of .07 ($N = 14,608$), with laterborns being more liberal (Sulloway, 2001).

It would be a mistake to dismiss such modest effects as trivial, either conceptually or practically. For example, a correlation of .07 means that the odds of a laterborn voting for a liberal political candidate are 1.25 times higher than for a firstborn. Still, when effect sizes are modest, as they are for most sources of individual differences, it is especially important for researchers to estimate the statistical power of planned studies. Assuming a true correlation of .07, for instance, a study of birth order and social attitudes has only a 19% likelihood of obtaining a statistically significant result if the sample size is only 250 participants. Researchers who wish to be at least 80% confident of obtaining a significant finding when the expected effect size is $r = .07$ must include at least 1,560 participants in their sample. With a median sample size of about 265, most birth order studies are substantially underpowered, resulting in the publication of numerous null findings for many aspects of behavior that generally show up as significant relationships in larger samples (Sulloway, 2002).

In the field of birth order research, meta-analysis has become a useful tool in helping to amalgamate effect sizes from disparate studies in order to detect modest but consistent relationships in collections of related studies with disparate outcomes. Meta-analysis not only allows us to provide a better estimate of effect sizes, but it also permits us to search for moderator variables in the expression of these effects. For example, birth order differences in social attitudes turn out to be significantly larger in within-family studies than they are in between-family studies, which often lack adequate controls for differences in sibship size and socioeconomic status (Sulloway, 2001, 2010). These same birth order differences are also larger in real-life studies as opposed to those obtained with the use of questionnaires. In addition, historical stud-

ies of social attitudes have generally produced larger birth order differences in social attitudes than have contemporary studies, which may reflect the prior practice of primogeniture and other cultural practices that reinforced unequal parental investment, usually to the benefit of eldest offspring.

Birth order differences are only one of many sources of sibling differences. Besides genetic differences, other important sources of sibling differences include disparities in parental investment, attachment patterns, parental loss and divorce, gender, age differences between siblings, and sibling deidentification. This last influence involves the tendency for offspring to differentiate themselves most strongly, in personality and interests, from those siblings who are adjacent in birth rank (Schachter, Gilutz, Shore, & Adler, 1978). This process sometimes leads to what have been called split-parent identifications, by which siblings develop closer relationships with one parent rather than another depending on the specific attachment patterns of other siblings (Schachter, 1982). Nor should we overlook the influence of sibling stereotypes. Like gender and racial stereotypes, birth order stereotypes appear to influence behavior independently of actual differences by birth order, which these stereotypes nevertheless tend to resemble (Herrera, Zajonc, Wieczorkowska, & Cichomski, 2003).

Among the most interesting unanswered questions about the influence that birth order and family niches have on personality is the degree to which these influences transcend the family system and express themselves later in adulthood in interactions with nonfamily members. Considerable evidence indicates that the psychological manifestations of birth order are smaller in nonfamilial contexts than they are within the family (Sulloway, 2001, 2002, 2010). We are particularly deficient in our understanding of the ways in which learned roles and behaviors within the family may lie latent in our repertoire of behaviors, only to be elicited in adulthood by specific behavioral contexts that tap such latent dispositions. Priming techniques and other experimental methods of research are needed to answer these kinds of questions about the continuity of behavior within, and beyond, the family.

Charles Darwin would have appreciated the importance of the kinds of modest individual differences in personality and behavior that arise from siblings' experiences within the family. As Darwin understood, natural selection works primarily on small individual differences. In the *Origin of Species* he made this point in a particularly vivid passage, asserting: "Natural selection is daily and hourly scrutinising, through-

out the world, every variation, even the slightest; rejecting that which is bad, preserving and adding up all that is good; silently and insensibly working, whenever and wherever opportunity offers. . . ” (1859;84). Although the mechanics of evolution by natural selection are different from the various proximate causes involved in ontogenetic differentiation, they both achieve their considerable ends through the gradual accumulation of small differences. Siblings are surprisingly different because numerous modest disparities, many of which arise within the family, help to create a much more extensive pool of variation in which some people inevitably occupy the tail ends of the normal distribution.

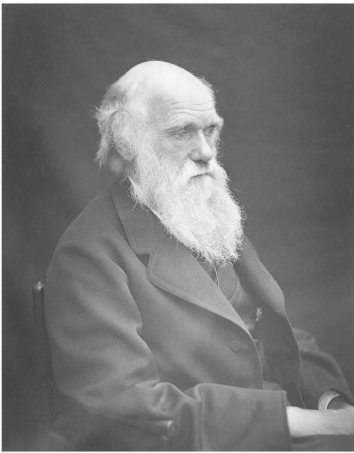


Figure 3 Charles Darwin about 1874, photographed by his son Leonard. Based on a multivariate measure of openness to experience—which includes diversity of scientific interests, world travel, and support for radical innovations in science—Darwin ranks in top 1/2 of 1 percent of more than 1,600 scientists who were active from 1543 to 1967 (Sulloway, 1996). Photograph from the author’s collection.

With regard to his willingness to promulgate new and radical scientific innovations, Darwin himself was such an individual outlier (Figure 3). As I have argued in *Born to Rebel*, Darwin’s openness to the theory of evolution—something that so puzzled me at the beginning of my academic career—was a natural consequence of a series of individual differences that propitiously guided his intellectual temperament in a radical direction (Sulloway, 1996). As the fifth of six children, Darwin’s birth order was just one significant contributor to his unusual willingness to endorse heterodox scientific ideas. Raised in a liberal family and espousing liberal religious and political views himself, Darwin was also a young man when he encountered the compelling evidence for evolution that was presented by his unusual specimens from the Galápagos Islands. Age is a relevant factor because younger scientists are more likely than older,

better established, scientists to endorse radical innovations (Sulloway, 1996, 2009b). Similarly, Darwin’s five-year circumnavigation of the globe aboard *H. M. S. Beagle* significantly increased his chances of looking favorably on evolution, because

world travel exposed him to repeated evidence of telltale geographical patterns in species distributions, and especially the crucial role of geographical isolation in the multiplication of species. Based a multivariate model that includes eight predictors of support for Darwinian theory, Darwin's own chances of endorsing an evolutionary viewpoint were about 94% compared with more than four hundred of his scientific contemporaries (Suloway, 1996). Similarly, Alfred Russel Wallace, who codiscovered the theory of natural selection in 1858 and who, like Darwin, benefited from growing up in a preadapted family niche, had a 96% likelihood of endorsing evolutionary theory.

One indication of Darwin's lasting impact on scientific thought is the fact that his ideas continue to inspire us in the field of psychology, bearing out one of the most controversial statements in the *Origin of Species*, namely, Darwin's famous assertion in the last chapter of this book: "Psychology will be based on a new foundation. . . . Light will be thrown on the origins of man and his history" (1859:488). Evolutionary psychology has inherited the mantle of Darwin's bold declaration, which he brilliantly expanded on himself in *The Descent of Man* (1871) and *The Expression of the Emotions in Man and Animals* (1872). This growing field continues to offer valuable insights about human behavior, just as Darwin maintained it would in the *Origin* and other works. In particular, the role of family dynamics in the origins of individual differences is likely to be a rewarding field of study, especially for researchers who take into account the evolved nature of our species and therefore the complementary roles of ultimate and proximate causation in explaining human behavior.