REBEL WITHOUT A CAUSE OR EFFECT: BIRTH ORDER AND SOCIAL ATTITUDES

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The enduring effects of an individual's birth order have been subject to a long and lively debate in sociology and other disciplines. Recently, in response to Sulloway's (1996) Born to Rebel: Birth Order, Family Dynamics, and Creative Lives, *interest has increased in the possible effects of birth order on social attitudes. Using quantitative, historical data, Sulloway found that birth order is a better predictor of social attitudes than is gender, class, or race. His novel, evolutionary theory asserts the universal influence of birth order across eras and cultures. We use contemporary data to test Sulloway's contention that firstborn adults are more conservative, supportive of authority, and "tough-minded" than laterborns. Examining 24 measures of social attitudes from the General Social Survey (GSS), we find no support for these claims, either in terms of significant effects or even the direction of nonsignificant coefficients. An expanded inquiry using all (202) relevant attitudinal items on the GSS yields similar results. In our analysis, variables discounted by Sulloway—gender, race, social class, and family size—are all linked to social attitudes more strongly than is birth order. Our findings suggest that birth-order theories may be better conceptualized in terms of modest effects in limited domains and in specific societies.*

Sociologists of the family have long tried to direct more attention to how individuals are affected by basic components of family structure and early childhood environment. In recent years, these efforts have sparked considerable debate about the effects of family size (Downey 1995; Downey et al. 1999; Guo and VanWey 1999; Phillips 1999) and of being raised in single- versus two-parent homes (Cherlin, Chase-Lansdale, and McRae 1998; Furstenberg 1990; McLanahan and Sandefur 1994). Historically, however, the family structure variable that has perhaps received the most lively scrutiny both within and outside the realm of sociology has been birth order. Indeed, birth order has inspired some of the most striking dialogues among sociologists and between sociologists and other social scientists (Bayer 1967; Hauser and Sewell 1985; Retherford and Sewell 1991; Schachter 1963; Steelman and Mercy 1980; Zajonc and Markus 1975; Zajonc et al. 1991). Sociologists have examined the effects of birth order on achievement, educational performance, and personality, and have critiqued some of the more ambitious claims that have been made about birth order. Until recently, scholars have shown little empirical interest in the relationship between birth order and social attitudes, despite the persistent (and often taken-for-granted) notion that adults who are firstborn children are more

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conservative than adults who are not. Instead, to comprehend the determinants of social attitudes, sociologists have typically emphasized the role of social structural position, cultural norms, and group identity, and they have relied on a relatively limited set of explanatory variables, most prominently gender, race, age, and social class.

Interest in birth order and social attitudes has been reignited by the recent publication of Sulloway's (1996) *Born to Rebel: Birth Order, Family Dynamics, and Creative Lives*. Using an impressive array of quantitative historical data, Sulloway finds evidence that firstborns are more politically conservative, supportive of existing authorities, and "tough-minded" (i.e., punitive) than are laterborns. Indeed, Sulloway's analyses suggest that, when appropriate controls are used, birth order is a better predictor of social attitudes—and, in turn, a better predictor of radical behavior—than is gender or social class. These dramatic findings have received considerable public attention, and Sulloway's book ranks high among the decade's top-selling books in social science.

Yet despite its popularity, Sulloway's work cannot be easily dismissed as "pop social science." His methods of data collection and quantitative analyses are more thorough and sophisticated than virtually all previous research in the field, and he provides a plausible account of how flaws in previous studies may have systematically obscured real birth-order effects.[1] Moreover, although Sulloway's basic premise is similar to long-held ideas about birth order (i.e., that firstborns are more conservative than laterborns) he offers an ingenious theoretical explanation of birth order's influence that draws upon recent work in sociobiology and evolutionary psychology. He is one of the first thinkers to elaborate an explicit theoretical link between birth order and social attitudes (and, in turn, behavior). Sulloway also offers detailed predictions about the effects of birth order on attitudes and how such effects vary as the result of interactions with other independent variables. This combination of rigorous analysis and creative theorizing has drawn accolades from scholars as diverse as Edward O. Wilson and Robert K. Merton.[2] The intellectual breadth of the book is evidenced by reviews in prominent periodicals of the natural sciences (*Science*, *Nature*), social sciences (*Contemporary Sociology*), and broader public (see Wolfe's [1996] featured review in the *New Republic*).

Sulloway also makes a more cogent case than has anyone before for why *sociologists*, in particular, should care about birth order. First, he provides evidence that birth order has been a crucial yet overlooked source of social division, and that birth order has played an important role in shaping the ideological differences among participants in some of modern history's most transformative events. Second, Sulloway claims that his data explicitly challenge classic sociological analyses of social movements, including Marxian studies of the French Revolution (pp. 309–15) and Weberian claims about the Reformation (pp. 262–70). Third, by arguing that birth order is a more important determinant of social attitudes than other variables, he maintains that sociologists have overemphasized the effects of social structural variables and that greater attention should be devoted to an individual's early family environment. Finally, Sulloway's use of evolutionary theory to explain birth-order effects prompts him to assert a broad generality to his findings, and he maintains that birth order is as critical to understanding ideological cleavages in contemporary society as it is in the historical disputes that comprise the bulk of his data.

We examine the relationship between birth order and social attitudes using data from a contemporary survey of adults in the United

[1] *Born to Rebel* is also difficult to dismiss as "pop" because of the reputation of its author: Sulloway is a former MacArthur fellow who has won numerous awards and plaudits for his earlier, critical work on Freud and psychoanalysis (Sulloway 1979).

[2] On the book's jacket, Wilson calls *Born to Rebel* ". . . one of the most important treatises in the history of the social sciences," and Merton writes, "A quarter century in the making, this brilliant, searching, provocative, and readable treatise promises to remain definitive for at least as long." Other eminent scholars praising the book include zoologist Ernst Mayr and anthropologist Sarah Blaffer Hrdy, who predicts that the book ". . . will have the same kind of long-term impact as Freud's and Darwin's."

States. We test whether firstborns are more conservative than laterborns, and we also test some of Sulloway's specific hypothesis about the effects of birth order on attitudes. Through this analysis, we seek not only to evaluate claims about the relationship between birth order and social attitudes, but also to assess the influence of birth order relative to that of variables discounted by Sulloway's analysis: gender, race, social class, age, and number of siblings.

BACKGROUND

Birth Order

Birth order has had a long and cyclical history in the social sciences. For the most part, modern birth-order theories have refashioned ideas already implicit in the centuries-old lore surrounding birth order; namely, that firstborns are smarter, more responsible, and more conservative than their younger siblings. Birth order first received scholarly attention in the work of Francis Galton (1874), who interpreted the disproportionate number of firstborns in his sample of English scientists as evidence of "the superiority of the eldest." Although, from a contemporary perspective, birth order may seem out-of-step with the hereditarian focus of Galton's scholarship (he was a pioneer of the eugenics movement), at the time Galton's findings were consistent with the common view that the intrinsic quality of a woman's offspring degenerated with successive births—an idea that persisted long after Galton (Apperly 1939; Clark 1918; Gini 1915). Later, as psychoanalytic theories of the self ascended, Adler (1928) proposed that firstborns differed from laterborns because only firstborns experienced the trauma of having the undivided attention of parents taken away from them by the birth of a sibling. Adler (1956: 327) posited that this "dethronement" causes firstborns to try to imitate their parents, to identify more strongly with rules and authority, and to often become "power-hungry conservatives." As a central part of Adler's "individual psychology," birth order remains an active topic in developmental psychology, psychoanalysis, and family studies research (Berthoud 1996; Weinstein and Sackhoff 1987).

In the 1960s and early 1970s, a number of social psychologists shifted their emphasis from the dynamics of experimental small groups to dynamics within families. Some of these early models of family dynamics made strong declarations about the consequences of birth order. For example, Toman (1970) contended that one can use birth order and its interactions with other family structure variables to predict quite accurately "a person's major personality characteristics and those of his friends and lovers, the likelihood of stability in his marriage, . . . what he is like at work, his politics and his probable philosophy" (p. 45; also see Toman 1993). Other researchers interested in intellectual development began to pay renewed attention to children's early home environments. It was in this context that Zajonc and Markus (1975) first proposed that firstborns had an academic advantage over laterborns because home environments tended to be more intellectually stimulating for an eldest child than for her or his siblings. Their "confluence model" of birth order and academic performance remains one of the most influential theories in social psychology.

Although bold claims have been made about the effects of birth order, work in sociological journals (including work published in *American Sociological Review*) has tended to remain skeptical. Schachter (1963) challenges previous research on birth order and eminence (also see Somit, Arwine, and Peterson 1996). Retherford and Sewell (1991) cap a series of sociological studies that have failed to find support for Zajonc and Markus's (1975) confluence model, despite its continuing popularity (Mercy and Steelman 1982; Steelman and Mercy 1980; also see reply to Rutherford and Sewell by Zajonc et al. 1991). Status attainment research by Blau and Duncan (1967), Hauser and Sewell (1985), and Blake (1989) challenges previous assertions that firstborns have greater economic or educational attainment than laterborns (also see Olneck and Bills 1979; Steelman and Powell 1985; for contradictory findings see Bayer 1967). Reviews by Adams (1972) and Schooler (1972) catalogue some of the methodological flaws that mar early birth-order studies. Steelman's (1985) overview of research suggests that the scholarly attention showered on birth order

has come at the expense of other family configuration variables—most notably family size, for which better evidence of consistent effects exists (Blake 1989; but see Guo and VanWey 1999).

Nonetheless, sociologists have found evidence of birth-order effects in other domains. Birth order has been shown to influence parental discipline patterns, funding for college, leadership, and sociability (Felson and Russo 1988; Steelman and Powell 1985, 1991). Sociologists also have provided a number of reasons why birth order should be of theoretical interest to the discipline. Bonacich, Grusky, and Peyrot (1985) argue that structural position in the family plays a critical role in the formation of intrafamilial coalitions. Differential treatment of firstborns by parents has been shown to influence occupational choice and educational attainment in other societies (e.g., Greenhalgh 1985; Post and Pong 1998). In our own society, Steelman and Powell (1996) note that birth order still often acts as an important status characteristic within families; as such, they speculate firstborns and laterborns may reproduce many of the same dynamics that mark superordinate and subordinate relationships more generally.

When considering the relationship between birth order and social attitudes, however, the analogy between family structure and social structure should not be taken too far. To understand why individuals differ in their social attitudes, sociologists have typically emphasized the role of social structural position, cultural norms, and group identity (Gurin, Miller, and Gurin 1980). Emphasis on these mechanisms has prompted sociologists to stress a relatively limited number of explanatory variables, most prominently race, gender, age, and class. Yet the same theoretical mechanisms are not so easily applied to birth order, because there is no such thing as a "firstborn subculture" and because firstborns do not saliently identify with one another as a group. As a result, any ideological differences between firstborns and laterborns imply a different set of underlying causes than those thought to create cleavages between the rich and poor, men and women, or blacks and whites. Indeed, birth-order theories (including Sulloway's, as we shall see) are often presented as opposing conventional sociological analyses, and the debate over birth order is often conceived as a dispute between those who emphasize the influence of social structure and culture and those who champion the effects of early family environment.

Born to Rebel

Using biographies and ratings from 94 historical experts, Sulloway's (1996) initial analyses examine data on more than 3,800 scientists who were pivotally involved in 28 different scientific controversies that took place over the past four centuries. Sulloway finds that while firstborn scientists tend to be more accomplished than laterborns, laterborns have been responsible for many of the most radical and important scientific breakthroughs. Moreover, when radical new ideas are proposed, Sulloway finds that laterborn scientists have been more than twice as likely as firstborns to adopt them early, especially when the ideas have liberal social implications. Firstborn scientists, by contrast, have only embraced radically innovative ideas when they have had clear conservative implications, such as scientific movements based largely on religious principles (for example, vitalism and idealistic taxonomization).

From these initial, evocative observations, Sulloway moves from considering scientists to a broader examination of the influence of birth order on social movements. Using data extracted from biographies and expert ratings of thousands of historical figures, he finds that birth order and age are strong predictors of liberal social attitudes, and that the influence of birth order on social attitudes has led laterborns disproportionately to support liberal social movements and firstborns to resist them. According to Sulloway's data, birth order is the single best predictor of whether eminent individuals converted to Protestantism or remained Catholic during the Reformation. During the French Revolution, a majority of firstborn deputies of the National Convention voted to execute Louis XVI, while most laterborn deputies voted to spare the King's life.[3] In American political

[3] Although at first glance the mere presence of firstborns among revolutionary deputies may

history, laterborns have been overrepresented among radical abolitionists, suffragettes, radical revolutionaries, social reformers, and liberal Supreme Court justices.

Although these instances appear to highlight behavioral differences between firstborns and laterborns, Sulloway argues that the behavioral differences are rooted at least in part in the effect of birth order on social attitudes. While Sulloway argues that birth order is crucial for understanding ideological differences, he claims his data also show that sociologists and other social scientists have exaggerated the explanatory role of gender, class, or race. He concludes that social structural factors are not as important for understanding attitudinal differences as are family configuration and birth order.

Sulloway's thinking contradicts prevailing sociological wisdom about the effects of birth order relative to other variables, but the possibility that he has found something others have missed gains support from both the sophisticated quantitative methods he employs and the novel evolutionary theory that he offers to explain birth order's effects. Regarding the latter, Sulloway postulates that children have an innate tendency to develop the attitudes and personalities best-suited for maximizing the resources that they get from their parents. Because siblings must compete with one another for parental resources, Sulloway argues that the attitudes most likely to nab parents' attention are those which help children stake out a unique "family niche" relative to their brothers and sisters. In the early years, at least, firstborns tend to be larger, stronger, and more intellectually developed than their siblings; as such, they already occupy a dominant position in the sibling group and develop the conservative attitudes best suited for safeguarding this place.[4] On the other hand, laterborn children are chronic underdogs who must seek out opportunities to differentiate themselves from their older siblings. In trying to secure their own family niche, laterborns develop attitudes that are more liberal, antagonistic to authority, and compassionate than do firstborns.

Even though Sulloway ties his theory to sociobiology and evolutionary psychology, he does not claim that there are any genetic differences between firstborns and laterborns. Rather, he contends that all children have the same evolved disposition to maximize parental investment, but that the optimal strategy for doing so varies systematically by birth order. In this regard, Sulloway's theoretical arguments are exemplary of a recent movement in evolutionary approaches to human behavior that criticizes sociobiology's early genetic determinism and emphasizes the sensitivity of evolved adaptations to environmental conditions (Pinker 1997). Sulloway's theory has been hailed by many sociobiologists and evolutionary psychologists because it provides a general means for incorporating environmental influences within an evolutionary framework, while still downplaying the explanatory potential of education, socioeconomic background, and the other factors that some evolutionary psychologists have lumped together as the "incoherent environmentalism" of the "standard social science model" (Tooby and Cosmides 1992:37).

The theoretical language of evolutionary approaches allows Sulloway to envisage a broad generality to his findings.[5] Even though his sample is comprised mainly of eminent historical figures, most of whom were upper-crust white males, Sulloway claims that "the effects of birth order transcend gender, social class, race, nationality, and for the last five centuries—time" (p. 356). Sulloway also provides an appendix, in which he shows readers how to calculate

seem to contradict Sulloway's theory, his treatment of the role of birth order in the French Revolution is much more nuanced than this and explains the seeming anomaly (see Sulloway 1996:306–26.)

[4] Parents also are seen as having a sociobiological incentive to favor firstborns, because the possibility of childhood mortality lowers laterborns' expected reproductive success relative to their older siblings (Daly and Wilson 1988).

[5] To support his claims about the contemporary relevance of his findings, Sulloway also conducts a meta-analysis of previous birth-order studies in psychology, in which he predicts and finds significant birth-order effects on all five basic personality dimensions (also see Sulloway 1995). Unfortunately, this meta-analysis has a number of severe problems, which are both meticulously and persuasively documented by Harris (1998). Preliminary work using sibling data by Hauser, Kuo, and Cartmill (1997) finds no evidence of birth-order effects on any personality dimension.

their own "propensity to rebel" based on the logistic regression coefficients from his sample of historical elites (pp. 440–44). Such claims to generality are of course *empirical* claims, and whether *Born to Rebel* ultimately measures up to its accolades and theoretical promise will depend on how well its ideas withstand empirical scrutiny using contemporary data and representative samples. By testing both the general idea that firstborns are more conservative than laterborns and some of Sulloway's more specific claims about birth order and social attitudes, we seek to assess whether the renewal of interest in birth-order effects is justified and whether birth order deserves a place alongside gender, race, class, and age in studies of social attitudes.

DATA AND MEASURES

Data

We use data from the 1994 General Social Survey (GSS), conducted by the National Opinion Research Center (Davis and Smith 1994). The GSS is a full probability sample of noninstitutionalized, English-speaking adults in the United States. In 1994, as part of a special module on family mobility, GSS respondents were asked to provide background information on each of their siblings, including their year of birth. To our knowledge, no other data set that contains information on a respondent's birth order combines the GSS's large, nationally representative sample, high-quality data-collection techniques, and variety of questions on social and political attitudes.

A difficulty in testing birth-order theories is that many individuals' early family lives do not lend themselves to easy classification as firstborns or laterborns. We use a subsample of GSS respondents that excludes only children, respondents with any step- or half-siblings, and respondents who report having a sibling born the same year as they were born. Only children differ from firstborns in that they do not compete with younger siblings for parental attention.[6] Step- and half-siblings imply varying relations in a family between children and caregivers that may complicate the allocation of parental resources and may unfairly undermine the expectations of birth-order theories. We assume that most pairs of siblings born in the same year are twins, and twins, unfortunately, have received little consideration in the birth-order literature. In auxiliary analyses, we retain only children and respondents with step- or half-siblings; retaining these individuals in our sample has little effect on the overall patterns we observe (these results are available from the authors on request).

After also excluding respondents who failed to report the birth year of any of their siblings, the sample used in our main analyses contains 1,945 of the original 2,992 respondents. The number of cases used in our analyses is sometimes considerably fewer than 1,945 because the 1994 GSS used a split-ballot design, and most of the questions eliciting social attitudes were administered only to a randomly selected subset (one-third to two-thirds) of all respondents. Preliminary analyses using items administered to the whole sample suggest no systematic differences among respondents receiving different ballots.

Like the data used in Sulloway's and most other birth-order studies, the GSS allows comparisons between firstborns and laterborns from different families. Some have argued that birth-order research ideally should use data that allow for the direct comparison of siblings (Retherford and Sewell 1991), although Ernst and Angst (1983) find that studies using inter- and intra-familial data yield similar results.[7] We are able to supplement our interfamilial analyses of the 1994 GSS data with intrafamilial comparisons that combine the GSS data with data from the

[6] Sulloway (1996:23) writes that only children "represent a kind of 'controlled experiment'—what it is like to grow up unaffected by birth order or sibling rivalry." Nevertheless, he usually codes only children as firstborns in his analyses. Including only children as firstborns compromises the evolutionary theory that firstborns' social attitudes develop in response to rivalry from their younger sibling(s), which is why we exclude them here.

[7] Ernst and Angst's (1983:170–71) discussion of birth-order studies that use parent ratings of siblings may be read as an exception to their overall conclusions on this point.

Study of American Families (SAF) (Hauser and Mare 1997). The SAF attempted to interview one randomly selected sibling of GSS respondents; in all, 1,115 sibling interviews were conducted. SAF includes a small subset of the social attitude items also used in the GSS. When examining sibling pairs from the SAF/GSS, we exclude step- and half-siblings and twins; we also exclude cases in which both siblings interviewed are laterborns.[8] While the SAF data enable us to compare siblings' attitudes, two caveats should be made: The SAF has a low response rate (43 percent) and the range of attitudinal items on the SAF is much narrower than in the GSS.

Measures of Birth Order

We measure birth order as a dichotomous variable indicating whether the respondent is the firstborn child in his or her family, as indicated by the year-of-birth information provided by respondents. This tactic is the most common way of measuring birth order in previous research. Sulloway's work has been criticized for using a measure of what he calls "functional" birth order, in which he makes case-by-case adjustments for instances in which early family environment is inconsistent with biological birth order—as, for example, when divorce and remarriage lead a firstborn child to be raised with older stepsiblings.[9] As mentioned earlier, we dropped all respondents with step- or half-siblings from our sample; by doing this, we attempt to maximize the correspondence between biological birth order and functional birth order.[10] In addition, we also tested other operationalizations of birth order: the number of older siblings (birth rank); the number of older siblings divided by the total number of siblings (relative birth rank); the number of older brothers; the number of older children of the same sex; and a trichotomous variable differentiating firstborns, middleborns, and lastborns. None of these alternative measures yielded patterns substantively different from those presented here.

Measures of Social Attitudes

The GSS contains a large number of questions on social attitudes. We sought to test a respondent's social attitudes in six domains: (1) political identification; (2) opposition to liberal social movements; views on (3) race and (4) gender; (5) support for existing authority; and (6) "tough-mindedness." Initially, we chose 24 items and scales that rep-

[8] The number of cases in our analysis of SAF data is considerably fewer than 1,115, partly because we exclude these respondents, but also, as mentioned above, because the split-ballot format of the 1994 GSS led to some attitudinal items being asked of only a randomly selected subset of respondents. The low response rate on the SAF resulted primarily not from refusals to participate but from GSS interviewers failing to get adequate contact information on the randomly selected sibling.

[9] Sulloway's evolutionary explanation of birth-order effects depends crucially on this distinction between "functional" and "biological" birth order. However, the finding that biological birth order is unimportant once functional birth order is controlled is based on a test of only 29 biologically laterborn scientists who were raised as "functional" firstborns (Sulloway 1996:465). Given the high rates of infant mortality and other sources of childhood instability in the eras predominantly represented in Sulloway's sample, it is almost certain that more than 29 cases of laterborns raised as "functional" firstborns exist among these scientists. This raises the possibility that the "functional" birth status of some sample members was investigated more thoroughly than others, *precisely because they otherwise would have been exceptions to the study's general findings*. At least 3 of the 29 scientists—Louis Agassiz, Georges Cuvier, and Tycho Brahe—are probably among the most eminent 1 percent of all the scientists Sulloway examined, and they would have stood out as prominent exceptions to the overall findings had they remained coded as laterborns. If the probability of being recoded as a "functional" firstborn is correlated with the probability of otherwise being a (prominent) deviation from the overall pattern, then we should not be surprised that Sulloway was able to report strongly significant differences ($p < .001$) between these 29 scientists and other biological laterborns.

[10] In Sulloway's historical data, one major cause of discrepancies between "biological" and "functional" birth order is infant mortality. We assume that measurement problems due to infant mortality are greatly diminished in a contemporary sample such as ours. Moreover, restricting the sample to only those respondents who reported having no deceased siblings does not affect the general pattern of results we report.

resented these broad headings and were also consistent with many of the specific assertions and historical examples presented in Sulloway's research.[11] These dependent variables are described in the text below, and their means, standard deviations, and metrics are presented in Appendix A. The analysis of these variables comprises the primary focus of this paper. We later expanded our inquiry to include all (202) attitudinal items that may distinguish respondents on the basis of conservatism, support for existing authority, or "tough-mindedness." We later summarize the results of this broader inquiry.

Political self-identification. We measure a respondent's political self-identification with an item asking respondents to place themselves on a seven-point scale ranging from "extremely liberal" to "extremely conservative," and a similar item with a scale ranging from "strong Democrat" to "strong Republican." We also use support for George Bush in the 1992 Presidential election as an indicator.

Opposition to liberal social movements. Consistent with the long-standing stereotype about the "liberal" laterborn and "conservative" firstborn, Sulloway provides historical evidence that laterborns have been both overrepresented among prominent liberal social reformers and underrepresented among those who have resisted liberal social change. We test whether firstborns are less supportive than laterborns of a variety of traditionally liberal movements and causes: abortion rights, environmentalism, free speech, social welfare programs, the effort to decriminalize marijuana, the right-to-die movement, and animal rights.

Conservative views on race and gender. Sulloway asserts that firstborns should be more resistant than laterborns to initiatives for racial and ethnic equality. Of all the social reform movements studied by Sulloway, the most disproportionate number of laterborns is observed among participants in the abolitionist movement (Sulloway 1996: 152). Elsewhere, Sulloway describes firstborns as "particularly inclined toward racism" (p. 286; also see Lieberman and Reynolds 1978; Sherwood and Nataupsky 1968). Because this latter conclusion is drawn from a sample that is almost exclusively white, we restrict our sample to whites when testing for birth-order differences in beliefs about racial equality. We measure attitudes toward racial reforms both in terms of attitudes toward African Americans and attitudes toward immigration. For the former, we test whether the respondent believes the government is too generous to blacks, that whites should be able to segregate themselves from blacks if they wish, and that the economic differences between blacks and whites are caused by racial differences in "in-born ability" and "motivation or will power." For attitudes toward immigration, we test a respondent's opposition to providing benefits to immigrants and support for laws requiring government documents to be only in English.

To support his contention that firstborns have more traditional beliefs about gender than laterborns, Sulloway (1996:154–58) presents evidence from a sample of female American conservatives and reformers. He notes also that Anita Bryant and Phyllis Schafly are firstborn women who have been outspoken in their support of traditional gender roles, while Susan B. Anthony, Elizabeth Cady Stanton, and other suffragette leaders were predominantly laterborns (1996:154). We examine respondent support for a traditional division of labor between spouses, in which the husband is the breadwinner and the wife stays home to look after their family. We also examine respondent beliefs about the appropriateness of mothers remaining in the labor force and the appropriateness of women seeking political offices.

[11] Alphas for scales typically ranged between .70 and .90 (available from the authors on request). The scales with the lowest alphas (measures of individualistic views about racial equality and support for English-only laws) are based on variables that were presented together as a set on the GSS. We tried to use existing GSS scales whenever possible to avoid the possible criticism that our scale construction decisions were (unintentionally or otherwise) biased against the hypothesis. Certainly, low alphas can lead to attenuated estimates of real effects. However, regarding the scales with the lowest alphas: (1) The estimated effects of birth order on these scales are opposite the predicted direction; (2) as will be shown in Table 2, other independent variables did exert a significant effect on these scales; and (3) when we look at the individual items used to create the scales, we observe no significant effects for any item in the predicted direction.

Support for existing authority. As noted above, the idea that firstborns identify more strongly with authority than laterborns goes back at least to Adler (1928). Sulloway supports this idea with examples from both the French and American revolutions in which laterborns rebelled against monarchies while their firstborn siblings or sons remained staunch royalists. We measure attitudes toward obedience with an item asking how important the respondent believes it is to teach a child to obey, as compared to teaching the child to work hard, help others, be well-liked, or think for her/himself. Support for existing authority is measured by a respondent's confidence in those running major social institutions, including banks, the armed forces, organized religion, and Congress. We also use respondent patriotism ("How proud are you to be an American?") as an indicator of support for existing authority.

"Tough-mindedness." Following Eysenck's (1954) two-dimensional model of political attitudes, Sulloway argues that firstborns not only are more politically conservative but also are more "tough-minded" (i.e., less compassionate and more aggressive in their assessment of human affairs). As mentioned, Sulloway presents evidence that firstborns were disproportionately likely among French deputies to vote to execute Louis XVI, while laterborns voted to spare the King's life. Accordingly, we use a respondent's support for capital punishment to measure tough-mindedness. In addition, we measure tough-mindedness with an item asking whether the respondent believes that the justice system should be harsher in its sentencing of criminals, and an item asking whether the respondent feels that "it is sometimes necessary to discipline a child with a good, hard spanking."

Other Independent Variables

As noted above, our research seeks not only to examine the effect of birth order on social attitudes, but also to compare the influence of birth order on social attitudes with that of other variables that have received more sustained attention from sociologists. Consequently, after examining the bivariate relationships between birth order and our measures of social attitudes, we look at birth order in the context of multiple regression models that also include sex, age, race (coded as dummy variables for blacks and other nonwhites), parents' education, and sibship size. Because each of these variables has been posited to affect social attitudes directly and because each may be correlated with birth order,[12] including these variables as controls also permits better estimates of actual birth-order effects.

In addition, subsequent models employ more stringent controls. Because birth-order theories typically place emphasis on childhood environment, our next model adds controls for parents' occupational prestige (using recent recodings by Hauser and Warren [1997]), parents' marital status, the loss of a parent to death before age 16, childhood religion, and the region of the country in which the respondent was raised. To account for the possibility that observed birth-order effects may be caused by birth-order differences in achievement, our final model adds controls for the respondent's education and occupational prestige.

RESULTS

Table 1 presents estimates of the effect of birth order on the different measures of social attitudes. All measures are coded so that positive coefficients are consistent with the hypothesis that firstborns are more conservative, supportive of authority, and "tough-minded" than laterborns. As described above, we provide results for four different models. Model 1 is the bivariate regression of the attitudinal measures on birth order. Model 2 holds constant the respondent's age, sex, race, sibship size, and parents' education. Model 3 adds controls for parents' occupa-

[12] Ernst and Angst (1983) therefore advise that credible birth-order research must, at a minimum, control for the respondent's sibship size and socioeconomic background; Hare and Price (1969) counsel that birth-order studies also should control for age. At the same time, we remind the reader that with cross-sectional data we cannot distinguish age effects from cohort effects. Sieff (1990) suggests that controlling for sex is important because laterborn children may be disproportionately female. Similarly, controlling for race is important because fertility varies across racial and ethnic groups.

Table 1. Coefficients from the OLS and Logistic Regression of Selected Measures of Social Attitudes on Birth Order: U.S. Adults with Full Siblings, GSS, 1994

Social Attitude Measure	Model 1 Coef.	Model 1 S.E.	Model 2 Coef.	Model 2 S.E.	Model 3 Coef.	Model 3 S.E.	Model 4 Coef.	Model 4 S.E.	Model 4 Results in Predicted Direction?
Political Identification									
Identifies self as:									
Conservative	−.057	(.069)	−.006	(.072)	−.021	(.071)	−.034	(.071)	No
Republican	.092	(.100)	.050	(.100)	.024	(.099)	.003	(.098)	Yes
Bush supporter in 1992 [c]	.220*	(.104)	.193	(.111)	.155	(.113)	.141	(.114)	Yes
Opposition to Liberal Movements									
Opposes:									
Abortion rights	.154	(.155)	.307	(.159)	.289	(.158)	.298	(.157)	Yes
Assisted suicide laws [c]	.039	(.139)	.229	(.150)	.194	(.154)	.206	(.154)	Yes
Legalization of marijuana [c]	−.167	(.142)	−.029	(.151)	−.078	(.155)	−.089	(.155)	No
Animal rights [b]	−.076	(.134)	−.005	(.141)	−.052	(.143)	−.032	(.144)	No
Environmental movement	.059	(.056)	.102	(.058)	.101	(.059)	.103	(.059)	Yes
Free speech	−.038	(.182)	.078	(.179)	.043	(.176)	.014	(.171)	Yes
Social welfare programs	.080	(.043)	.034	(.043)	.023	(.043)	.013	(.043)	Yes
Resistance to Racial Reforms									
Thinks government is too generous to blacks [a]	.083	(.059)	.093	(.061)	.076	(.060)	.065	(.060)	Yes
Excluding blacks is OK [a]	−.003	(.062)	.048	(.060)	.024	(.060)	.014	(.058)	Yes
Racial inequality due to blacks' lack of ability/ will power [a]	−.142	(.076)	−.101	(.078)	−.127	(.076)	−.127	(.075)	No
Against benefits for immigrants [a,b]	−.008	(.149)	−.026	(.155)	−.063	(.157)	−.090	(.158)	No
Supports English-only laws [a]	−.079	(.074)	−.121	(.076)	−.129	(.077)	−.145	(.077)	No
Belief in Traditional Gender Roles									
Against mothers working	.005	(.081)	−.020	(.079)	−.019	(.079)	−.021	(.079)	No
Supports traditional division of labor between spouses	.008	(.077)	.027	(.071)	.016	(.071)	.003	(.069)	Yes
Against women in politics [b]	−.019	(.152)	.153	(.162)	.150	(.165)	.133	(.166)	Yes
Support for Existing Authority									
Children should obey [b]	−.095	(.110)	.051	(.115)	.001	(.117)	.010	(.117)	Yes
Trusts social institutions	−.005	(.100)	.027	(.104)	.032	(.105)	.024	(.105)	Yes
Patriotism [b]	−.156	(.136)	−.292*	(.145)	−.309*	(.147)	−.332*	(.148)	No
"Tough-Mindedness"									
Tough on crime[c]	−.350*	(.155)	−.401*	(.164)	−.412*	(.165)	−.424*	(.166)	No
Supports:									
Capital punishment[c]	−.172	(.124)	−.269*	(.134)	−.284*	(.135)	−.305*	(.136)	No
Corporal punishment[b]	−.001	(.112)	.114	(.117)	.092	(.119)	.086	(.119)	Yes

Notes: Numbers in parentheses are standard errors. Model 1 is the bivariate regression. Model 2 controls for sibship size, age, sex, race, and parents' education. Model 3 adds controls for parents' marital status and occupational prestige, parental loss, respondents' religion, and region where respondent was raised. Model 4 adds controls for current income and education. Positive coefficients are consistent with the hypothesis that firstborns are more conservative, supportive of authority, and "tough-minded" than laterborns. Number of cases range from 595 to 1,894 (see Appendix A).

[a] Racial equality items include only white respondents.

[b] Ordered logistic regression used for ordinal dependent variables.

[c] Binary logistic regression used for dichotomous dependent variables.

*$p < .05$ **$p < .01$ ***$p < .001$ (two-tailed tests)

tional prestige and marital status, parental loss prior to age 16, respondent's religion, and the region of the country where the respondent was raised. Model 4 adds the respondent's current family income and education.

If we look first at the results of the bivariate regression (Model 1), the data do not appear to support the hypothesis. The observed effect of birth order is indistinguishable from chance for 22 out of the 24 measures of social attitudes, and only one of the two significant effects is in the predicted direction: firstborns were more likely than laterborns to have supported Bush in 1992.[13] Meanwhile, contradicting Sulloway's findings about the "tough-mindedness" of laterborns, firstborn respondents are significantly more likely than laterborns to believe that the nation's courts are too harsh with criminals.

Introducing control variables in Models 2, 3, and 4 does not improve support for the hypothesis. In each of these models, significant effects are observed for only 3 of the 24 measures of social attitudes, and all significant effects are opposite the predicted direction. After controls are added the connection between birth order and support for Bush is no longer significant, while the relationship between birth order and the adequacy of criminal sentencing remains. In addition, laterborns are more likely than firstborns to support capital punishment, and laterborns also are significantly more patriotic.

Many of the nonsignificant estimates also run opposite the predicted direction. In the bivariate regressions, fewer than half of the estimates are in the predicted direction (9 of 24), while in Model 4 slightly more than half of the estimates are in the predicted direction (14 of 24). Indeed, when asked to place themselves on a liberal–conservative continuum, firstborns identified themselves as more *liberal* than laterborns, although this result was not significant. Moreover, while it is plausible that systematic birth-order effects could exist in some domains of social attitudes but not in others, we observed inconsistent results within each of the six broad types of attitudes we defined.

[13] In our data, firstborns were neither over- nor underrepresented among Perot supporters.

Comparing Birth Order with Other Independent Variables

Above we noted that Sulloway's work poses a direct challenge to sociologists by asserting that birth order is a more important determinant of social attitudes than is gender or social class. In Table 2, we compare the effect on social attitudes of being firstborn with the effect of the control variables used in Model 2: sibship size, age, sex, race, and parents' education (which we use here as a proxy for social class). While birth order is significantly associated with only 3 out of the 24 measures of social attitudes (all opposite the predicted direction), Table 2 shows that each of the other independent variables is significantly associated with at least half (12) of the dependent variables. When we compare standardized coefficients (not shown), we find that parents' education is a more powerful predictor of attitudes than birth order for 22 of 24 variables (92 percent), race for 16 of 19 (84 percent); sex for 19 of 24 (79 percent); age for 18 of 24 (75 percent); and sibship size for 17 of 24 (71 percent). Consequently, our data strongly suggest birth order is not as important for understanding attitudinal differences as are these other variables.

Several implications of these results are worth highlighting. First, by observing so many significant effects for other variables, we gain confidence that the null results we observe for birth order are not due to inadequate or unreliable measures of social attitudes. Second, the linchpin of Sulloway's claim that his Darwinian approach supplants conventional sociological analyses is his finding that birth order is 14 times more powerful a predictor of attitudes than social class, but our data indicate that parents' education actually influences attitudes much more strongly than birth order. Third, birth order appears even less valuable for predicting social attitudes than sibship size, which suggests that, at least relative to historical data, Sulloway overstates the influence of birth order, not only compared to sociological mainstays like gender, race, and class, but also compared to other aspects of family configuration.

Finally, we should note that while the independent variables other than birth order

Table 2. Coefficients from the OLS and Logistic Regression of Social Attitude Measures on Birth Order and Other Independent Variables: U.S. Adults with Full Siblings, GSS 1994

Social Attitude Measure	Independent Variables [a]					
	Firstborn	Sibship Size	Age	Female	Black	Parents' Education
Political Identification						
Identifies self as:						
Conservative	−.006 (.072)	.039* (.018)	.007** (.002)	−.205** (.064)	−.526*** (.111)	−.027 (.028)
Republican	.050 (.100)	−.002 (.024)	−.005 (.003)	−.244** (.089)	-1.925*** (.153)	.102** (.039)
Bush supporter in 1992 [d]	.193 (.111)	−.009 (.028)	.001 (.003)	.107 (.101)	-1.940*** (.278)	.037 (.043)
Opposition to Liberal Movements						
Opposes:						
Abortion	.307 (.159)	.099* (.040)	−.005 (.005)	−.099 (.144)	.165 (.248)	−.278*** (.063)
Assisted suicide laws [d]	.229 (.150)	.131*** (.035)	.010* (.004)	.450** (.139)	.700** (.212)	−.004 (.059)
Legalization of marijuana [d]	−.029 (.151)	.079* (.040)	.010* (.005)	.567*** (.135)	−.387 (.228)	−.086 (.058)
Animal rights [c]	−.005 (.141)	.094** (.035)	.006 (.004)	−.570*** (.127)	−.502* (.207)	−.141* (.056)
Environmental movement	.102 (.058)	.022 (.015)	.001 (.001)	−.073 (.052)	.140 (.088)	−.073** (.023)
Free speech	.078 (.179)	.036 (.045)	.025*** (.005)	.225 (.160)	.773** (.281)	−.546*** (.069)
Social welfare programs	.034 (.043)	−.018 (.010)	.005*** (.001)	−.195*** (.038)	−.289*** (.098)	.063*** (.017)
Resistance to Racial Reforms						
Thinks government is too generous to blacks [b]	.093 (.061)	−.002 (.016)	.002 (.002)	−.092 (.055)	—	−.080** (.024)
Excluding blacks is OK [b]	.048 (.060)	.044** (.015)	.011*** (.002)	−.191*** (.054)	—	−.132*** (.023)
Racial inequality due to blacks' lack of ability/will power [b]	−.101 (.078)	.0002 (.019)	.003 (.002)	−.190** (.071)	—	−.161*** (.030)
Against benefits for immigrants [b, c]	−.026 (.155)	−.021 (.039)	.006 (.004)	−.215 (.137)	—	−.060 (.060)
Supports English-only laws [b]	−.121 (.076)	−.043* (.019)	.010*** (.002)	−.195** (.068)	—	−.023 (.030)
Belief in Traditional Gender Roles						
Against mothers working	−.020 (.079)	−.001 (.019)	.022*** (.002)	−.357*** (.072)	−.334* (.132)	.055 (.031)
Supports traditional division of labor between spouses	.027 (.071)	.006 (.018)	.022*** (.002)	−.203** (.065)	−.100 (.121)	−.079** (.028)
Against women in politics [c]	.153 (.162)	.114** (.038)	.020*** (.005)	−.037 (.147)	.035 (.248)	−.151* (.067)

(Table 2 continued on next page)

(Table 2 continued from previous page)

Social Attitude Measure	Independent Variables [a]					
	Firstborn	Sibship Size	Age	Female	Black	Parents' Education
Support for Existing Authority						
Children should obey [c]	.051	.064*	.013***	−.080	.436*	−.221***
	(.115)	(.029)	(.003)	(.103)	(.184)	(.045)
Trusts social institutions	.015	.026	−.001	−.071	.093	.044
	(.095)	(.024)	(.003)	(.084)	(.149)	(.036)
Patriotism [c]	−.292*	−.113**	.021***	−.172	−.699**	−.114*
	(.145)	(.036)	(.004)	(.129)	(.214)	(.056)
"Tough-Mindedness"						
Tough on crime[d]	−.401*	−.078	.004	.342*	−.549*	−.181**
	(.164)	(.041)	(.005)	(.150)	(.226)	(.062)
Supports:						
Capital punishment [d]	−.269*	−.083*	.003	−.291*	-1.291***	−.178***
	(.134)	(.032)	(.004)	(.122)	(.122)	(.050)
Corporal punishment [c]	.114	.068*	.003	−.443***	.708***	−.109*
	(.117)	(.029)	(.003)	(.107)	(.183)	(.047)

Notes: Numbers in parentheses are standard errors. Model includes an additional control for other nonwhites. Number of cases range from 595 to 1,894 (see Appendix A).

[a] Firstborn is measured with a dummy variable (1 = yes); sibship size is number of siblings; age is in years; female is a dummy variable (1 = yes); black is a dummy variable (1 = yes); and parents' education is the highest degree earned by the respondent's most educated parent, measured by a categorical variable (from 0 = no high school degree to 4 = graduate degree).

[b] Racial equality items include only white respondents.

[c] Ordered logistic regression used for ordinal dependent variables.

[d] Binary logistic regression used for dichotomous dependent variables.

*$p < .05$ **$p < .01$ ***$p < .001$ (two-tailed tests)

significantly affect a broad range of social attitudes, only age does so in a seemingly consistent fashion (in terms of the direction of coefficients). In contrast, respondents with well-educated parents tend to be more liberal on most attitudinal measures than do those with less-educated parents, yet they are also more likely to identify themselves as Republicans. Females and blacks tend to be more liberal than males and whites, but among other things, females are more likely than males to oppose the legalization of marijuana and blacks are more likely than whites to believe that spanking children is sometimes necessary. Social scientists have known about such apparent inconsistencies for a long time, and considerable work has gone into explicating the nuances of attitude formation across various social divisions (Brooks and Manza 1997; Inglehart 1990). Yet these results may point to possible, deeper problems with birth-order theories, which have tended to trade on broad characterizations of firstborns as "conservative" and "identifying with authority" (Sulloway 1996; also see Adler 1928; Toman 1993). Put simply, such labels may not be fine-grained enough to map a thoroughly consistent relationship between a single independent variable and opinions on the complex social issues of contemporary society.

Comparisons within Families

Like most other birth-order studies, Tables 1 and 2 compare persons from different families, while birth-order theories posit a process of differentiation that takes place within families. As described above, the SAF data allow for the comparison of GSS respondents with a randomly selected sibling. These interviews included 9 of the 24 measures of social attitudes examined in Tables 1 and 2, including at least one measure from each of

Table 3. Within-Family Comparisons of Firstborns and Laterborns on Selected Social Attitude Measures: Scores on Items Included in both the GSS and the Study of American Families (SAF)

Social Attitude Measure	Mean Score for Firstborns	Mean Score for Laterborns	Difference in Predicted Direction?	Difference Significant at $p < .05$?	Number of Cases
Identifies self as:					
Conservative	3.19	3.21	No	No	492
Republican	3.22	3.22	No	No	483
Opposes free speech	2.00	1.81	Yes	No	274
Excluding blacks is OK [a]	.71	.70	Yes	No	249
Racial inequality due to blacks' lack of ability/will power [a]	1.60	1.78	No	No	382
Against women in politics	1.23	1.26	No	No	286
Children should obey	1.56	1.41	Yes	No	345
Trusts social institutions	4.21	4.25	No	No	315
Supports corporal punishment	1.78	1.82	No	No	319

Notes: Significance tests use two-tailed *t*-tests for paired observations. Variables are coded such that the hypothesis predicts the means for firstborns to be higher than laterborn means.

[a] Means are for white respondents only.

the six broad types we defined. Using the SAF/GSS data, we are able to test for birth-order differences *within* families; however, we remind readers of the low response rate and relatively narrow range of attitudinal items available in these data.

Table 3 compares the mean responses of firstborn SAF/GSS respondents with the mean responses of their laterborn siblings. The means of most of the variables differ only slightly between firstborns and laterborns, and none of the observed differences is statistically significant.[14] Although the lack of significant results here may be partially attributed to the relatively small sample size, most of the observed differences are opposite the predicted direction. Only the differences in respondent attitudes toward free speech, the exclusion of blacks, and the importance of obedience in childrearing are consistent with the hypothesis (3 of 9, or 33 percent). These results are consistent with Ernst and Angst's (1983) observation that inter- and intrafamilial data tend to yield similar findings on the effects of birth order, and that when results differ studies using intrafamilial data tend to be less likely to observe significant birth-order effects than comparisons of children from different families.

Examining Additional GSS Items

Because the attitudinal variables discussed above represent only a portion of the attitudinal items available in the 1994 GSS, it is possible that the results for the items we present are less favorable to hypothesized birth-order effects than results using other items we could have chosen. We tested whether our selection was inadvertently biased by running regressions of all 202 GSS items that could be considered measures of conservatism, support for existing authority, and/or "tough-mindedness."[15] Table 4 summarizes the results of the bivariate regres-

[14] The mean differences between firstborns and laterborns were also not significant when Model 2 controls were added. To test whether a few outlying sibling pairs influenced our results, we compared the number of pairs in which firstborn siblings gave the more conservative response to the number of pairs in which the laterborn was more conservative, and this difference was not significant for any dependent variable.

[15] Even here, of course, researchers may disagree about which items they consider to be indicators of conservatism, support for authority, or "tough-mindedness." Of the 202 items we examined, 197 (97 percent) were positively correlated with respondent self-identification as conservative (albeit not all significantly). The 5 items that were not positively correlated with conservatice self-identification had been selected as indicators of supportive attitudes toward authority.

Table 4. Frequency Distribution Summarizing the Results from the OLS and Logistic Regressions of Relevant GSS Social Attitude Measures on Birth Order and Other Selected Independent Variables

Variable	Predicted Direction	Total Number of GSS Items	Number of GSS Items in Predicted Direction		Number of Items Significant at $p < .05$		Number of Significant Items in Predicted Direction	
			N	Percent	N	Percent	N	Percent
Tests of the Main Effect of Birth Order on Social Attitude Measures								
Firstborn (Model 1)[a]	Conservative	202	100	(49.5)	10	(5.0)	4	(2.0)
Firstborn (Model 2)[b]	Conservative	202	117	(57.9)	16	(7.9)	8	(4.0)
Firstborn (Model 4)[c]	Conservative	202	104	(51.5)	15	(7.4)	5	(2.5)
Comparing the Effects of Model 2 Variables on Social Attitude Measures								
Firstborn	Conservative	202	117	(57.9)	16	(7.9)	8	(4.0)
Age	Conservative	202	154	(76.2)	120	(59.4)	105	(52.0)
Parents' education	Liberal	202	150	(74.3)	106	(52.5)	89	(44.1)
Female	Liberal	202	139	(68.8)	89	(44.1)	64	(31.7)
Black	Liberal	148	84	(56.8)	54	(36.5)	36	(24.3)
Sibship size	Conservative	202	115	(56.9)	38	(18.9)	30	(14.9)

Note: Numbers in parentheses are percentages. Relevant GSS measures include all attitudinal items considered to test respondents' conservatism, support for existing authority, and/or "tough-mindedness" (a complete list is available from the author on request).

[a] Model 1 is the bivariate regression model.

[b] Model 2 controls for sibship size, age, sex, parents' education, and race.

[c] Model 4, the full model, controls for age, sibship size, sex, race, parents' education, parents' occupational prestige, parental loss, childhood religion, region where respondent was raised, respondents' income, and respondents' education.

sions of these items on birth order, as well as the results of regressions using the controls employed in Models 2 and 4 (from Table 1). Table 4 shows how many results were in the predicted direction, how many were significant, and how many of the significant results were as predicted.

Mirroring the results for the previous tables, we find little support for the theory that firstborns are more conservative than laterborns. The number of significant effects is exactly what chance predicts for the bivariate regressions, and only slightly more than half for both models that add controls. Importantly, in none of the models are more than half of the significant effects in the predicted direction, suggesting that even if there were some small number of real birth-order effects in the data that are not simply due to chance, theories such as Sulloway's offer no insight for predicting their direction. Because the measures of social attitudes are not independent of one another, we cannot use standard binomial confidence intervals to calculate the p-value of a given deviation away from the 5 percent of the items being significant or away from 50 percent of the coefficients being in the predicted direction. Even so, the number of variables in the predicted direction for Models 1 and 4 are both almost exactly 50 percent; that somewhat more than 50 percent of the items are in the correct direction for Model 2 is less convincing given the reversal in the direction of coefficients when controls are either added or dropped.

The possibility of strong birth-order effects in these data is thrown into even greater doubt when we look at the second panel of Table 4, which compares the effect of birth order on all GSS attitudinal items with the independent variables included as controls in Model 2. Although above we questioned the

adequacy of broad labels like "conservative" or "liberal" for understanding the relationship between an independent variable and attitudes on complex social issues, here for purposes of comparison we ascribe a predicted direction to each variable based on previous research (e.g., Huber and Form 1973; Hunt 1996; Schuman, Steeh, and Bobo 1985). Looking first at the results for respondents' age and parents' education, we see that approximately three-quarters of all the estimates are in the direction we assigned, over half the estimates are significant, and over 40 percent of the estimates are significant as predicted (as compared to only 4 percent for birth order). Sex is significantly associated with 44 percent of the GSS items, and significant as predicted for 32 percent. Even for the control variable that exerts the weakest apparent influence on social attitudes—sibship size—we still observe twice as many significant effects as for birth order and three times as many effects that are significant in the predicted direction.

Interaction Effects

Up to this point, we have examined main effects of birth order and social attitudes; we find no evidence of the profound effects that Sulloway and others have predicted. Yet a key difference between Sulloway's and most earlier birth-order theories is that Sulloway argues that birth order is also influential through its interaction with other independent variables.[16] Perhaps most plausibly, he proposes an interaction effect between birth order and age spacing between siblings (Sulloway 1996:133–36). Drawing upon Hamilton's (1964) biological theory of inclusive fitness and kin selection, Sulloway claims that the most pronounced attitudinal differences occur when there is a moderate gap (2 to 5 years) between adjacent siblings.[17] Consequently, firstborns who have a sibling close to their age, or who only have much younger siblings, are expected to be less conservative than firstborns with a moderate gap to their next oldest sibling.

Table 5 presents tests for each of these possibilities. For firstborns with closely spaced younger siblings, the number of significant results is approximately consistent with what chance would predict (5.9 percent), and considerably less than half of the significant estimates are in the predicted direction (2 of 12). The results are similar for firstborns who have only distantly spaced younger siblings. Clearly, then, the data do not support the proposition that firstborns are more liberal when there is a small or large gap between them and their next oldest sibling.

In addition, Sulloway presents evidence of interaction effects between birth order and social class, which we also test in Table 5.[18] His model of social attitudes reports a significant interaction, suggesting that upper-class firstborns are more conservative than lower-class firstborns (p. 507).[19] Yet, in

[16] The 1994 GSS does not contain information that would have allowed us to test two other interaction effects discussed by Sulloway—those between birth order and shyness, and between birth order and childhood conflict between respondents and their parents.

[17] Using Hamilton's (1963) theory, Sulloway argues that siblings who are more closely or distantly spaced are less costly (in an evolutionary sense) than those who are moderately spaced, and that as a result firstborns should feel a greater rivalry with moderately spaced siblings than with other siblings. Sulloway also claims that laterborn children born after a long gap are much like firstborns and therefore tend toward conservativism. These claims also were not supported by tests using the 202 measures.

[18] In a footnote, Sulloway (1996:507) describes a model of social attitudes that includes an interaction between birth *rank* and sibship size. He provides no justification for why such an interaction should be included other than that the result is significant using stepwise methods in his sample. Because birth rank and sibship size are highly correlated ($r = .64$ in the GSS data), using the product of birth rank and sibship size is very much like using the square of sibship size, which makes more theoretical sense because it raises the possibility that the marginal effect of siblings on attitudes changes with each additional sibling (cf. Downey 1995). We find no evidence of an interaction effect for birth rank × sibship size in the GSS data once the square of sibship size is controlled.

[19] The text of *Born to Rebel* is ambiguous about the direction of this interaction effect; we thank Frank Sulloway (personal communication) for clarifying this matter. Sulloway alternatively describes the interaction of birth order and social class on conservatism in terms of the birth-order effects being much more pronounced for upper-

Table 5. Frequency Distribution Summarizing the Results of Relevant GSS Social Attitude Measures on Interactions between Birth Order and Other Selected Independent Variables

Variable	Predicted Direction	Total Number of GSS Items	Number of GSS Items in Predicted Direction		Number of Items Significant at $p < .05$		Number of Significant Items in Predicted Direction	
			N	Percent	N	Percent	N	Percent
Tests of Effect of Birth Order × Sibling Spacing on Social Attitude Measures								
Firstborn × Closely spaced younger sibling	Less Conservative	202	86	(42.6)	12	(5.9)	2	(1.0)
Firstborn × Distantly spaced younger sibling	Less Conservative	202	77	(38.1)	4	(2.0)	2	(1.0)
Tests of Effect of Birth Order × Other Variable on Social Attitude Measures.								
Firstborn × Parents' education	More Conservative [a]	202	106	(52.5)	5	(2.5)	3	(1.5)
Firstborn × Parents' occupational prestige	Less Conservative [a]	202	102	(50.5)	10	(5.0)	7	(3.5)
Firstborn × Parents' occupational prestige × Parental loss	Less Conservative	202	116	(57.4)	3	(1.5)	2	(1.0)

Note: Numbers in parentheses are percentages. Each interaction in the table was tested separately. Models also control for age, sex, race, sibship size, parents' education, parents' occupational prestige, and parental loss. Relevant GSS measures include all attitudinal items considered to test respondents' conservatism, support for existing authority, and/or "tough-mindedness" (a complete list is available from the author on request).

[a] While all other models in this study derive from predictions that birth order affects conservatism and tough-mindedness in the same direction, the prediction here is that upper-class firstborns are more conservative, but less tough-minded, than lower-class firstborns.

his model of the behavior of deputies during the French Revolution, he finds that upper-class firstborns were less tough-minded than lower-class firstborns (p. 323). Measuring social class both by parents' education and occupational prestige, we find no evidence of these patterns: The number of significant effects and the number of estimates in the predicted direction are fully in line with what chance would predict. Sulloway also argues that social class and birth order mediate the effect of parental loss through a three-way interaction effect (pp. 136–45). Lower-class firstborns, thrust into the role of surrogate parents, become even more doggedly conservative, while upper-class firstborns, who often do not have to bear this burden, become somewhat more liberal. This proposition is also not supported by our data: Significant three-way interaction effects are in the predicted direction for only 4 of 202 items when social class is measured by parents' education, and for only 2 of 202 measures when class is measured by parents' occupational prestige.

and middle-class sample members than for lower-class members. When we restrict the sample to only those respondents whose parent's occupational prestige is above the sample median, we find no additional evidence for the theory: Excluding measures of tough-mindedness, estimates for 106 of 193 (54.9 percent) items are in the predicted direction, 17 (8.8 percent) are statistically significant at $p < .05$, and 7 (3.6 percent) are significant in the predicted direction.

CONCLUSION

Birth order has enjoyed one of the longest pedigrees of any variable in the social sciences, but most previous studies have looked at its effects on either personality or achievement. Sulloway (1996) gives new reasons why sociologists should be interested in birth

order, as he provides the first extensive theoretical and empirical consideration of the relationship between it and social attitudes (and, in turn, behavior). Using quantitative historical data, Sulloway finds a pronounced tendency for firstborns to be more conservative than laterborns, and he claims this difference has led laterborns to be more likely than firstborns to embrace liberal social movements early. Moreover, because he maintains that these birth-order differences are ultimately rooted in evolved adaptations, he asserts that his findings apply not just to historical elites but throughout any society where children of different ages are raised together.

We have used contemporary data to test Sulloway's hypothesis that firstborns are more conservative, supportive of existing authority, and "tough-minded" than laterborns. We find no evidence that birth order affects social attitudes in the way Sulloway predicts. Instead, our data strongly contradict his assertion that birth order is a better predictor of social attitudes than are gender, class, or race.

How can we reconcile the discrepancy between our findings and Sulloway's? One possibility is that substantial birth-order effects on social attitudes may have existed in the historical eras that Sulloway studies but do not exist today. Primogeniture may have encouraged conservatism among firstborns by binding them to their ancestral properties, while encouraging liberalism among laterborns by allowing them greater freedom to travel and have a broader range of experiences. The privileged position of firstborns has been long in decline, as evidenced, especially over this century, by the steady replacement of inheritance practices biased toward firstborns with practices that divide wealth equally among children (a process which has itself been the topic of sociobiological explanation [Hrdy and Judge 1993]). In contemporary society, Steelman and Powell (1991) find that laterborn children may often have the upper hand in receiving parental economic investments because they are born at a time when their families are more likely to be economically secure.

Another possibility is that birth-order effects may be confined to elites in both historical and contemporary times.[20] Sulloway's sample includes members of lower social strata only when they rose from their conditions to make a place for themselves in history. Practices such as primogeniture certainly affected wealthy families more than peasant families who had no lands or wealth to pass on, and birth-order differences in education and the opportunity to enter science or politics may also manifest themselves most strongly among elites. We have no way of comparing the relative birth-order effects of elites and peasants in eighteenth- and nineteenth-century society, but we did test whether birth-order differences exist among contemporary economic or intellectual elites by restricting our sample first to respondents with upper-class parents and then to respondents who scored in the top 15 percent on the cognitive tests included on the 1994 GSS.[21] In neither instance did we find any evidence that firstborns were more conservative than laterborns.

Our failure to replicate Sulloway's findings may also point to problems in his analysis. Although reminiscent of some of Sorokin's (e.g., 1928) work, the strategy of using biographies and historians' ratings for testing general propositions about individual behavior is unusual, and the lack of established procedures for this method leaves open several potential problems. One problem is that the ratings from historians were all obtained through in-person interviews conducted by Sulloway well after he began constructing his arguments about birth order, and although he used a standardized rating

[20] Sulloway (1996:416–18) discounts the possibility that his results are confined either to past eras or to elites. He finds that the birth-order effects in his data do not significantly vary over time, and that the effects exist among 115 scientists and historical figures in his sample that were born after 1900. Concerning elites, Sulloway (1997:382) also argues that birth-order effects turn up in analyses of the "most obscure" scientists and historical figures in his data. Here, however, it seems likely to us that the most obscure members of his sample are still more accurately characterized as "elite" than "typical" members of their respective societies.

[21] We also found no significant birth-order differences among those who labeled themselves "extremely liberal" or "extremely conservative."

scale, the interview procedures themselves are not well-documented. As a result, the possibility of substantial interviewer effects cannot be ruled out. Another problem is that Sulloway's reliance on biographies results in a disturbing amount of missing data that many social scientists would not accept. For the eight variables in one of his key models, Sulloway has complete records on fewer than 200 of the 3,890 scientists in his sample. In addition, some procedures in Sulloway's quantitative analysis are questionable, especially his use of stepwise regression-like procedures to derive all of his main multivariate models.[22] Because the inclusion or exclusion of independent variables is based on empirical fit rather than on substantive justification, Sulloway's theoretical arguments often have the character of post hoc attempts to explain the observed results.

In any case, the true cause of the discrepancy between our findings and Sulloway's can be revealed only through additional research. Surely, a study that focuses squarely on social behavior would be instructive. This said, it is important to remember that Sulloway's assertions about birth order and behavior are rooted in his claims about birth order's effect on social attitudes and on personality. Regarding the latter, preliminary work by Hauser et al. (1997) compares siblings in the Wisconsin Longitudinal Study and finds no evidence for hypothesized effects of birth order on personality. If further work supports our findings on social attitudes and Hauser et al.'s findings on personality, it would not be the first time that enthusiasm about birth order has given way to sobriety. Indeed, Somit et al. (1996: 105) liken the recurrence of birth-order theories to a "vampire" that cannot be extinguished by either rational argument or contravening evidence.

[22] Specifically, Sulloway uses the All Possible Subsets Regression algorithm in the statistical package BMDP, which finds the set of variables that yields the best Mallows' C_p. For missing data, Sulloway uses imputation methods outlined by Rubin (1987), but these should not be confused with *solving* such a pronounced problem. It is also not clear from Sulloway's text when these methods were applied, as he says only that he uses them "occasionally" (p. 453), even though his data would seem to require some accommodation for missing data in every model.

We do not contend, however, that birth order is unimportant for every question in which sociologists are interested. On the contrary, earlier we list some sociological studies that have documented an eclectic array of birth-order effects, and we note that, in other societies, whether one is a firstborn or laterborn can exert a profound effect on life outcomes. But the history of birth-order research suggests that those interested in the variable may be well advised to think in terms of *modest* effects in *limited* domains and in *specific* societies. To date, the sweeping and universalistic claims that periodically have been offered about birth order have struggled to live up to their hubris in subsequent research. With regard to social attitudes, our research indicates that broad claims, such as those offered by Sulloway, may be inherently problematic: None of the independent variables we examine is associated with respondents being more liberal or more conservative across every social issue.

An additional benefit of the renewal of interest in birth order is that it forces us to think again about the possible influences of intrafamilial variables. At present, sociologists still have only a limited understanding of why people from very similar backgrounds come often to hold very different beliefs about the social world, even when they are of the same sex and age. Without discounting the importance of structural position and of culture, sociologists may profit from further considering the possible mechanisms of attitude formation that may operate within families. Birth order is only one of a number of basic family configuration variables (others include sex composition of the sibship, the age spacing of siblings, single- or step-parenthood, and parental age at birth) that have been shown to exert significant effects in some domains. Each merits greater consideration, both separately and as part of one's overall constellation of family traits, as potential determinants of social attitudes. In addition, although its effects were not as strong as that of other variables, our findings indicate that additional consideration of the effects of sibship size on social attitudes may prove lucrative.

The study of family dynamics and its effects increasingly has become a key focal point in debates between advocates of tradi-

tional sociological approaches and proponents of sociobiological or otherwise evolutionary ones. As we noted above, Sulloway's theory has been hailed as a cogent demonstration of how evolutionary reasoning can be used to explain the influence of family environment. Although we find no evidence supporting Sulloway's theoretical claims, our results cannot be taken as an indictment of evolutionary perspectives generally, as they cannot speak to the many other Darwinian theories that have been offered (including those which purport to explain the effects of race, gender, or social class). Yet our study does illustrate how sociologists can empirically engage evolutionary theories. All too often, sociologists have either ignored sociobiological and evolutionary psychological alternatives or critiqued these theories at a distance from actual empirical investigation. By testing Sulloway's specific claims using nationally representative data, we hope to prompt additional tests of evolutionary hypotheses by sociologists—and we underscore the importance of using *empirical criteria* to evaluate these ideas.

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Appendix A. Means, Standard Deviations, and Descriptions of Variables in the Study

Variable	Description	Metric	Mean (S.D.)	N
Political Identification				
Identifies self as:				
Conservative	Placement on liberal–conservative scale.	0 = extremely liberal, to 6 = extremely conservative.	3.19 (1.39)	1,887
Republican	Party identification.	0 = strong Democrat, to 6=strong Republican.	2.90 (2.01)	1,894
Bush supporter in 1992	Voted for Bush (or would have voted for Bush) in 1992 Presidential election.	0 = vote for Clinton or Perot, to 1= vote for Bush.	.37 (.48)	1,819
Opposition to Liberal Movements				
Opposes:				
Abortion rights	Whether woman should be able to get a legal abortion if (1) her life is in danger, (2) baby may have serious defect, (3) she wants no more children, (4) family can afford no more children, (5) pregnancy is the result of rape, (6) she does not wish to marry father, or (7) she wants abortion for any reason.	0 = should be legal in all these circumstances, to 7 = should be illegal in all these circumstances.	2.29 (2.44)	1,153

(Continued on next page)

(Appendix A continued from previous page)

Variable	Description	Metric	Mean (S.D.)	N
Assisted suicide laws	Belief that doctors should *not* be legally allowed to help patients with incurable diseases who want to end their lives.	0 = disagrees, to 1 = agrees.	.26 (.44)	1,214
Legalization of marijuana	Belief that marijuana use should remain illegal.	0 = should be legal, to 1 = should stay illegal.	.76 (.43)	1,245
Animal rights	Belief that animals do *not* have same moral rights as humans.	0 = strongly disagrees, to 4 = strongly agrees.	2.39 (1.20)	839
Environmental movement	Whether respondent would be willing to (1) pay much higher prices, (2) pay much higher taxes, and (3) accept cuts in standard of living to protect environment.	0 = very willing to do all of these, to 3 = not at all willing to do any of these.	1.54 (.75)	843
Free speech	Belief that (1) atheists, (2) communists, or (3) homosexuals should *not be able to (1) make a speech in* respondent's community, (2) teach in college or university, and (3) have their books shelved in public library.	0 = all of these should be permitted, to 9 = none of *these should be permitted.*	2.56 (2.83)	1,131
Social welfare programs	Belief that government has no responsibility to (1) improve the living standards of the poor or (2) help poor people pay their medical bills and that (3) the government tries to do too much to solve the country's problems.	0 = disagrees strongly with all items, to 3 = agrees strongly with all items.	1.46 (.71)	1,301
Resistance to Racial Reforms				
Thinks government is too generous to blacks[a]	Belief that the government gives too much attention to blacks and should spend less money trying to improve the conditions of blacks.	0 = disagrees strongly, to 3 = agrees strongly.	1.73 (.76)	773
Excluding blacks is OK[a]	Belief that blacks should not push themselves where they are not wanted and that whites have a right to keep blacks out of their neighborhood if desired.	0 = disagrees strongly, to 3 = agrees strongly.	.94 (.82)	813
Racial inequality due to blacks' lack of ability/ will power[a]	Belief that blacks tend to have worse jobs and incomes than whites because most blacks (1) have less innate ability and (2) lack motivation, but *not* because blacks (3) have less educational opportunities and (4) are discriminated against.	0 = disagrees with all items, to 4 = agrees with all items.	1.82 (1.20)	1,102
Against benefits for immigrants[a]	Belief that illegal immigrants should (1) not be able to get work permits, (2) not be able to attend public universities, and (3) not have their children qualify as American citizens if born in the U.S., and (4) belief that legal immigrants should not be able to receive welfare benefits upon entering the country.	0 = believes immigrants are entitled to all these, to 4 = believes immigrants are entitled to none of these.	2.75 (1.19)	703

(Continued on next page)

(Appendix A continued from previous page)

Variable	Description	Metric	Mean (S.D.)	N
Supports English-only laws[a]	Belief that English should be exclusive language used (1) in schools, (2) on election ballots, and (3) to conduct government business.	0 = disagrees with all items, to 3 = agrees with all items.	1.69 (.94)	746
Belief in Traditional Gender Roles				
Against mothers working	Belief that mothers should stay home (1) when they have child under school age and (2) after youngest child has started school, and that working mothers (3) have weaker relationships with children, (4) cause children to suffer and (5) cause family life to suffer.	0 = disagrees with all items, to 5 = agrees with all items.	2.40 (1.17)	814
Supports traditional division of labor between spouses	Belief that (1) women should look after home and family, (2) it is more important for wife to help husband's career than have one herself, (3) it is bad if husband stays home and wife works, and (4) it is better if husband is achiever outside home and wife takes care of family.	0 = disagrees with all items, to 4 = agrees with all items.	1.43 (.88)	595
Against women in politics	Belief that (1) men are emotionally better suited for politics than women, (2) that women should leave running U.S. up to men, and (3) that respondent would not vote for female Presidential candidate from own party.	0 = disagrees with all items, to 3 = agrees with all items.	1.23 (.56)	1,150
Support for Existing Authority				
Children should obey	Evaluation of how important it is to teach a child to obey versus (1) to be well-liked, (2) to think for her/himself, (3) to work hard, (4) or to help others.	0 = less important than all these, to 4 = more important than all these.	1.78 (1.31)	1,290
Trusts social institutions	Confidence in persons running (1) Congress, (2) the executive branch of the government, (3) the U.S. Supreme Court, (4) the military, (5) major companies, (6) banks, (7) education, (8) organized religion, and (9) medicine.	0 = hardly any confidence in all institutions, to 9 = great deal of confidence in all institutions.	4.75 (1.59)	1,193
Patriotism	How proud respondent is to be an American.	0 = not very proud, to 3 = extremely proud.	2.31 (.74)	923
"Tough-Mindedness"				
Tough on crime	Belief that courts are not harsh enough with criminals.	0 = believes courts are too harsh or about right, to 1 = believes courts are not harsh enough.	.89 (.31)	1,852
Supports capital punishment	Attitude toward death penalty for those convicted of murder.	0 = opposes the death penalty, to 1 = favors the death penalty.	.80 (.40)	1,824
Supports corporal punishment	Belief that spanking is sometimes necessary as punishment for children.	0 = disagrees strongly, to 3 = agrees strongly.	1.90 (.88)	1,268

Note: Almost all variation in the number of available cases is due to the split ballot format of the GSS and the administration of many questionnaire items to a randomly selected subset (1/3 to 2/3) of the total sample.

[a] Effects examined for white respondents only.

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