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Why Liberals and Atheists Are More Intelligent

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The origin of values and preferences is an unresolved theoretical question in behavioral and social sciences. The Savanna-IQ Interaction Hypothesis, derived from the Savanna Principle and a theory of the evolution of general intelligence, suggests that more intelligent individuals may be more likely to acquire and espouse evolutionarily novel values and preferences (such as liberalism and atheism and, for men, sexual exclusivity) than less intelligent individuals, but that general intelligence may have no effect on the acquisition and espousal of evolutionarily familiar values (for children, marriage, family, and friends). The analyses of the National Longitudinal Study of Adolescent Health (Study 1) and the General Social Surveys (Study 2) show that adolescent and adult intelligence significantly increases adult liberalism, atheism, and men's (but not women's) value on sexual exclusivity.

Keywords: origin of values and preferences, evolutionary psychology, the Savanna Principle, the Savanna-IQ Interaction Hypothesis, general intelligence

Where do individual values and preferences come from? Why do people want what they want? Some social scientists and biologists have explored the origin of values (Emerson 1987; Hechter, Nadel, and Michod 1993) while economists have remained mute on the issue. Their traditional answer to the question of individual values and preferences is: *De gustibus non est disputandum* (Stigler and Becker 1977). There is no accounting for tastes, and one cannot explain individuals' idiosyncratic values and preferences, although Becker (1996) has since attempted to explain them. A theory of revealed preferences, which is often used in microeconomics, only *measures* individuals' preferences empirically but does not *explain* where they come from or why actors have them. Despite many attempts and some promising starts (Hechter et al. 1999; Schwartz 1992; Wildavsky 1987), there currently is no satisfactory general theory of values.

Some argue that evolutionary psychology can provide such a general theory of values (Ben-Ner and Putterman 2000; Horne 2004; Kanazawa 2001). *Evolutionary psychology* is the study of universal human nature, or sex-specific male human nature and female human nature, and their interaction with the environment. It can therefore in principle explain both universal preferences (as a function of the universal human nature) and individual preferences (as a function of the interaction between the universal human nature and individual circumstances and experiences).

In this paper I discuss recent theoretical developments in evolutionary psychology and offer one possible explanation of individual values and preferences that I call the Savanna-IQ Interaction Hypothesis. It explains how the level of general intelligence

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affects the acquisition of certain evolutionarily novel values and preferences. I then test the Savanna-IQ Interaction Hypothesis with respect to three evolutionarily novel values (liberalism, atheism, and monogamy) and show that, consistent with the Hypothesis, more intelligent individuals are more likely to espouse liberal political ideology and to be atheists, and more intelligent men (but not women) are more likely to value sexual exclusivity. In contrast, and consistent with the prediction, general intelligence does not affect the espousal of evolutionarily familiar values for children, marriage, family, and friends.

THE SAVANNA PRINCIPLE

Adaptations, physical or psychological, are designed for and adapted to the conditions of the environment of evolutionary adaptedness, not necessarily to the current environment (Tooby and Cosmides 1989). This fundamental principle of evolution holds equally for psychological adaptations as it does for physical adaptations. Pioneers of evolutionary psychology (Crawford 1993; Symons 1990; Tooby and Cosmides 1990) all recognized this. Kanazawa (2004a) systematizes these observations into what he calls the *Savanna Principle:* The human brain has difficulty comprehending and dealing with entities and situations that did not exist in the ancestral environment. Hagen and Hammerstein (2005:341-3) refer to the same observation as the "*mismatch hypothesis*," while Burnham and Johnson (2006:130-31) call it the "*evolutionary legacy hypothesis.*"

The Savanna Principle can potentially explain why some otherwise elegant scientific theories of human behavior, such as the subjective expected utility maximization theory or game theory, often fail empirically, because they posit entities and situations that did not exist in the ancestral environment. For example, many players of one-shot Prisoner's Dilemma games may make the theoretically irrational choice to cooperate with their partner, possibly because the human brain has difficulty comprehending completely anonymous social exchange and absolutely no possibility of knowing future interactions (which makes the game truly one-shot). Neither of these situations existed in the ancestral environment, but they are crucial for the game-theoretical prediction of universal defection.

As another illustration of the Savanna Principle, individuals who watch certain types of TV shows are more satisfied with their friendships, just as they are if they had more friends or socialized with them more frequently (Kanazawa 2002). This may be because realistic images of other humans, such as television, movies, videos, and photographs, did not exist in the ancestral environment, where all realistic images of other humans *were* other humans. As a result, the human brain may have implicit difficulty distinguishing their "TV friends" (the characters they repeatedly see on TV shows) and their real friends. Caughey (1984:31-76) details the "imaginary social relations" that many Americans have with media figures, including TV characters.

EVOLUTION OF GENERAL INTELLIGENCE

General intelligence refers to the ability to reason deductively or inductively, think abstractly, use analogies, synthesize information, and apply it to new domains (Gottfredson 1997; Neisser et al. 1996). The concept of general intelligence poses a problem for evolutionary psychology. Evolutionary psychologists contend that the human brain consists of domain-specific evolved psychological mechanisms, which evolved to solve specific adaptive problems (problems of survival and reproduction) in specific domains. If the contents of the human brain are domain-specific, how can evolutionary psychology explain general intelligence?

In contrast to views expressed by Miller (2000), Cosmides and Tooby (2002), and Chiappe and MacDonald (2005), Kanazawa (2004b) proposes that what is now known as general intelligence may have originally evolved as a domain-specific adaptation to deal with evolutionarily novel, nonrecurrent problems. Kanazawa's (2004b) theory of the evolution of general intelligence represents

some departure from the orthodox in intelligence research. It provides a theoretical definition of general intelligence as well as an explanation for its evolution, whereas the orthodox intelligence research defines it only empirically as the highest-order latent factor—the *g* factor—that emerges from a factor analysis of a large number of cognitive ("IQ") tests. For the orthodox, "general intelligence" and "*g*" are completely synonymous, whereas for Kanazawa (2004b) *g* is an *indicator* or *measure* of general intelligence, *not* general intelligence itself (Kanazawa 2007:284n).

The human brain consists of a large number of domain-specific evolved psychological mechanisms to solve recurrent adaptive problems. In this sense, our ancestors did not really have to think in order to solve such recurrent problems. Evolution has already done all the thinking, so to speak, and equipped the human brain with the appropriate psychological mechanisms, which engender preferences, desires, cognitions, and emotions, and motivate adaptive behavior in the context of the ancestral environment.

Even in the extreme continuity and constancy of the ancestral environment, however, there were likely occasional problems that were evolutionarily novel and nonrecurrent, which required our ancestors to think and reason in order to solve. Such problems may have included, for example:

1. Lightning has struck a tree near the camp and set it on fire. The fire is now spreading to the dry underbrush. What should I do? How could I stop the spread of the fire? How could I and my family escape it? (Since lightning never strikes the same place twice, this is guaranteed to be a nonrecurrent problem.)
2. We are in the middle of the severest drought in a hundred years. Nuts and berries at our normal places of gathering, which are usually plentiful, are not growing at all, and animals are scarce as well. We are running out of food because none of our normal sources of food are working. What else can we eat? What else is safe to eat? How else can we procure food?
3. A flash flood has caused the river to swell to several times its normal width, and I am trapped on one side of it while my entire band is on the other side. It is imperative that I rejoin them soon. How could I cross the rapid river? Should I walk across it? Or should I construct some sort of buoyant vehicle to use to get across it? If so, what kind of material should I use? Wood? Stones?

To the extent that these evolutionarily novel, nonrecurrent problems happened frequently enough in the ancestral environment (different problem each time) and had serious enough consequences for survival and reproduction, any genetic mutation that allowed its carriers to think and reason would have been selected for, and what we now call "general intelligence" could have evolved as a domain-specific adaptation for the domain of evolutionarily novel, nonrecurrent problems. General intelligence may have become universally important in modern life (Gottfredson 1997; Herrnstein and Murray 1994; Jensen 1998) only because our current environment is almost entirely evolutionarily novel. The new theory suggests, and empirical data confirm, that more intelligent individuals are better than less intelligent individuals at solving problems *only if* they are evolutionarily novel, but that more intelligent individuals are *not better* than less intelligent individuals at solving evolutionarily familiar problems, such as those in the domains of mating, parenting, interpersonal relationships, and wayfinding (Kanazawa 2004b, 2007). Three recent studies, employing widely varied methods, have shown that the average intelligence of a population appears to be a strong function of the evolutionary novelty of its environment (Ash and Gallup 2007; Bailey and Geary 2009; Kanazawa 2008).

SAVANNA-IQ INTERACTION HYPOTHESIS

The logical conjunction of the Savanna Principle and the theory of the evolution of general intelligence suggests a qualification of the Savanna Principle. If general intelligence evolved to deal with evolutionarily novel problems, then the human brain's difficulty in comprehending and dealing with entities and situations that did not exist in the ancestral environment (proposed in the Savanna Principle) should interact with general intelligence, such that the Savanna Principle holds stronger among less intelligent individuals than among more intelligent individuals. More intelligent individuals should be better able to comprehend and deal with evolutionarily novel (but *not* evolutionarily familiar) entities and situations than less intelligent individuals.

There has been accumulating evidence for this *Savanna-IQ Interaction Hypothesis*. First, individuals' tendency to respond to TV characters as if they were real friends, first discovered by Kanazawa (2002), appears to be limited to those with below-median intelligence (Kanazawa 2006a); individuals with above-median intelligence do not become more satisfied with their friendships by watching more television.

Second, net of age, race, sex, education, marital history, and religion, less intelligent individuals have more children than more intelligent individuals, even though they do not want to do so. This may possibly be because they have greater difficulty effectively employing evolutionarily novel means of modern contraception (Kanazawa 2005). Another indication that less intelligent individuals may have greater difficulty employing modern contraception effectively is the fact that the correlation between the lifetime number of sex partners and the number of children is positive among the less intelligent but negative among the more intelligent. The more sex partners less intelligent individuals have, the more children they have; the more sex partners more intelligent individuals have, the fewer children they have.

Third, more intelligent individuals stay healthier and live longer than less intelligent individuals possibly because they are better able to recognize and deal with evolutionarily novel threats and dangers to health in modern society (Deary et al. 2004; Gottfredson and Deary 2004; Kanazawa 2006b). Consistent with the Hypothesis, however, general intelligence does not appear to affect health and longevity in sub-Saharan Africa, where many of the health threats and dangers are more evolutionarily familiar than elsewhere in the world.

Finally, criminologists have long known that criminals on average have lower intelligence than the general population (Wilson and Herrnstein 1985; Herrnstein and Murray 1994). From the perspective of the Hypothesis, there are two important points to note (Kanazawa 2009). Much of what we call interpersonal crime today, such as murder, assault, robbery, and theft, were probably routine means of intrasexual male competition in the ancestral environment. This is how men likely competed for resources and mating opportunities for much of human evolutionary history; they beat up and killed each other, and they stole from each other if they could get away with it. We may infer this from the fact that behavior that would be classified as criminal if engaged in by humans, like murder, rape, assault, and theft, is quite common among other species (Ellis 1998), including other primates such as chimpanzees (de Waal 1998), bonobos (de Waal 1992), and capuchin monkeys (de Waal, Luttrell, and Canfield 1993).

At the same time, the institutions that control, detect, and punish criminal behavior in society today—the police, the courts, and the prisons—are all evolutionarily novel; there was very little formal third-party enforcement of norms in the ancestral environment, only second-party enforcement (victims and their kin and allies) or informal third-party enforcement (ostracism). Thus it makes sense from the perspective of the Savanna-IQ Interaction Hypothesis that men with low intelligence may be more likely to resort to evolutionarily familiar means of competition for resources (theft rather than full-time employment) and mating opportunities (rape rather than computer dating) and not to comprehend fully the consequences

of criminal behavior imposed by evolutionarily novel entities of law enforcement.

There thus appears to be some evidence for the Savanna-IQ Interaction Hypothesis. Applied to the origin of preferences and values, the Hypothesis suggests that *more intelligent individuals may be more likely to acquire and espouse evolutionarily novel preferences and values than less intelligent individuals, while general intelligence may make no difference for the acquisition and espousal of evolutionarily familiar values.* In particular, the Hypothesis leads to predictions about three evolutionarily novel values of liberalism, atheism, and, for men, sexual exclusivity, and how general intelligence may affect their acquisition and espousal.

GENERAL INTELLIGENCE AND OPENNESS TO EXPERIENCE

Research in personality psychology has shown that one of the Five-Factor Model personality factors — openness to experience — is significantly positively correlated with intelligence (Ackerman and Heggestad 1997). The similarity and overlap between intelligence and openness are apparent from the fact that some researchers call this personality factor "intellect" rather than "openness" (Goldberg 1992; McRae 1994). While it is widely accepted by personality psychologists that intelligence and openness covary across individuals, it is not known *why* (Chamorro-Premuzic and Furnham 2006). The Savanna-IQ Interaction Hypothesis can potentially explain why more intelligent individuals are more open to new experiences and are therefore more prone to seek novelty. It is instructive to note from this perspective that only the actions, ideas, and values facets of openness to experience are significantly correlated with general intelligence, not the fantasy, esthetics, and feelings facets (Gilles, Stough, and Loukomitis 2004; Holland et al. 1995).

At the same time, the Hypothesis suggests a possible need to refine the concept of novelty and to distinguish between *evolutionary novelty* (entities and situations that did not exist in the ancestral environment) and *experiential novelty* (entities and situations that individuals have not personally experienced in their own lifetime). While the Five-Factor Model does not specify the type of novelty that open individuals are more likely to seek, the Savanna-IQ Interaction Hypothesis suggests that more intelligent individuals are more likely to seek only evolutionary novelty, not necessarily experiential novelty.

For example, everybody who is alive in the United States today has lived their entire lives in a strictly monogamous society, and, despite recent news events, very few contemporary Americans have any personal experiences with polygyny.[1] Therefore monogamy is *experientially familiar* for most Americans whereas polygyny is *experientially novel.* The Five-Factor Model may therefore predict that more intelligent individuals are more likely to be open to polygyny as an experientially novel idea or action. In contrast, humans have been mildly polygynous throughout their evolutionary history (Alexander et al. 1977; Leutenegger and Kelly 1977), and socially imposed monogamy is a relatively recent historical phenomenon (Kanazawa and Still 1999). In other words, polygyny is *evolutionarily familiar*, whereas monogamy is *evolutionarily novel.* The Savanna-IQ Interaction Hypothesis would therefore predict that more intelligent individuals are more likely to be open to monogamy and less likely to be open to polygyny. In fact, as the empirical analysis below shows, more intelligent men are more likely to value monogamy and sexual exclusivity than less intelligent men.

As another example, for most contemporary Americans, traditional names derived from the Bible, such as John and Mary, are

[1] There is much confusion about terminology for different institutions of marriage, even among social scientists. *Monogamy* is the marriage of one man to one woman. *Polygyny* is the marriage of one man to more than one woman, while *polyandry* is the marriage of one woman to more than one man. *Polygamy* (although it is often used synonymously with polygyny in casual conversations) refers to both polygyny and polyandry. Because of its ambiguity, the word polygamy should not be used unless it specifically and simultaneously refers to both polygyny and polyandry.

experientially more familiar than untraditional names like Winner and Loser (Levitt and Dubner 2005). So the Five-Factor Model may predict that more intelligent individuals are more likely to name their children untraditional names like Winner and Loser than less intelligent individuals. From the perspective of the Hypothesis, however, both John and Winner are equally evolutionarily novel (because the Bible itself and all the traditional names derived from it are evolutionarily novel), so it would not predict that more intelligent individuals are more likely to name their children untraditional names. In fact, there is no evidence at all that more intelligent individuals are more likely to prefer untraditional names for their children (Fryer and Levitt 2004; Lieberson and Bell 1992).

The Savanna-IQ Interaction Hypothesis underscores the need to distinguish between evolutionary novelty and experiential novelty. It can potentially explain why more intelligent individuals are more likely to seek evolutionary novelty, but not necessarily experiential novelty. It further suggests that the established correlation between openness and intelligence may be limited to the domain of evolutionary novelty, not necessarily experiential novelty.

EVOLUTIONARILY NOVEL AND FAMILIAR PREFERENCES AND VALUES

Liberalism

It is difficult to provide a precise definition of a whole school of political ideology like liberalism. Further, what passes as liberalism varies by place and time. The Liberal Democratic Party in the United Kingdom is middle-of-the-road, while the Liberal Democratic Party in Japan is conservative. The political philosophy which originally emerged as "liberalism" during the Enlightenment is now called "classical liberalism" or "libertarianism," and represents the polar opposite of what is now called "liberalism" in the United States (Murray 1998).

In this paper I will adopt the contemporary American definition of liberalism. I provisionally define *liberalism* (as opposed to conservatism) as the genuine concern for the welfare of genetically unrelated others and the willingness to contribute larger proportions of private resources for the welfare of such others. In the modern political and economic context, this willingness usually translates into paying higher proportions of individual incomes in taxes toward the government and its social welfare programs.

Defined as such, liberalism is evolutionarily novel. Humans (like other species) are designed by evolution to be altruistic toward their genetic kin (Hamilton 1964), their repeated exchange partners (Trivers 1971), and members of their *deme* (a group of intermarrying individuals) or ethnic group (Whitmeyer 1997). They are not designed to be altruistic toward an indefinite number of complete strangers whom they are not likely ever to meet or exchange with. This is largely because our ancestors lived in a small band of 50 to 150 genetically related individuals all their lives, and large cities and nations with thousands and millions of people are themselves evolutionarily novel.

In order to make reasonable inferences about what values our ancestors might have held during the course of human evolution, I have relied on two sources. First, I have consulted the ten-volume compendium *The Encyclopedia of World Cultures* (Levinson 1991-1995), which extensively describes *all* human cultures known to anthropology (more than 1,500) in great detail. Second, I have consulted the following extensive (monograph-length) ethnographies of traditional (hunter-gatherer, pastoral, and horticultural) societies around the world: *Yanomamö* (Chagnon 1992); *From Mukogodo to Maasai: Ethnicity and Cultural Change in Kenya* (Cronk 2004); *Ache Life History: The Ecology and Demography of a Foraging People* (Hill and Hurtado 1996); *The !Kung San: Men, Women, and Work in a Foraging Society* (Lee 1979); and *Sacha Runa: Ethnicity and Adaptation of Ecuadorian Jungle Quichua* (Whitten 1976). While contemporary hunter-gatherers are not exactly the same as our ancestors during the Pleistocene, they are the best analog that we have available for close examination and are thus often used for the purpose of making inferences about our ancestral life.

These ethnographic sources make it clear that, while sharing of resources, especially food, is quite common and often normatively prescribed among hunter-gatherer tribes, and while trade with neighboring tribes may have taken place (Ridley 1996), there is no evidence that people in contemporary hunter-gatherer bands *freely* share resources with members of other tribes. Because all members of a hunter-gatherer tribe are genetic kin or at the very least repeated exchange partners (friends and allies for life), sharing resources among them does not qualify as an expression of liberalism as defined above. It may therefore be reasonable to infer that, while sharing of food and other resources with genetic kin may be part of universal human nature, sharing of the same resources with total strangers that one has never met or is not likely ever to meet is not part of evolved human nature. The Savanna-IQ Interaction Hypothesis would therefore predict that more intelligent individuals are more likely to espouse liberal political ideology than less intelligent individuals.

In an earlier study, Eaves and Eysenck (1974) discover that political attitude (on the "radical-conservative" scale) has the heritability of .65. More recently, Alford, Funk, and Hibbing (2005) show that roughly 43 percent of the variance in political attitudes on the conservative-liberal dimension is determined by genes, and parental socialization has a relatively minor role, accounting for only 22 percent of the total variance. In a comprehensive meta-analysis, Jost et al. (2003) uncover a large number of personality correlates with conservatism such as death anxiety and intolerance of ambiguity. Their study, however, does not include general intelligence as a correlate of political attitude, except that they show that openness to experience is negatively correlated with conservatism, and we know from studies cited above that openness correlates positively with intelligence. Consistent with the prediction derived from the Hypothesis, Deary, Batty, and Gale's (2008a, b) recent studies show that more intelligent British children are more likely to become liberal adults.

Atheism

While religion is a cultural universal (Brown 1991), recent evolutionary psychological theories (Atran 2002; Boyer 2001; Guthrie 1993; Haselton and Nettle 2006; Kirkpatrick 2005) suggest that religiosity (belief in higher powers) may not be an adaptation in itself. It may instead be a byproduct of other evolved psychological mechanisms, variously known as "animistic bias" (Guthrie 1993) or "the agency-detector mechanisms" (Atran 2002).

When our ancestors faced some ambiguous situation, such as rustling noises nearby at night or a large fruit falling from a tree branch and hitting them on the head, they could attribute it either to impersonal, inanimate, unintentional forces (wind blowing gently to make the rustling noises among the bushes and leaves, a mature fruit falling by its own weight from the branch by the force of gravity and hitting them on the head purely by accident) or to personal, animate, intentional forces (a predator sneaking up on them to attack, an enemy hiding in the tree branches and throwing fruits at their head).

Given that the situation is inherently ambiguous, our ancestors could have made one of two errors of inference. They could have attributed the events to intentional forces when they are in fact caused by unintentional forces (false-positive or Type I error) or they could have attributed them to unintentional forces when they were in fact caused by intentional forces (false-negative or Type II error). The consequences of Type I errors were that our ancestors became unnecessarily paranoid and looked for predators and enemies where there were none. The consequences of Type II errors were that our ancestors were attacked and killed by predators or enemies when they least suspected an attack. The consequences of committing Type II errors are far more detrimental to survival and reproduction than the consequences of committing Type I errors. Evolution should therefore favor psychological mechanisms which predispose

their carriers to commit Type I errors but avoid Type II errors, and thus overinfer (rather than underinfer) intentions and agency behind potentially harmless phenomena caused by inanimate objects. Evolutionarily speaking, it is good to be paranoid, because it might save your life (Haselton and Nettle 2006).

Recent evolutionary psychological theories therefore suggest that evolutionary origin of religious beliefs in supernatural forces may stem from such an innate bias to commit Type I errors rather than Type II errors. The human brain may be biased to perceive intentional forces (the hands of God at work) behind a wide range of natural physical phenomena whose exact causes are unknown. If these theories are correct, then it means that religion and religiosity have an evolutionary origin. It is evolutionarily familiar and natural to believe in God, and evolutionarily novel not to be religious.

Once again, in order to make reasonable inferences about the religious beliefs of our ancestors during the course of human evolution, I have consulted the same primary ethnographic sources on which I relied to make inferences about their liberalism. Out of more than 1,500 distinct cultures throughout the world described in *The Encyclopedia of World Cultures*, only 19 contain any references to atheism. Not only do all these 19 cultures exist far outside of our ancestral home in sub-Saharan Africa, but all 19 without an exception are former Communist societies (Abkhazians in Georgia, Ajarians in Georgia, Albanians, Bulgarians, Chuvash in Russia, Czechs, Germans in Russia [but not in Germany], Gypsies in Russia, Itelmen in Russia, Kalmyks in Russia, Karakalpaks in Russia, Koreans in Russia (but not in Korea), Latvians, Nganasan in Russia, Nivkh in Russia, Poles, Turkmens, Ukrainian peasants). There are no non-former-Communist cultures described in *The Encyclopedia* as containing any significant segment of atheists. Nor is there any reference to any individuals who do not subscribe to the local religion in any of the monograph-length ethnographies cited above. It may therefore be reasonable to conclude that atheism may not be part of the universal human nature, and widespread practice of atheism may have been a recent product of Communism in the twentieth century. The Hypothesis would therefore suggest that more intelligent individuals are more likely to be atheist than less intelligent individuals.

Monogamy

Throughout human evolutionary history, humans were mildly polygynous. A species-typical degree of polygyny correlates with the extent of sexual dimorphism in size; the more sexually dimorphic the species (where males are bigger than females), the more polygynous the species (Alexander et al. 1979; Leutenegger and Kelly 1977). This is either because males of polygynous species become larger in order to compete with other males and monopolize females (Alexander et al. 1979; Leutenegger and Kelly 1977) or because females of polygynous species become smaller in order to mature early and start mating (Harvey and Bennett 1985; Kanazawa and Novak 2005; Pickford 1986). Thus strictly monogamous gibbons are sexually monomorphic (males and females are about the same size), whereas highly polygynous gorillas are equally highly sexually dimorphic in size. On this scale, humans are *mildly* polygynous, not as polygynous as gorillas, but not strictly monogamous like gibbons.

Consistent with this comparative evidence, an analysis of the Standard Cross-Cultural Sample (Murdock 1967) shows that an overwhelming majority of traditional cultures in the world (83.39 percent) practice polygyny, with only 16.14 percent practicing monogamy and 0.47 percent practicing polyandry. Once again, while present-day hunter-gatherer societies are not the same as our ancestors in every detail, they are our best analogs available to us to study. The fact that polygyny is widespread in such societies, combined with the comparative data discussed above, strongly suggests that our ancestors might have practiced polygyny

throughout most of human evolutionary history.

Under polygyny, one man is married to several women, so a woman in a polygynous marriage still (legitimately) mates only with one man as a woman in a monogamous marriage does. In contrast, a man in a polygynous marriage concurrently mates with several women quite unlike a man in a monogamous marriage who mates with only one woman. So throughout human evolutionary history, men have mated with several women while women have mated with only one man.[2] Sexual exclusivity prescribed under socially imposed monogamy today is therefore evolutionarily novel for men, but not for women. The Hypothesis would therefore suggest that more intelligent men may value sexual exclusivity more than less intelligent men, but intelligence may not affect women's likelihood of espousing the value of sexual exclusivity.

Evolutionarily Familiar Values

Unlike liberalism, atheism, and monogamy, values in such evolutionarily familiar entities as children, marriage (pair-bonding), family, and friends should themselves be evolutionarily familiar. It has always been important to value these entities throughout human evolutionary history; our ancestors who did not value these entities are not likely to have left many descendents. The Hypothesis would therefore predict that general intelligence may make no difference for the acquisition and espousal of these evolutionarily familiar values.

[2] Of course, polygynous marriage in any society is mathematically limited to a minority of men; most men in polygynous societies either have only one wife or no wife at all. However, at least some men throughout evolutionary history were polygynous, and we are disproportionately descended from polygynous men with a large number of wives (because they had more children than monogamous or wifeless men). Nor does the human evolutionary history of mild polygyny mean that women always remained faithful to their legitimate husband. There is anatomical evidence to suggest that women have always been mildly promiscuous (Baker and Bellis 1995; Gallup et al. 2003).

I will test these predictions derived from the Savanna-IQ Interaction Hypothesis with regard to the origin of preferences and values using two separate representative data sets from the United States (Add Health and GSS).

STUDY 1

Method

Data. In Study 1, I use the National Longitudinal Study of Adolescent Health (Add Health). A sample of 80 high schools and 52 middle schools from the United States was selected with an unequal probability of selection. Incorporating systematic sampling methods and implicit stratification into the Add Health study design ensures this sample is representative of U.S. schools with respect to region of country, urbanicity, school size, school type, and ethnicity. A sample of 20,745 adolescents were personally interviewed in their homes in 1994 through 1995 (Wave I) and again in 1996 (Wave II; n = 14,738). In 2001 through 2002, 15,197 of the original Wave I respondents, now aged 18 to 28, were interviewed in their homes. My sample consists of Wave III respondents in their early adulthood. For further details on the design features of Add Health, see http://www.asanet.org/journals/spq/health.cfm.

Dependent variables. For liberal political ideology, I use the respondents' response to the following question: "In terms of politics, do you consider yourself conservative, liberal, or middle-of-the-road?" Their responses are coded as follows: 1 = *very conservative*, 2 = *conservative*, 3 = *middle of the road*, 4 = *liberal*, 5 = *very liberal*. For religiosity, I use the respondents' response to the following question: "To what extent are you a religious person?" Their responses are coded as follows: 1 = *not religious at all*, 2 = *slightly religious*, 3 = *moderately religious*, 4 = *very religious*. Because both of these dependent variables are measured on an ordinal scale, I use the ordinal regression (McCullagh 1980) to estimate these models. For sexual exclusivity, I

use the respondent's response to the following question: "Using a scale from 1 to 10, where 1 means not important at all and 10 means extremely important, how important do you think each of the following elements is for a successful marriage or serious committed relationship? Being faithful—that is, not cheating on your partner by seeing other people." I use OLS regression to analyze this response.

Independent variable. Add Health measures respondents' intelligence with the Peabody Picture Vocabulary Test (PPVT). The raw scores (0–87) are age-standardized and converted to the IQ metric, with a mean of 100 and a standard deviation of 15. The PPVT is properly a measure of verbal intelligence, not general intelligence. However, verbal intelligence is known to be highly correlated with (and thus heavily load on) general intelligence. Miner's (1957) extensive review of 36 studies shows that the median correlation between vocabulary and general intelligence is .83. Wolfle (1980) reports that the correlation between a full-scale IQ test (Army General Classification Test) and the GSS synonyms measure (which I use later in Study 2) is .71. As a result, the GSS synonyms measure has been used widely by intelligence researchers to assess trends in general intelligence (Huang and Hauser 1998), as well as in research by sociologists who do not primarily study intelligence (Alwin and McCammon 1999; Glenn 1999; Wilson and Gove 1999).

With respect specifically to PPVT, Zagar and Mead's (1983) hierarchical cluster analysis of the Wechsler Intelligence Scale for Children-Revised (WISC-R), the Peabody Individual Achievement Test (PIAT), the Beery Developmental Test of Visual-Motor Integration (VMI) and the PPVT shows that the PPVT and the VMI, along with some components of the WISC-R, load on a first-order factor which they term "perceptual motor ability," which in turn loads on a second-order factor which they term "general intelligence." As a result, their conclusion is that the WISC-R, VMI, and PPVT are all good tests of general intelligence, whereas the PIAT is a test of academic achievement. Stanovich, Cunningham, and Feeman's (1984) study of first, third, and fifth graders shows that the correlation between the PPVT and Raven's Progressive Matrices (which is widely regarded as the best measure of general intelligence) is .22 (*ns*, $n = 56$) among the first graders, .52 ($p < .05$, $n = 18$) among the third graders, and .52 ($p < .05$, $n = 20$) among the fifth graders. It appears that the PPVT becomes a better measure of general intelligence as children get older.

In order to establish the direction of causality more clearly, I will use the measure of intelligence taken in Wave I (in 1994–1995 when the respondents were in junior high and high school) to predict their adult values in Wave III (in 2001–2002 when the respondents are in their early adulthood). Despite the fact that correlation between measures of intelligence at Waves I and III (taken seven years apart) is not extremely high ($r = .5844$, $p < .00001$, $n = 13{,}943$), all of my substantive conclusions (and even the size of the coefficients) remain the same if I use Wave III's measure of intelligence.

Control variables. In addition to adolescent intelligence, I control for the following variables: age (even though there is very little variance in it given that these are cohort data); sex (1 if male); race (with three dummies for Asian, black, and Native American, with white as the reference category, even though Add Health respondents can choose more than one racial category and a small proportion [4.15%] of them do); education (years of formal schooling); earnings (in dollars); and religion (with four dummies for Catholic, Jewish, Protestant, and other, with none as the reference category). For models predicting the value on sexual exclusivity, I also control for the number of times that the respondent has been married; 81.1 percent of the Wave III respondents have never been married.

Results

Figure 1a shows a clear monotonic bivariate relationship between adolescent intelligence

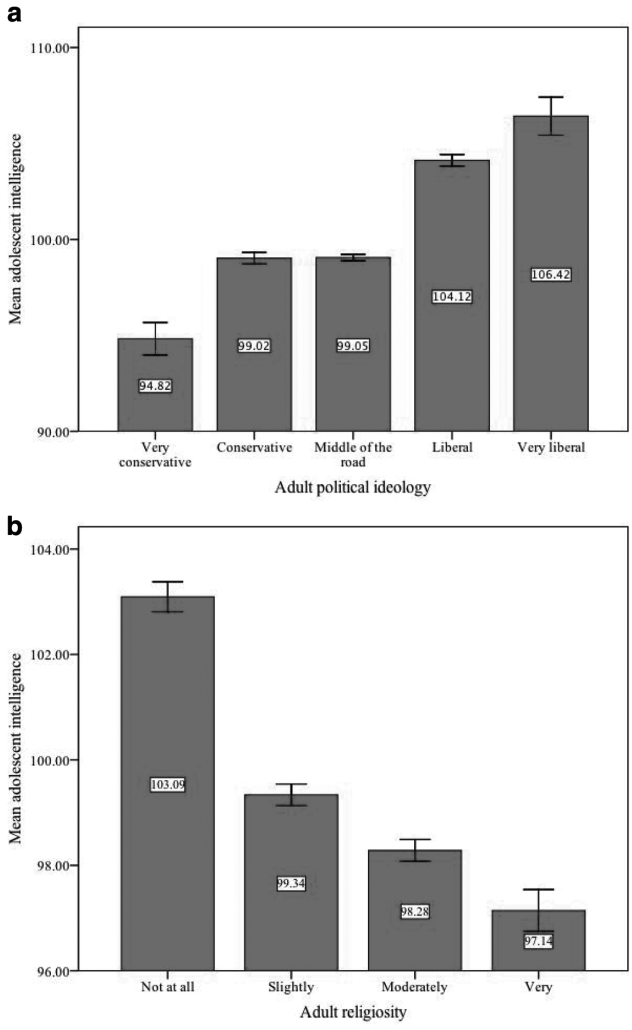

Figure 1. Mean Adolescent Intelligence by Political Ideology and Religiosity Add Health Data, Wave III (2001–2002). Error bars indicate standard error of the mean.

and adult political ideology. The higher the intelligence of Add Health respondents in junior high and high school, the more liberal they grow up to be in their early adulthood. The mean adolescent intelligence of young adults who identify themselves as "very liberal" is 106.42, while that of those who identify themselves as "very conservative" is 94.82. The differences in mean adolescent intelligence by adult political ideology is highly statistically significant ($F_{(4,\ 13053)} = 83.6327$, $p < .00001$).

Figure 1b shows a similarly clear monotonic bivariate relationship between adolescent intelligence and adult religiosity. The higher the intelligence of Add Health respondents in junior high and high school, the less religious they grow up to be in their early adulthood. The absolute difference in mean adolescent intelligence between the extreme categories of religiosity is not as great as that between the extreme categories of political ideology. The mean adolescent intelligence of young adults who identify

themselves as "not at all religious" is 103.09, while that of those who identify themselves as "very religious" is 97.14. The difference is still statistically very significant ($F_{(3, 14273)} = 78.0381$, $p < .00001$).

Correlation between adolescent intelligence and the value on sexual exclusivity is $r = .0572$ ($n = 7{,}657$) among women, and $r = .0849$ ($n = 6{,}756$) among men. The correlation is statistically significantly larger among men than among women ($t = 2.9774$, $n = 14{,}413$, $p < .01$).

Table 1 presents the results from the two multiple ordinal regression models predicting adult political ideology and religiosity from adolescent intelligence and a set of control variables. Column 1 shows that, net of age, sex, race, education, earnings, and religion, Add Health respondents who have higher adolescent intelligence are significantly more liberal in early adulthood than those who have lower adolescent intelligence ($b = .0158$, $p < .0001$, standardized coefficient = .2380). A comparison of standardized coefficients (an unstandardized coefficient multiplied by the standard deviation of the independent variable to capture the effect of one standard deviation increase in the independent variable on the dependent variable) shows that adolescent intelligence has a larger effect on adult political ideology than any other variable in the model except for religion (Catholicism, Protestantism, and other religion). Despite the fact that past studies show that women are more liberal than men (Lake and Breglio 1992; Shapiro and Mahajan 1986; Wirls 1986) and blacks are more liberal than whites (Kluegel and Smith 1989; Sundquist 1983), the results here show that adolescent intelligence is twice as strong an influence on adult political ideology as sex (.2380 vs. –.1260) or being black (.2380 vs. .1115).

Table 1, Column 2 shows that, net of the same control variables, adolescent intelligence has an equally significant effect on adult religiosity ($b = –.0212$, $p < .0001$, standardized coefficient = –.1821). Add Health respondents who have higher adolescent

Table 1. The Effect of Adolescent Intelligence on Evolutionarily Novel Values (Liberalism and Atheism) Add Health Data, Wave III (2001–2002)

	Liberal Political Ideology (1)	Religiosity (2)
Adolescent intelligence	.0158****	–.0121****
	(.0015)	(.0014)
	.2380	*–.1821*
Age	–.0131	–.0021
	(.0119)	(.0112)
	–.0232	*–.0037*
Sex	–.2524****	–.1822****
	(.0396)	(.0372)
	–.1260	*–.0910*
Race		
Asian	–.0184	–.1173**
	(.0463)	(.0444)
	–.0096	*–.0612*
Black	.1931****	.3463****
	(.0437)	(.0411)
	.1115	*.2000*
Native American	–.1174*	–.1292*
	(.0556)	(.0529)
	–.0551	*–.0606*
Education	.0290**	.0542****
	(.0110)	(.0104)
	.0750	*.1404*
Earnings	–.0000**	–.0000**
	(.0000)	(.0000)
	–.0640	*–.0470*
Religion		
Catholic	–.6143****	2.3695****
	(.0595)	(.0618)
	–.2655	*1.0243*
Jewish	1.1356****	1.7496****
	(.2236)	(.2150)
	.0976	*.1503*
Protestant	–1.0957****	2.9244****
	(.0688)	(.0709)
	–.3847	*1.0266*
Other	–.8246****	2.8744****
	(.0556)	(.0598)
	–.4036	*1.4070*
Threshold		
Y=1	–2.7625	–.2491
	(.3085)	(.2845)
Y=2	–.3552	1.8936
	(.3036)	(.2857)
Y=3	2.3153	4.0332
	(.3017)	(.2867)
Y=4	4.8826	—
	(.3119)	—

(continued)

Table 1. continued

	Liberal Political Ideology (1)	Religiosity (2)
χ^2 goodness of fit	39500.1374	32834.1840****
Cox and Snell pseudo R^2	.0579	.2714
Number of cases	9,952	10,673

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors. Numbers in italics are standardized coefficients (b^*s_x). *$p < .05$; **$p < .01$; ***$p < .001$; ****$p < .0001$.

intelligence are significantly less religious in early adulthood than those who have lower adolescent intelligence. Once again, despite the fact that past studies show that women are much more religious than men (Miller and Hoffmann 1995; Miller and Stark 2002), adolescent intelligence is twice as strong an influence on adult religiosity as sex (–.1821 vs. –.0910). It is remarkable that adolescent intelligence is a significant and strong determinant of adult religiosity when religion itself is controlled for (with no religion as the reference category).

Table 2 presents the results for the value on sexual exclusivity, broken down by sex. The left column shows that, net of the same control variables as before and the number of marriages, adolescent intelligence significantly increases men's value on sexual exclusivity; the more intelligent male Add Health respondents are in junior high and high school, the more value they grow to place on sexual exclusivity. In sharp contrast, the right column shows that adolescent intelligence has no significant effect on women's value on sexual exclusivity; more intelligent female Add Health respondents are no more likely to grow up to espouse a value on sexual exclusivity than their less intelligent counterparts. The comparison of standardized coefficients shows that adolescent intelligence has more than four times as strong an effect on the value for sexual exclusivity for men as it does for women (.0465 vs. .0110). This is

Table 2. The Effect of Adolescent Intelligence on Evolutionarily Novel Values (Sexual Exclusivity for Men) Add Health Data, Wave III (2001–2002)

	Sexual Exclusivity	
	Men	Women
Adolescent intelligence	.0038**	.0006
	(.0012)	(.0008)
	.0465	*.0110*
Age	.0051	–.0074
	(.0100)	(.0068)
	.0076	*–.0163*
Race		
Asian	.0492	–.0067
	(.0380)	(.0247)
	.0227	*–.0042*
Black	–.1753****	–.0610**
	(.0355)	(.0236)
	–.0862	*–.0409*
Native American	.1174**	.0140
	(.0410)	(.0340)
	.0519	*.0067*
Education	.0006	–.0031
	(.0092)	(.0061)
	.0009	*–.0078*
Earnings	–.0000	.0000
	(.0000)	(.0000)
	–.0061	*–.0044*
Religion		
Catholic	.1551***	.1468****
	(.0468)	(.0332)
	.0582	*.0822*
Jewish	–.1163	.0324
	(.2003)	(.1195)
	–.0081	*.0037*
Protestant	.2940****	.1337****
	(.0559)	(.0377)
	.0860	*.0610*
Other	.2142****	.1367****
	(.0436)	(.0308)
	.0885	*.0861*
Number of marriages	.1710***	.0245
	(.0444)	(.0262)
	.0557	*.0134*
Constant	8.9640	9.8878
	(.2539)	(.1636)
R^2	.0176	.0066
Number of cases	5,263	5,480

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors. Numbers in italics are standardized coefficients (betas). *$p < .05$; **$p < .01$; ***$p < .001$; ****$p < .0001$.

consistent with the prediction from the Hypothesis. However, the effect of adolescent intelligence on the value on sexual exclusivity is not as strong as its effects on liberalism or atheism.[3]

Because it is impossible to have a one standard deviation increase in truly dichotomous variables like sex or race (as a dummy), one may suggest that the proper comparison is between an unstandardized coefficient for the dichotomous variables (measuring the difference between men and women and that between blacks and whites) and an unstandardized coefficient for adolescent intelligence multiplied by its standard deviation (to measure the change in the dependent variable associated with one standard deviation increase in adolescent intelligence). These comparisons show that the effect of sex on liberal political ideology is comparable to that of adolescent intelligence (–.2524 vs. .2457), the effect of being black on liberal political ideology is much smaller than that of adolescent intelligence (.1931 vs. .2457), and the effect of sex on religiosity is comparable to the effect of adolescent intelligence (–.1822 vs. –.1882).

STUDY 2

Method

Data. Because Add Health is cohort data and includes only respondents in the same generation and similar age group (in their earlier twenties), the findings from them may or may not generalize to all Americans across generations. In order to ascertain whether the effect of intelligence can be generalized to all contemporary Americans in the last 30 years, I now use data from the General Social Surveys (GSS) to examine the effect of intelligence on the espousal of both evolutionarily novel values (liberalism and atheism) and evolutionarily familiar values (on children, marriage, family, and friends).

The National Opinion Research Center at the University of Chicago has administered the GSS either annually or biennially since 1972. Personal interviews are conducted with a nationally representative sample of non-institutionalized adults in the United States. The sample size is about 1,500 for each annual survey, and about 3,000 for each biennial one. The exact questions asked in the survey vary by the year. Some of the following analyses includes samples from multiple years (when the relevant questions are asked multiple times) or a sample from one year (when the relevant questions are asked only once).

Dependent variables: Evolutionarily novel values. For liberal political ideology, I use the GSS respondents' response to the following question: "We hear a lot of talk these days about liberals and conservatives. I'm going to show you a seven-point scale on which the political views that people might hold are arranged from extremely liberal—point 1 to extremely conservative—point 7. Where would you place yourself on this scale?" Their response are reverse-coded as follows: 1 = *extremely conservative*, 2 = *conservative*, 3 = *slightly conservative*, 4 = *moderate*, 5 = *slightly liberal*, 6 = *liberal*, 7 = *extremely liberal*. The GSS asks this question in every survey year since 1974.

For religiosity, I use two different questions. The first question asks: "Please look at this card and tell me which statement comes closest to expressing what you believe about God: 1. I don't believe in God; 2. I don't know whether there is a God and I don't believe there is any way to find out; 3. I don't believe in a personal God, but I do believe in a Higher Power of some kind; 4. I find myself believing in God some of the time, but not at others; 5. While I have doubts, I feel that I do believe in God; 6. I know God really exists and I have no doubts about it." The GSS asks this question in

[3] While both height (Case and Paxson 2008; Jensen and Sinha 1993) and physical attractiveness (Kanazawa and Kovar 2004) are correlated with intelligence, entering them as additional controls does not alter the substantive findings on the effect of adolescent intelligence. Physical attractiveness and height have no effect on liberalism; physical attractiveness significantly ($p < .0001$) increases, and height significantly ($p < .001$) decreases, religiosity; physical attractiveness significantly ($p < .05$) increases men's (but not women's) value on sexual exclusivity while height has no effect for either sex.

1988, 1991, 1993, 1994, 1998, and 2000. The second question asks: "Would you call yourself a strong [respondent's religion] or a not very strong [respondent's religion]?" Their responses are coded as follows: 1 = *no religion*, 2 = *somewhat strong*, 3 = *not very strong*, 4 = *strong*. The GSS asks this question in every survey year since 1974.

Dependent variables: Evolutionarily familiar values. For evolutionarily familiar values on children and marriage, I use the following question: "I'm going to read you a list of some things that different people value. Some people say these things are very important to them. Other people say they are not so important. Please tell me how important each thing is to you personally, using the response on this card. How about having children? How about being married?" Their responses are coded as follows: 1 = *not at all important*, 2 = *not too important*, 3 = *somewhat important*, 4 = *very important*, 5 = *one of the most important*. The GSS asks these questions only in 1993.

For evolutionarily familiar values on family and friends, I use the following question: "On these cards are various aspects of life. We would like to know how important each of these aspects of life is for you. On each of these cards you see on the right hand side a scale with seven points. The lowest point with number 1 indicates that this aspect of life is unimportant to you. Point 7 at the top indicates that the particular aspect of life is very important to you. The numbers in between indicate varying degrees of importance. Please take a look at all the cards first. Then, tell me for each card its letter and the number you've decided on. One's own family and children. Friends and acquaintances." The GSS asks these questions only in 1982. Because all of the dependent variables are measured on ordinal scales, I once again use ordinal regression.

Independent variable. The GSS measures the verbal intelligence of its respondents by asking them to select a synonym for a word out of five candidates. Half of the respondents in each GSS sample answer 10 of these questions, and their total score (the number of correct responses) varies from 0 to 10. I use this score as a measure of verbal intelligence, which is known to be highly correlated with general intelligence (Huang and Hauser 1998; Miner 1957; Wolfle 1980).

Control variables. In addition to intelligence, I control for the following variables: age (in years); sex (1 = male); race (1 = black); education (years of formal schooling); earnings (measured in 12 to 23 equidistant ordinal categories, here treated as continuous); religion (with four dummies for Catholic, Jewish, Protestant and other, with none as the reference category); and survey year (only for questions asked in multiple years).

In addition, for models predicting evolutionarily familiar values on marriage, children, family, and friends, I control for whether or not the respondent is currently married (1 = yes), whether or not the respondent has ever been married (1 = yes), and the total number of children.

Results

Table 3 presents the analysis of the GSS data with respect to the evolutionarily novel values of liberalism and atheism. Column 1 shows that, net of age, sex, race, education, earnings, religion, and survey year, GSS respondents who are more intelligent are significantly more liberal than those who are less intelligent ($b = .0335$, $p < .001$, standardized coefficient = .0726). Columns 2 and 3 show that, controlling for the same set of variables, more intelligent individuals have a significantly weaker belief in God ($b = -.1048$, $p < .0001$, standardized coefficient = –.2271) and significantly less intense religiosity ($b = -.0283$, $p < .01$, standardized coefficient = –.0613).[4] These results are

[4] In the model predicting religious intensity (Column 3), inclusion of all four religion dummies simultaneously results in complete separation of data, and the maximum likelihood estimates thus do not exist. This is because the reference category then is "no religion," while the lowest category of the dependent variable is also "no religion." In order to avoid complete separation, I only enter three religion dummies (Catholic, Jewish, Protestant), thus leaving the reference category "no religion and other religion."

Table 3. The Effect of Intelligence on Evolutionarily Novel Values: General Social Survey Data, 1972–2004

	Liberal Political Ideology (1)	Belief in God (2)	Religious Intensity (3)
Intelligence	.0335***	–.1048****	–.0283***
	(.0091)	(.0215)	(.0096)
	.0726	*–.2271*	*–.0613*
Age	–.0098****	.0072*	.0157****
	(.0013)	(.0030)	(.0013)
	–.1714	*.1259*	*.2745*
Sex (1=Male)	–.1994****	–.5084****	–.2644****
	(.0336)	(.0774)	(.0352)
	–.0989	*–.2522*	*–.1311*
Race (1=Black)	.5420****	.6619****	.3195****
	(.0480)	(.1360)	(.0498)
	.1867	*.2280*	*.1101*
Education	.0142*	–.0249	.0563****
	(.0070)	(.0159)	(.0073)
	.0450	*–.0789*	*.1783*
Earnings	–.0148****	.0020	–.0090*
	(.0035)	(.0073)	(.0036)
	–.0866	*.0117*	*–.0526*
Religion			
Catholic	–.7686****	2.0418****	4.5118****
	(.0589)	(.1247)	(.0750)
	–.3312	*.8798*	*1.9442*
Jewish	–.0137	.7157**	4.5643****
	(.1224)	(.2474)	(.1340)
	–.0020	*.1026*	*.6545*
Protestant	–1.0498****	2.2861****	4.6800****
	(.0548)	(.1154)	(.0718)
	–.5123	*1.1156*	*2.2838*
Other	–.4659****	1.4427****	—
	(.1056)	(.2085)	—
	–.0807	*.2500*	—
Year	–.0095****	.0187*	.0028
	(.0023)	(.0090)	(.0022)
	–.0923	*.1817*	*.0272*
Threshold			
Y=1	–23.7067	34.2737	7.5566
	(4.5650)	(17.8854)	(4.4433)
Y=2	–21.6938	35.4099	9.2032
	(4.5645)	(17.8857)	(4.4435)
Y=3	–20.7137	36.4118	11.6322
	(4.5642)	(17.8862)	(4.4439)
Y=4	–19.0873	36.7681	—
	(4.5636)	(17.8865)	—
Y=5	–18.2036	37.9383	—
	(4.5634)	(17.8872)	—
Y=6	–16.2599	—	—
	(4.5634)	—	—
χ^2 goodness of fit	77390.5215	16874.8644****	63737.5261****
Cox and Snell pseudo R^2	.0571	.1807	.3494
Number of cases	13,034	3,200	13,904

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors. Numbers in italics are standardized coefficients (b^*s_x).
*$p < .05$; **$p < .01$; ***$p < .001$; ****$p < .0001$.

identical to the results from the Add Health data in Study 1 reported above.

Table 4 presents the analysis of the GSS data with respect to the evolutionarily familiar values of children, marriage, family and friends. Columns 1 through 4 show that intelligence does not have a significant effect on any of these evolutionarily familiar values (children: $b = -.0486$, *ns*, standardized coefficient = –.1053; marriage: $b = -.0229$, *ns*, standardized coefficient = –.0469; family: $b = .0611$, *ns*, standardized coefficient = .1324; friends: $b = -.0335$, *ns*, standardized coefficient = –.0726). Now because all four questions were asked only in a single year, the sample size for all models in Table 4 are smaller than that for models in Table 3. The smaller sample size is not likely to be the main reason for the lack of significant effects, however, because other variables included in these models continue to have significant effects. For example, despite the small sample size, number of children has a highly significant ($p < .0001$) and very large (standardized coefficient = .5829), if very predictable, positive effect on the value of children. Less predictably, more educated individuals place a significantly ($p < .05$) and moderately (standardized coefficient = .2423) greater value on children, and older individuals place a significantly ($p < .01$) and moderately (standardized coefficient = –.3532) smaller value on them.

WHAT DOES IT MEAN TO BE A LIBERAL IN THE CONTEMPORARY UNITED STATES?

The results presented in Tables 1 and 3 indicate that more intelligent individuals are more likely to identify themselves as liberal as opposed to conservative. But what does such self-identification mean? Is it consistent with the operational definition of liberalism used in this paper? How are self-identified liberals different from self-identified conservatives? The GSS data can shed some light on these questions.

Self-identified liberals in the GSS samples are significantly more likely to agree with the statements "It is the responsibility of the government to reduce the differences in income between people with high incomes and those with low incomes" ($r = .208$, $p < .00001$, $n = 9{,}306$), and with the statement "The government in Washington ought to reduce the income differences between the rich and the poor, perhaps by raising the taxes of wealthy families or by giving income assistance to the poor" and less likely to agree with the statement "The government should not concern itself with reducing this income difference between the rich and the poor" ($r = .217$, $p < .00001$, $n = 12{,}122$).

However, even though more intelligent GSS respondents are more likely to identify themselves as liberals (Table 3, Column 1), they are actually *less* likely to agree with the statement "It is the responsibility of the government…" ($r = -.236$, $p < .00001$, $n = 5{,}849$) or the statement "The government in Washington ought to reduce…" ($r = -.167$, $p < .00001$, $n = 5{,}814$). Net of the same demographic controls as in Table 3 (age, sex, race, education, earnings, religion, and survey year), intelligence is significantly *negatively* associated with agreement with the first statement ($b = -.147$, $p < .00001$) or the second statement ($b = -.067$, $p < .00001$) in multiple ordinal regression equations.

In this paper, however, I provisionally define liberalism as the genuine concern for the welfare of genetically unrelated others and the willingness to contribute larger proportions of private resources for the welfare of such others. There is some evidence in the GSS data that self-identified liberals indeed espouse these values. Reflecting their genuine concern for the welfare of genetically unrelated others, nonblack liberal GSS respondents are significantly more likely to agree with the statement "Blacks have been discriminated against for so long that the government has a special obligation to help improve their living standards" and less likely to agree with the statement "The government should not be giving special treatment to blacks" ($r = .209$, $p < .00001$, $n = 19{,}290$). Reflecting their willingness to contribute larger proportions of private resources

Table 4. The Effect of Intelligence on Evolutionarily Familiar Values: General Social Survey Data, 1972–2004

	Children (1)	Marriage (2)	Family (3)	Friends (4)
Intelligence	–.0486	–.0229	.0611	–.0335
	(.0419)	(.0417)	(.0563)	(.0308)
	–.1053	*–.0469*	*.1324*	*–.0726*
Age	–.0202**	.0041	–.0175	.0187****
	(.0066)	(.0066)	(.0090)	(.0049)
	–.3532	*.0717*	*–.3060*	*.3270*
Sex (1=Male)	–.4279**	.2724	–.5934**	–.0222
	(.1491)	(.1481)	(.2259)	(.1203)
	–.2122	*.1351*	*–.2943*	*–.0110*
Race (1=Black)	–.4836*	.0696	.2256	–.4491****
	(.2440)	(.2426)	(.2492)	(.1328)
	–.1666	*.0240*	*.0777*	*–.1547*
Education	.0765*	.0228	–.0307	–.0468
	(.0316)	(.0313)	(.0471)	(.0248)
	.2423	*.0722*	*–.0972*	*–.1482*
Earnings	.0026	–.0162	.0288	–.0244
	(.0142)	(.0141)	(.0245)	(.0134)
	.0152	*–.0947*	*.1684*	*–.1427*
Religion				
Catholic	.7397**	.4360	1.1443**	.3560
	(.2583)	(.2578)	(.3488)	(.2201)
	.3187	*.1879*	*.4931*	*.1534*
Jewish	1.1874*	.5651	1.4268	.8562
	(.5280)	(.5197)	(1.0875)	(.4731)
	.1703	*.0810*	*.2046*	*.1228*
Protestant	.7384**	.7155**	.7174*	.4433*
	(.2341)	(.2349)	(.2928)	(.2036)
	.3603	*.3492*	*.3501*	*.2163*
Other	.3176	.2922	.8132	.5311
	(.4836)	(.4853)	(.8806)	(.5232)
	.0550	*.0506*	*.1409*	*.0920*
Currently married	.5324**	2.1984****	.1620	–.3187*
	(.1901)	(.2037)	(.3117)	(.1422)
	.2646	*1.0924*	*.0805*	*–.1584*
Ever married	.6497**	–.0574	1.3718****	–.2517
	(.2517)	(.2490)	(.3435)	(.1868)
	.2565	*–.0227*	*.5416*	*–.0994*
Number of children	.3215****	–.0550	.1302	–.0881*
	(.0591)	(.0570)	(.0844)	(.0365)
	.5829	*–.0997*	*.2361*	*–.1597*
Threshold				
Y=1	–.8876	–.9053	–3.2897	–6.2999
	(.5058)	(.5066)	(.7093)	(.6301)
Y=2	.0126	.6433	–3.0873	–4.6761
	(.5012)	(.5007)	(.7004)	(.4444)
Y=3	1.2256	1.9560	–2.6374	–3.4213
	(.5037)	(.5064)	(.6861)	(.4027)
Y=4	3.1364	3.8336	–2.3133	–2.1552
	(.5143)	(.5203)	(.6791)	(.3893)

(continued)

Table 4. continued

	Children (1)	Marriage (2)	Family (3)	Friends (4)
Y=5	—	—	–1.6922	–1.0349
	—	—	(.6712)	(.3849)
Y=6	—	—	–.9300	.0546
	—	—	(.6674)	(.3836)
χ^2 goodness of fit	2733.6806	2712.0050	6586.0304	6911.0090
Cox and Snell pseudo R^2	.1835	.2719	.0749	.0545
Number of cases	683	683	1,125	1,126

Note: Main entries are unstandardized regression coefficients. Numbers in parentheses are standard errors. Numbers in italics are standardized coefficients (b^*s_x).
$^*p < .05$; $^{**}p < .01$; $^{***}p < .001$; $^{****}p < .0001$.

for the welfare of such others, liberals of all races are significantly more likely to state that the amount of federal income tax that they pay is too low, rather than too high or about right ($r = .048$, $p < .00001$, $n = 25{,}174$).

Consistent with the prediction derived from the Savanna-IQ Interaction Hypothesis, more intelligent nonblack GSS respondents are more likely to agree that the government has a special obligation to help blacks ($r = .060$, $p < .00001$, $n = 8{,}610$) and more intelligent GSS respondents of all races are more likely to state that the amount of their federal income tax is too low ($r = .039$, $p < .0001$, $n = 12{,}463$). Net of the same control variables, intelligence among nonblack respondents is significantly positively associated with agreement with the statement that the government has a special obligation to help blacks ($b = .054$, $p < .001$), and intelligence is significantly positively associated with the likelihood that the GSS respondents of all races state that their federal income tax is too low ($b = .052$, $p < .001$).

It therefore appears that, while they are opposed to government-imposed income transfers from the rich to the poor, more intelligent individuals are more liberal in the sense that they exhibit genuine concern for the welfare of genetically unrelated others (nonblacks' concern for the welfare of blacks), and that they are willing to contribute larger proportions of private resources for the welfare of such others (in the forms of higher federal income tax). It is also instructive to note that two recent studies, conducted in another nation (the United Kingdom), using valid measures of general intelligence, and entirely different indicators of liberalness (nontraditional social attitudes and voting for the Green Party or the Liberal Democratic Party), reach the same conclusion that childhood intelligence increases adult liberal attitudes (Deary et al. 2008a, b).

CONCLUSION

The Savanna-IQ Interaction Hypothesis, derived from the logical conjunction of the Savanna Principle and a theory of the evolution of general intelligence, suggests that more intelligent individuals may be more likely to acquire and espouse evolutionarily novel values, such as liberalism, atheism, and, for men, sexual exclusivity, than less intelligent individuals, while general intelligence may have no effect on the acquisition and espousal of evolutionarily familiar values. Data from two large representative samples, the National Longitudinal Study of Adolescent Health and the General Social Surveys, support the predictions (although some of the standardized coefficients, while highly statistically significant, are relatively small in size). Both adolescent and adult intelligence predict adult espousal of liberalism, atheism, and sexual exclusivity for men (but not for women), while intelligence is not associated with the adult espousal of evolutionarily familiar values on children, marriage, family, and friends.

Given the high heritability of intelligence (Jensen 1998:169-202), and the moderate heritability of political attitudes (Alford et al. 2005; Eaves and Eysenck 1974) and religiosity (Bouchard et al. 1999; Koenig et al. 2005), one alternative explanation for the effect of adolescent intelligence on adult political ideology and religiosity is the genetic transmission of all three traits. Intelligent parents beget intelligent children; liberal parents beget liberal children; religious parents beget religious children.

Such behavior genetic explanations, while undoubtedly true, cannot explain the origin of covariance between general intelligence and certain values. Why do intelligent parents tend simultaneously to be liberal and atheist, to pass on their genetic tendencies toward liberalism and atheism to their intelligent children? Why are there not an equal (or greater) number of intelligent parents who are conservative and/or religious, to pass on their conservative and religious tendencies to their intelligent children? Why are there not many less intelligent parents who are liberal and atheist? Further, behavior genetics cannot explain why the value on sexual exclusivity (if heritable) is transmitted only to sons but not to daughters. The Savanna-IQ Interaction Hypothesis can offer one possible explanation for the coexistence of general intelligence and certain values.

Another alternative hypothesis is that more intelligent individuals are more likely not necessarily to acquire and espouse evolutionarily novel values, as the Hypothesis predicts, but not to conform to others in the society (Millet and Dewitte 2007). It may be adaptive for the survival of humans to adopt the rule "The less intelligent you are relative to those around you, the more you should mimic their beliefs and actions." Because the majority, under most reasonable conditions, is always mathematically more likely to be correct than the average individual (as the Condorcet Jury Theorem holds), such a decision rule may save the lives of individuals of less than average intelligence.

It is a bit difficult to separate this alternative hypothesis from the prediction of the Savanna-IQ Interaction Hypothesis because many of the current beliefs in our society, derived as they are from evolved human nature, are evolutionarily familiar. However, the alternative hypothesis should lead to the prediction that, because contemporary American society is predominantly monogamous, more intelligent individuals should prefer polygyny. As the results presented above show, however, this is not the case; more intelligent men are more likely to prefer monogamy and sexual exclusivity. Further, both in the relatively more conservative capitalist United States and in the relatively more liberal socialist United Kingdom, more intelligent individuals are more likely to be liberal than less intelligent individuals (Deary et al. 2008a, b). So it appears that it is not the predominant values of society that affect the values of more or less intelligent individuals, but their evolutionary novelty.

While it may be reasonable to posit that liberalism, atheism, and sexual exclusivity for men may be evolutionarily novel values, they are far from the only ones. For example, while the contemporary American definition of left-wing liberalism may be the polar opposite of genetic self-interestedness, nepotism, reciprocal altruism, and ethnocentrism of our ancestors, there are other political values that deviate from them, such as communism, monarchism, and libertarianism, to name just a few. Future research would have to examine whether more intelligent individuals are also more likely to adopt these evolutionarily novel political ideologies.

What other values are evolutionarily novel? Another such value is vegetarianism. Humans are naturally omnivorous, and anyone who eschewed animal protein and ate only vegetables in the ancestral environment, in the face of food scarcity and precariousness of its supply, was not likely to have survived long and stayed healthy enough to have become our ancestors. Vegetarianism would therefore be an evolutionarily novel value, and the Hypothesis would predict more intelligent individuals are more likely to choose to be a vegetarian than less intelligent individuals.

Consistent with this prediction, Gale et al. (2007) find in their analysis of the 1970 British Cohort Study that, net of sex, social class, and education, childhood intelligence at age 10 significantly increases the probability that individuals become vegetarian as adults at age 30. In the Add Health Data, adolescent intelligence (in junior high and high school) significantly ($p < .05$) increases the likelihood of vegetarianism in early adulthood, net of age, sex, race, education, and earnings. However, once I control for religion, the effect of adolescent intelligence becomes only marginally significant ($p < .07$). (Results available upon request.)

The current work must be extended into several directions in the future. First, the Hypothesis must be tested against other competing theories of the origin of values and preferences. Second, future empirical work must consider other evolutionarily novel and familiar values besides the ones considered and tested in this paper. For example, in addition to vegetarianism referred to above, the Hypothesis would predict that more intelligent individuals are more likely to espouse such other evolutionarily novel values as pacifism (for men), feminism, or environmentalism. Third, future empirical work must be carried out with samples from nations other than the United States, such as Gale et al.'s (2007) paper discussed above, which uses a large British sample to test the effect of childhood intelligence on the acquisition of vegetarianism.

The origin of values and preferences remains a very important theoretical puzzle for social and behavioral sciences, and the Savanna-IQ Interaction Hypothesis, at the intersection of evolutionary psychology and intelligence research, provides one deductive explanation from theoretical first principles for why individuals have certain values and preferences. By explaining how general intelligence may interact with the evolutionary constraints of the human brain, the Hypothesis can account for the effect of intelligence on the acquisition and espousal of evolutionarily novel values. Because the list of such evolutionarily novel values is potentially very long, the Hypothesis promises to provide a theoretical explanation for why intelligent individuals acquire preferences and values in many different domains of life.

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