

Genes, Games, and Political Participation

James H. Fowler^{1,2}, Peter J. Loewen³, Jaime Settle², and Christopher T. Dawes²

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Groups often ask their members to contribute to collective activities. But the benefits of these activities often do not offset the costs of individual participation. Everyone in the group may be better off if everyone cooperates, but each person individually may be better off not cooperating. As a result, we might expect cooperation to fail. Yet modern human society relies on cooperation at a level unseen anywhere else in the animal world (e.g. Stevens and Hauser 2004). We have organized complex systems of government and social assistance, and we regularly join together in smaller acts of cooperation, whether in community groups, sports teams, or explicitly political organizations. We almost constantly engage in commercial activities that require trust in complete strangers (Henrich et al. 2001). All of this adds up to societies that are unrivalled in size and peacefulness (Pinker 2007). But how did we come to cooperate on such a massive scale? Or at all?

It may seem strange to focus on such an abstract question in a book on politics, but the puzzle of cooperation is very closely related to two of our most important questions in political science: 1)

¹ Department of Medical Genetics, University of California, San Diego.

² Department of Political Science, University of California, San Diego.

³ Department of Political Science, University of Toronto.

How do we organize ourselves to do more than we could on our own? and 2) How do we distribute the fruits of our collective labor? In this chapter we argue that the answers to these questions can be better understood by considering models of early cooperation in pre-modern times. As we show, the emergence of cooperation relied on a population with different types of people, some of whom were inclined towards taking up costly action for the benefit of others. We also review the use of laboratory experiments from behavioral economics to show that differences between individuals can explain variation in large-scale cooperative acts like voting and other forms of political participation that take place in modern times. And finally, we explore the root of these different types of behavior. Although much of our political behavior is learned and influenced by the environment, we are quickly coming to realize that fundamental differences in participation and political ideology reach deep into our biology, in some cases all the way to our DNA.

1. The Origins of Cooperation

In his 2006 *Science* review, the prominent evolutionary game theorist Martin Nowak declared: “From hunter-gatherer societies to nation-states, cooperation is the decisive organizing principle of human society” (p.1560). However, it remains a mystery how cooperation has evolved given that natural selection generally favors selfish acts because they enhance an individual’s ability to survive and reproduce. Cooperation results in the provision of a good that all members of a dyad, group, or society can enjoy regardless of whether they themselves contributed to the good’s provision. Those who cooperate pay a cost for doing so, usually denoted by c , and all members of group enjoy the benefit of the so called public good that is provided, denoted by b . Those who do not cooperate still receive the good: they get b but do not pay the cost, c . As long as $c > 0$, those that do not cooperate are at an advantage because they have a higher average

fitness than cooperators. Eventually, cooperators should be driven out of the population completely, either because they die off or copy the more successful strategy of non-cooperation. Even though cooperators will not survive under these conditions, a population of all cooperators produces the highest average fitness while the one with all non-cooperators produces the lowest (Nowak 2006 , Smirnov and Johnson, this volume).

Hence the puzzle: if cooperators should be driven to extinction by natural selection, why do we consistently observe cooperation across a wide variety of historical and societal settings? In other words, what explains the evolution of cooperation, especially on a level unmatched in the animal world (Proctor and Brosnan, this volume)? While this question remains largely unanswered, several mechanisms have been proposed that allow cooperation to evolve, such as kin selection, direct reciprocity, and indirect reciprocity.

Kin selection simply states that natural selection favors cooperation among genetic relatives (Hamilton 1964) because by helping a genetic relative, an individual's genes will be passed along to the next generation indirectly. However, many interactions in which we observe cooperation are between unrelated individuals. Kin selection is accordingly limited in its explanatory power.

Direct reciprocity is based on the assumption that there are repeated interactions between individuals so that the decision to cooperate with an individual in the present period can be conditioned on his or her behavior in past interactions (Trivers 1971). In this scenario, the cost of cooperating in the present period is outweighed by the long-run benefits (Axelrod and

Hamilton 1981). In public goods games administered in a laboratory setting, individuals playing the game repeatedly with the same group members tend to make larger contributions (Gächter and Herrmann 2009). The shortcoming of the theory of direct reciprocity is that many interactions, especially in modern society, are with individuals we have never interacted with before and likely will not interact with in the future. Therefore, it is not possible to condition cooperation on directly observed past actions.

Indirect reciprocity overcomes this problem by assuming interactions are observed by a subset of the group that then informs all other members of the group. Like the direct reciprocity scenario, natural selection favors the use of reputation as a tool to decide whether or not to cooperate with others (Nowak and Sigmund 2005). Experimental evidence is also consistent with this theoretical argument (Gächter and Herrmann 2009).

Cooperation can be achieved under direct and indirect reciprocity because cooperators are able to withdraw cooperation based on direct experience or avoid cooperating with non-cooperators by learning their reputation from others. Therefore, non-cooperators are no longer at a fitness advantage. Withholding cooperation is straightforward in a dyadic setting; however, in a group where access to a public good cannot be restricted, it is more problematic. An alternative is to directly punish non-cooperators who free ride. The logic is that while non-cooperators gain the benefit of the public good without paying the cost, sanctions imposed by other members of the group serve to offset the fitness advantage of free riding. It is important to highlight that this mechanism is not based on reputation or repeated interaction. Laboratory experiments confirm that *some* individuals are willing to use their own money, thus making themselves worse off, in

order to punish non-cooperators (Fehr and Gächter 2002; for a detailed review see Gächter and Herrmann 2009) and this result holds in large-scale and small-scale societies around the world (Henrich et al. 2005).

The fact that some people are willing to punish and others are not highlights an important feature of mathematical models of cooperation. Many evolutionary models help to explain the origin of cooperation and punishment, but they predict that *everyone* in the population will eventually engage in the same behavior (e.g. Fowler 2005). Contrast this prediction with the real world: sometimes people cooperate and sometimes they do not. While this might just be a stochastic outcome or could be due to unobserved differences in benefits and costs, recent evidence suggests that cooperative behavior is stable over time and across different experimental contexts (Johnson et al. 2009). In other words, people who cooperate in one context are likely to do so in another, and the same is true for those who do not cooperate. In fact, not only is individual cooperative behavior stable, but recent studies by Wallace et al. (2007) and Cesarini et al. (2008, 2009) suggest that some of the stability in behavior may result from differences in genotypes. Thus, more recent evolutionary models have sought to elaborate equilibria that yield mixed populations, like Hauert et al.'s (2007) recent generalization of the Fowler (2005) model to finite populations. In that model, a mix of cooperators, noncooperators, punishers, and “loners” (people who forgo both the costs and benefits of group activities) survives, and although cooperators and punishers are usually the most prevalent, there is variety in the population and the dominant type tends to cycle from one to another over time.

2. The Connection to Real Politics

The problem of cooperation, and how it is maintained, is nearly identical to the problem of collective action (Ostrom 1998). In large-scale societies, why do people join political groups, participate in elections, and engage in other kinds of mass behavior when they know their individual effort will not alter the political outcome? An emerging body of work addresses this paradox of participation by exploring whether modern populations are divided into different types of people, some of whom are motivated to cooperate and some of whom are not.

The decision to participate in politics is the most studied behavior in political science. Why do we vote? What makes us attend a rally or protest? How do we decide how much to contribute to a like-minded organization? The main focus of the literature on participation over the last 50 years has been the “paradox of turnout” (Downs 1959, Blais 2000). This paradox has, in the analogy of one author, consumed whole theories of political action, particularly those that rely on a conception of individuals as monolithically self-interested (Grofman 1993). While other classes of explanation exist, the most pertinent assume that individuals are preoccupied by the costs and benefits of voting. These approaches are not the only ones we have on hand (see Blais 2000 for a review), but they are foundational and do act as the starting point for most analyses of political participation.

The decision to vote is very similar to the decision to cooperate discussed in the previous section. The benefits of one party or another winning an election are shared over whole groups of people irrespective of their participation, but the costs of voting are borne by a smaller number of people. What is more, the marginal benefits that one person receives are often outweighed by the costs of voting, especially in the short term. Despite this, we witness large amounts of voting

and other forms of political participation. Could it be that this participation paradox is similarly solved by a population endowed with different types of actors, especially some who consistently contribute to cooperative acts (Weber and Murnighan 2008)? A review of recent literature suggests that this might be the case.

Habitual Turnout

Participation in elections is neither universal nor uniform. Some people never vote, while others cast ballots only occasionally. Many voters miss elections only with great exception. Thus, voting can be thought of as *habitual*. This claim has received broad empirical support, both in the United States (Gerber, Green, and Shachar 2003; Green and Shachar 2000; Miller and Shanks 1996; Plutzer 2002; Verba and Nie 1972) and internationally (Franklin 2002, Denny and Doyle 2009). But what is the theoretical reason for such an observed regularity?

Two recent formal theoretical accounts (Bendor et al. 2003, Fowler 2006) rely on voters who have different *underlying propensities* to participate in elections. These models assume that voters begin their political lives with different likelihoods of voting in elections, and then update these propensities in response to electoral outcomes. Although Bendor et al.'s (2003) model generates reasonably high turnout, the people who vote come from a large group of "casual voters" who essentially flip a coin at each election, voting in some and not in others. Fowler (2006) shows evidence from the American National Election Study and the South Bend Election Study that contradicts this result. In fact, most people either habitually vote or habitually abstain.

Fowler's model generates all the properties of the Bendor et al. (2003) model, but it also generates an empirically realistic distribution of voting propensities, helping to show how such "always vote" and "always abstain" types could emerge from an adaptive process. Thus, turnout may be driven not by some thoughtful deliberative process, but from the expression of a trait that some people have and others do not. Similarly, Weber and Murnighan (2008) show that "consistent contributors" play an important role in spurring other kinds of collective action, suggesting that variation in behavioral types may be critical for cooperation more broadly conceived.

Patience and Turnout

Election outcomes often matter for a great number of citizens. Depending on which party wins, voters can expect to have their taxes increased or decreased, can expect social programs to change, and can more generally expect to receive benefits if their party wins. But whatever benefits citizens can gain, they cannot reasonably expect them to be delivered quickly. Meanwhile, the costs of voting are immediate. Thus, the decision to vote may depend on a voter's level of patience, which varies substantially from one person to another (Funder and Block 1989, Funder, Block, and Block 1983).

In a laboratory experiment, Fowler and Kam (2006) elicited the degree to which subjects were willing to forgo a payment in one time period for a larger payment in a later time period. Those who were more willing to wait could be understood as being more patient. They then showed that more patient individuals were more likely to vote, confirming the proposition that more patient individuals are more likely to participate in elections.

This connection between patience and turnout is supportive of our general claim, because patience does not exist uniformly in a population. Instead, individuals vary in their patience; and, these differences in patience emerge at very young ages. As Fowler and Kam note, children as young as four years old have shown variance in willingness to delay immediate gratification, and these differences correlate with their dispositions as measured later in life. What is more, these differences explain a variety of other behaviors, including “drug addiction, educational attainment, savings and investment, and gambling (p. 116).” By conceiving of a population of types in which some individuals are inclined to be patient and others are not, we can further understand a fundamental act of cooperation such as voting.

Social Preferences and Political Participation

Recent studies also suggest that we can better understand political participation by relaxing a canonical assumption that individuals are self-interested and unconcerned with benefits for others. Theoretical work (Edlin et al. 2007, Jankowski 2007) demonstrates that we can explain high levels of participation by assuming that the utility of some voters is increased when other voters benefit from an election outcome. Recent empirical work has tested these propositions by measuring the "social preferences" of individuals, and showing that those with certain types of social preferences are more likely to participate in politics. Fowler (2006) used a dictator game to reveal pure altruistic social preferences among subjects. He then showed that those who held these preferences and identified with a political party were more likely to vote in elections. Altruism, then, did not have a direct effect on voting, but it did motivate those who believed that one party was better suited to govern than another *and* who revealed concern for others.

Moreover, these effects were independent of a standard schedule of control variables, such as political knowledge and interest.

Fowler and Kam (2007) then expanded this work by considering two types of altruism, a general altruism and social identification. The first is a concern for all individuals, while the second is a differentiated concern for some partisans over others. These preferences were measured in a unique dictator game design. They also considered political participation beyond merely voting. Their findings suggested that both altruism and social identification directly explain political participation, again independently of a standard array of control variables.

Loewen (2010) also explored the importance of social preferences in voting. Using a large online sample, he demonstrated that voters with a greater difference in their concern for different partisans groups were more likely to vote in Canadian elections. Moreover, he showed that this effect increases as the size of partisan groups increases. But contrary to Fowler (2006) and Fowler and Kam (2007), he found no role for general altruism. Instead, what was important was the antipathy and affinity individuals felt for different groups.

Finally, Dawes, Loewen, and Fowler (2009) explored the influence of different types of social preferences on political participation. Rather than measuring general altruism or social identities, they used a dictator game designed by Andreoni and Miller (2002) to reveal whether subjects were "Rawlsian" or "Utilitarian" in their social preferences. Rawlsian individuals are concerned with equalizing resources among individuals, while Utilitarians are interested in maximizing the total resources among individuals. Because politics is principally about maximizing total welfare

and is rarely about increasing the lot of the worst off, those with Utilitarian preferences should be more likely to participate in politics than Rawlsian individuals, who should be no more likely than selfish subjects. Dawes et al. (2009) show that this is exactly the case among their experimental subjects.

Taken together, the preceding four studies suggest that we can better explain participation in politics by taking account of individuals' social preferences and not just their self-interest. Moreover, by conceiving of the population as divided into types, we can understand how different motivations draw individuals into political participation. However, for these arguments to lend support to our claim that politics reflects our more ancient inheritances, then we need to demonstrate a heritable origin to these differences.

3. Origins

What are the origins of social preferences? Is there a deeply set, genetic basis to the types of individuals we have discussed thus far? In short, we argue yes. We have a growing body of literature in political science and economics demonstrating that nature and nurture play a joint role in shaping how people behave in the political realm. Moreover, the evidence is not limited to just participation, but also a broad range of attitudes and dispositions that influence how people engage in politics and decide whether to contribute to group outcomes.

Building on techniques developed by behavioral geneticists during the past 30 years, social scientists have begun to test phenotypes of interest related to political behaviors and attitudes, as well as the underlying values and orientations that support them. Many of the pioneering papers

in this sub-discipline use data collected by behavioral geneticists who had the foresight to anticipate that many social behaviors, including explicitly political ones, likely had a heritable component and could be associated with specific genetic variants. The patterns and relationships found thus far are just the beginning of the potential inquiry; the extent of what has already been found indicates significant promise for understanding more about the biological foundations of political behavior.

Evidence from Twin and Extended Family Design Studies

The extension of the twin study approach to political phenotypes is conceptually similar to the use of the methodology in studies that examine phenotypes, such as substance abuse or personality constructs, that are more typically studied using behavioral genetics (BG) techniques (see Eaves et al, this volume). As with other BG subfields, methodologists suggest that any series of work examining biological influences on political behavior begin with the classical twin design and its variants (Medland and Hatemi 2009). While this approach does not demonstrate the extent to which specific genes or other predictors affect the population mean of a trait, it is useful in demonstrating that individual differences in the trait are genetically influenced before proceeding to a search for specific genes that may be involved.

The underlying foundation of twin studies is rooted in biometric theory and uses structural equation modeling of the observed covariance between monozygotic and dizygotic twins to evaluate the contribution of latent genetic and environmental influences on the trait of interest (Medland and Hatemi 2009). Estimates for the parameters of these latent factors are then

assessed for goodness of fit, often using maximum-likelihood criterion, though other approaches can be employed. Extended family designs build on the basic twin study but incorporate knowledge about the genetic relationships with other family members to provide additional leverage in analysis. There are some challenges to the application of these methods to political phenotypes, such as self-report bias and the error induced by measurement, but they are analogous to those faced by scholars who attempt to measure any other complex phenotypes, like personality, attitudes, or addiction.

Twin study analysis has been conducted on a variety of political phenotypes, including participation, partisanship, ideology, and issue opinions. Although many of the large twin and family registries include some data on social and behavior traits, the original focus of these studies was directed toward medical and psychological traits. Consequently, the questions asked on extant surveys are often basic and do not always reflect the most contemporary knowledge of survey response methodology. Yet despite the relative scarcity of data on social behaviors, several important findings have been uncovered.

Using a sample of twins from the Southern California Twin Registry, Fowler, Baker, and Dawes (2008) show that greater than 50% of the variation in turnout behavior can be attributed to additive genetic effects, which we can think of as the sum of the effects of several different genes, rather than the effects of their interactions. This estimate is significantly different than zero in their analysis. In the same article, the finding was replicated in the National Longitudinal Study of Adolescent Health (Add Health). The Add Health sample also includes a battery of questions about other political behaviors, and genetic effects account for 60% of the

variance in an index of political participation that includes joining an organization, running for office, donating to a campaign, and attending a rally or march.

Genetic influences on the decision to vote appear to be more direct than influences on other political behavior. For example, there is a modest genetic influence on vote choice in a sample of Australians, when the vote was dichotomized between Labor and Conservative, but the genetic influence in vote choice is explained not by a unique genetic contribution to voting preference but rather by shared genetic influences in sociodemographic factors and political attitudes (Hatemi et al. 2007).

The heritability findings extend to partisanship as well, another frequently studied political behavior. While there is no evidence to suggest that the choice of political party with which one affiliates is heritable, there is evidence that the strength with which one attaches to a political party does have a genetic component. Two independent studies have confirmed that partisanship strength is approximately 60% heritable (Settle et al. 2009, Hatemi et al. 2009a). This pattern of findings—a genetic basis for the strength of a behavior but not its direction—appears analogous to the findings about religious affiliation and religiosity. The denomination of the church one attends is mostly a product of the environment in which one was raised, but the extent to which a person is religious, as defined by church attendance and prayer, does have a heritable component (Koenig et al. 2005). There are important findings, as they suggest that behaviors with more apparent evolutionary analogues, such as participation, appear more heritable than those with less obvious analogues, such as for whom to vote or with which party to identify.

There is even more evidence suggesting that political attitudes have a heritable component and there is little doubt that the way people think about politics and political issues is influenced by their genes. The first piece published on this topic, and one that initiated much of the interest in this field, is that of Alford, Funk and Hibbing (2005) who show that ideology is heritable, as measured by a battery of politically-related questions from the Wilson-Patterson Attitude Inventory.

In addition to a measure of ideology constructed from several attitude questions, individual political attitudes appear to be heritable. Hatemi and colleagues have taken the lead in showing that political beliefs have a heritable component that can be analyzed using both twin studies and the extended family design (Hatemi et al. 2007). This team has explored the contribution of genes and the environment at various stages of the life course, finding that while there are no genetic influences on political attitudes prior to adulthood, when political attitudes stabilize in the early 20s, there is a substantial genetic influence (Hatemi et al. 2009a). Additionally, there appear to be significant gender differences in whether attitudes toward social and political items have a genetic origin, and different genes may contribute to the difference in attitudes between men and women (Hatemi, Medland and Eaves 2009).

One set of attitudes has been given particular attention, that of attitudes toward homosexuality and gay rights. Two studies, published in the same edition of *Behavior Genetics*, have confirmed a significant role for a genetic basis of homophobic attitudes, reinforced by the strong assortative mating on characteristics that are associated with attitudes toward homosexuality and gay rights. Both studies evaluate a subsample of the Australian Twin Registry that took a survey on sexual

behavior and attitudes. In the twin study, while additive genetic factors account for 36% of the variance, the shared environmental estimate may be subsumed by the extra additive genetic variance arising from assortative mating on homophobic attitudes (Verweij et al. 2008). In other words, much of the apparent effect of parental socialization is actually due to the fact that individuals with similar views on homosexuality are more likely to couple and then pass on their views by way of their genes, rather than their parenting. The second study used a more extended design and found estimates of 50-70% heritability of the individual survey items (Eaves and Hatemi 2008).

The Underpinnings of Political Behavior: Heritability and Economic Games

The collected body of evidence from the twin and extended family designs leave little doubt that there is a significant role for heritability in explaining political attitudes and behaviors. However, one of the first responses to this literature (Charney 2008) questioned what exactly was heritable about these political outcomes. What specific values and orientations were underlying the propensity to participate or to support liberal social positions? In this vein, scholars turned toward examining whether the preferences that underlie much of our theory about political behavior were also heritable. Significant evidence has been marshaled to support the conjecture that in addition to the political actions themselves, the economics and social preferences and values that guide political action are heritable, as well.

In a twist on a classic behavioral economics game, a group of scholars tested members of the Swedish Twin Registry and found that greater than 40% of the variance in behavior of the ultimatum responder in the Ultimatum game could be attributed to heritable factors (Wallace et

al. 2007). This is important because responder behavior reveals preferences for punishing other people who have behaved in an unfair way. Using the same sample and moving beyond previous work that simply calculated the intergenerational correspondence between behavior in public goods, risk and giving games, Cesarini and colleagues determine that 20% of the variance of behavior in two games measuring economic preferences is heritable (Cesarini et al. 2009). The finding on risk taking was replicated using a small study of Chinese students (Zhong et al 2009). The dictator game result in particular suggests that genetic variation could play a role in explaining voter turnout via altruism. Finally, these findings extend to the classic trust game, designed to gauge interpersonal trust as measured by one's willingness to invest and reciprocate investment (Cesarini et al. 2008). In both the US and Sweden, independent twin samples show that cooperative behavior in this game is significantly heritable.

Evidence in support of the idea that there is a genetic basis for cooperation and punishment for unfair behavior greatly bolsters the theoretical case for the underpinnings of more complicated political behaviors. As noted in Zhong et al. (2008), economists can derive and test better models of individual decision-making, a fundamental component of the field, with an improved understanding of the genetic, and consequently neurobiological, basis of attitudes toward risk, cooperation, and punishment.

The Evidence from Gene Association Studies

Heritability suggests that there is a genetic basis for many political orientations; genetic association studies take us one step further in identifying the specific gene variants and environmental exposures that help to shape behavior and attitudes.

There has been more mixed success in explaining the way that genes and the environment interact to influence behavior. Some scholars in the behavioral genetics community advocate the approach because it is a better approximation of reality. Yet others argue that the approach is akin to “finding a needle in a haystack” given the universe of potential genetic variants and environmental exposures. Despite these challenges, several important relationships, including mediated and moderated relationships, have been found between particular genetic variants and political behaviors. These relationships include those that are direct, where those with the gene in question have a significantly different propensity to exhibit a behaviour; mediated, where the effect of some environmental factor is dependent on the presence or absence of the gene; and moderated, where a gene changes the magnitude of the effect of some environmental factor.

While the application of gene association is in its relative infancy, it has already influenced our understanding of political participation. The first study to be published using a genetic association approach demonstrated a role for two genes associated with voter turnout. Using data from the Add Health study, a polymorphism of the MAOA gene was found to increase the likelihood of voting directly, while a variant of the 5HTT gene interacted with the respondent’s self-reported religious attendance to increase voter turnout (Fowler and Dawes 2008). Indeed, once the effect of church attendance was conditioned on the gene variant, there was no main (or direct) effect for church attendance, as attendance only predicted greater turnout among those with a particular variant of 5HTT. This finding is of particular note, as it reshapes our understanding of one of the most important predictors of participation. The relationship between religious observance and political participation has been long noted. However, it has been

assumed that this represents a wholly environmental or developmental influence on the decision to participate in politics. What this finding suggests is that this environmental influence is also dependent on an individual's genes.

In addition to political participation, other polymorphisms have been found to matter for partisanship, another aspect of politics long attributed to environment. Using the same Add Health data, Dawes and Fowler (2009) found that individuals with the A1 allele of the DRD2 gene are more likely to identify as partisans, and that this relationship mediates an association between the A1 allele and voter turnout.

Gene association studies have also probed political ideology and uncovered an interesting relationship between a genetic factor (the 7R allele of DRD4) and an environmental factor (the number of friendships a respondent names in adolescence). The study finds that the number of friends an individual has in adolescence moderates the effect of the 7R allele of DRD4 on political ideology. For those with the allele, it appears that an increased number of friendships is associated with a more politically liberal ideology as a young adult (Settle et al. 2008). This again reconditions our understanding of something previously understood to be purely environmental.

Other studies probe the micro-level connections between genes and behavior. For example, economists have also examined gene associations. One team finds that the DRD4-R7 allele is associated with financial risk-taking in men, consistent with what is known in the behavioral genetics literature about this allele and a propensity toward novelty-seeking and risky behavior in

general (Dreber et al. 2009). A second group of scholars have employed association techniques in the experimental dictator game, finding that a vasopressin receptor promoter region is associated with the allocation of funds in the game (Knafo et al. 2008).

Further evidence to make the case between specific alleles and environmental exposures is a pursuit that will require a significant investment of time and resources. These approaches require large samples, and the strength of the relationship must be able to meet the rigorous statistical standards of the BG community that have been developed to avoid producing false positive results. Replication is a must.

Yet, we have reason to believe that we will continue to describe increasingly more variance in behavior as we refine our understanding of the relationship between foundational orientations and preferences and the more complicated political behaviors we seek to explore. Just as we have evidence of heritability, we now have evidence of direct, mediated, and moderated links between genes and political behavior.

4. Implications and Conclusion

We live in complex world, and one which does not at first resemble the one in which we evolved. As Kuklinski and Quirk (2000) observe, our mental equipment evolved in a world where our crucial tasks did not resemble those of today. What is more, this older world has been the norm for the vast majority of human existence. The consequence is that “the entire period of agricultural and industrial civilization, about one percent of human history, has been too short to produce further biological adaptation” (162). This was a world with no media, no cities, and no

elections. It was one that greatly resembled that of other primates (Proctor and Brosnan, this volume). However, the point of this is not that our politics insufficiently resembles our evolutionary past such that we cannot understand it through this lens. Instead, the implication is that humans are limited by the capacities and constraints we have inherited, whether physiological (Smith and Hibbing, McDermott, Apicella and Cesarini, this volume), cognitive (Schreiber, this volume), or genetic (Boardman, this volume). Given these limitations, we should pay particular attention to understanding how modern institutions interact with these limitations to produce the political outcomes we see in today's world.

Voter participation provides a great example of this point. Modern political science has expended great effort in understanding how individual characteristics and institutional arrangements increase or decrease voter turnout. The underlying assumption has been that explaining why some people vote and others do not requires no more information than this. However, even the most sophisticated analyses explain less than a third of the variation in voter turnout (Plutzer 2002). As we have shown, models that take account of fundamental differences between individuals – whether through basic preferences and personality types or through genotypes – can add important information.

As a field, political science is open for the further application of insights from biology, behavioral genetics, neuroscience, and psychology. Indeed, because human action is central to politics, political scientists should feel compelled to pay increasing attention to the factors that constrain human behavior. In the last fifty years, our understanding of politics has been greatly improved by understanding how institutions constrain the choices and actions of actors. It is time

that we also recognize how humans are constrained internally. Genes are the institution of the human body. Whether we wish to understand voter participation, public opinion, participation in war, or the behavior of legislators, we should take seriously these other types of constraints.

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