

Ten Misconceptions Concerning Neurobiology and Politics

John R. Hibbing

Political science is far behind the other social science disciplines in incorporating neurobiological concepts, techniques, and theory. In recent years progress has been made in closing this gap but many in the political science mainstream view the movement with concern or even horror. Though a healthy dose of skepticism is appropriate and beneficial to the scientific endeavor, negative reactions to viewing politics through a neurobiological lens are often based on fundamental misconceptions regarding both neurobiology and politics. In this Reflections essay, I address ten of these misconceptions, including the beliefs that biology is deterministic, reductionist, unnecessary, irrelevant, normatively dangerous, and ideologically biased. The goal is to encourage a constructive dialogue on the relevance of neurobiology to political life—a dialogue that would in turn improve research in the fledgling subfield and lead to innovations in political science by encouraging new ways of conceptualizing and analyzing the variables at the discipline's core.

In the last decade, the discipline of political science has begun taking neurobiology (hereafter, shortened to biology) more seriously. From one perspective, the shift has been dramatic. Stephen Engelmann writes of a “sociobiological wave in the discipline,” including “a flurry of publications . . . in the national association's main journals.¹ Former editor of the *American Political Science Review* Lee Sigelman remarked that one of the early articles in this wave “set a new standard for political science in terms of the media attention and public discussion it has provoked.” He even wondered “whether it will emerge among the most important articles the *APSR* has ever published.”² In considering the potential impact of the movement, Evan Charney goes further, asserting that if the

claims of this new wave are true, “it would require nothing less than a revision of our understanding of all of human history, much—if not most—of political science, sociology, anthropology, and psychology as well as, perhaps, our understanding of what it means to be human.”³

From the perspective of those working in this area, these assessments seem overstated. Interest in biology and politics is indeed high but it emanates from curiosity as much as appreciation. Efforts to get the larger discipline to incorporate biological techniques have been only minimally successful and many traditional scholars view the movement as counterproductive and possibly dangerous. I have heard from dozens of graduate students and junior faculty around the country who are eager to pursue biologically-informed research projects but who have been told by older scholars that they should not spend time on such efforts.

A fair summary of the current situation is that the movement to integrate biology with empirical political science has made significant strides of late, with additional political scientists joining every year, but continues to encounter stiff resistance. Much of this resistance is not only perfectly appropriate but welcome. The scientific process demands scrutiny, criticism, and replication. Skeptical eyes and second looks are essential, particularly when the research in question is perceived as something of a paradigm shift. In the case of biology and politics, however, the resistance often springs from basic misconceptions regarding the movement, its techniques and findings, and even the nature of biology itself. Accordingly, I am delighted to have this opportunity to address several of these misconceptions.

John R. Hibbing is the Foundation Regents Professor of Political Science and Psychology at the University of Nebraska–Lincoln where, along with Kevin B. Smith, he co-directs the Political Physiology Lab (unl.edu/polphyslab). This essay relies heavily on insights provided by (and research conducted with) numerous co-authors but especially Kevin B. Smith of the University of Nebraska–Lincoln and John R. Alford of Rice University. Those projects, as well as preparation of this essay, were supported by the Human and Social Dynamics Program of the National Science Foundation (BCS-08-26828). The author acknowledges with gratitude the valuable comments on an earlier draft of this essay by his recent students, participants in the Political Behavior Reading Group at the University of Nebraska–Lincoln, Matthew V. Hibbing, Kevin B. Smith, reviewers, and editor Jeff Isaac.

doi:10.1017/S1537592713000923

© American Political Science Association 2013

June 2013 | Vol. 11/No. 2 475

Selection of the specific misconceptions to address is rendered more difficult by the absence of broad published critiques. Questions have been raised in print about particular biological techniques such as those involving genetics⁴ or neuroscience,⁵ but not about the overall enterprise. Reservations are out there: we hear them at conferences and lectures and we read them in blog posts and anonymous reviews but they are not typically in forums that lend themselves to scholarly exchange. Thus, I cannot be certain that the misconceptions I address here are those most on the minds of critics. I have not intended to cherry-pick only those misconceptions that are easily rebuttable but if I have neglected to address an obvious concern it is likely that those asked to respond will point this out to me. That is the advantage of this format and I hope my essay is viewed not as an attempt to alleviate concerns with this style of research but rather as the beginning of a printed conversation that could help to separate valid critiques from those that are based on misconceptions.

Misconception #1: Biology Is Genetics

For better or worse, several of the more visible early articles in the recent movement, including the one referenced by Sigelman, investigated a possible role for genetics in shaping political orientations.⁶ Perhaps this is why many observers are left with the impression that biology and politics deals only with the degree to which political orientations are innate.

In actuality, biologically-based research is not a synonym for genetics-based research, as the following three examples illustrate. First, research on sexual orientation suggests that the likelihood of males being gay increases slightly for each non-adoptive older brother they have. Speculation is that pregnancy with a male fetus activates certain immune-related chemicals in the mother that then affect the development of subsequent male fetuses carried in that same womb.⁷ Second, most monozygotic (MZ; sometimes called identical) twins develop in the same chorion (outer birth sac) but some develop in separate chorions. Though mono-chorionic MZ twins are no more similar genetically than di-chorionic MZ twins, they grow up to be more alike with regard to a variety of traits, suggesting an in-utero influence on those traits.⁸ Finally, brain imaging research indicates that the posterior hippocampus (a part of the brain known to be involved with memory and navigation) of a typical London taxi driver is denser and has more volume than the hippocampus of a matched non-taxi-driver and, controlling for age, is densest among those who have been driving London taxis the longest.⁹ Note that none of these examples has anything to do with genetics yet each is heavily biological. Prenatal environment is almost entirely about biology and the London taxi driver research finds anatomical differences as a result of the environment, not genetics. The nature versus

nurture debate is assumed by many political scientists to be at the core of the biology and politics movement but it is not even a debate among biologists because they are much more accustomed to integrating genetic, non-genetic biological (such as early development), and environmental factors.¹⁰ Understanding the extent to which predispositions become biologically instantiated, regardless of their original source, is the main goal of our lab and of many students of biology and politics.

A popular area of study in sociology and other disciplines involves identifying biomarkers such as endocrine levels, autonomic nervous system engagement, and brain activation patterns that correlate with important social variables. No a priori assumption is made that these biomarkers are genetically derived. Indeed, researchers in this area realize that the next steps are to sort out the causal direction (does poverty elevate cortisol levels or do individuals with chronically high cortisol levels often end up in poverty?) and to identify possible interaction effects (does poverty have an especially deleterious effect on individuals with high cortisol levels?). Still, establishing a correlational relationship between biology and social behaviors is the necessary place to begin, in sociology as well as political science. Evidence suggests that biologically instantiated attitudes are different from those that are not in that they are held more firmly and require different strategies if they are to be changed.¹¹ All this will be missed should political scientists continue to ignore the degree to which orientations have demonstrable biological signatures. In sum, students of biology and politics are pursuing a variety of important topics quite apart from the extent to which political views are innate or socialized; genetic or environmental.

Misconception #2: Biology Is Deterministic

Relationships of interest to social scientists are often weak. For example, the political attitudes of parents only modestly correlate with the political attitudes of their 18-year-old children. Jennings and Niemi report correlations of .07 for views on business issues, .35 on prayer in schools, .13 on tolerance, .18 on political trust, and .11 on interest in politics, meaning that at best parents' orientations "account for" 12 percent (.35 x .35) of the variation in the political opinions of their offspring.¹² Similarly, socioeconomic status (SES) is related to political views, but only weakly. Even though high SES is typically found to be positively associated with "conservative" political beliefs, many low SES individuals adopt right-of-center political stances and Warren Buffett is a registered Democrat and strong advocate of a more redistributive tax code. These sorts of low correlations and exceptions rarely lead people to the conclusion that parents and socioeconomic status are totally irrelevant to political orientations. In considering traditional variables like these, scholars and laypeople

alike are willing to accept that the social world is extraordinarily complicated and that uncovering modest tendencies is informative and probably the most for which social scientists can hope.

Yet, when biological variables are suggested as a possible explanatory factor, people suddenly seem less willing to tolerate low correlations and inevitable exceptions. One of the consistent findings of emerging research is that people who report themselves to be sensitive to disgusting concepts such as eating monkey meat or sleeping in a bed in which someone recently died are more likely to oppose homosexual rights and, more generally, to classify themselves as politically conservative.¹³ Whenever I describe these findings in a lecture, at least one person in the audience will say, “that can’t be right: I am a liberal and a supporter of rights for homosexuals but am very bothered by disgusting concepts and objects.” The truth of the matter, of course, is that the finding can be “right” even though the protesting individual does not fit the pattern. We all know of smokers who live to be 90 and African-Americans who are politically conservative but these cases do not call into question the health risks of tobacco use or the liberal inclinations of African-Americans as a group. The same willingness to accept the existence of tendencies despite countervailing examples should apply to relationships involving biology. Skeptics seem to believe that for biology to be politically relevant it must explain everything and that, since it does not, its role must be negligible or even fictitious.

A major reason for the application of unrealistic standards to relationships between biology and politics may be misconceptions regarding the nature of genetics. Non-geneticists, including reporters and many practicing political scientists, often believe that variation in a given gene is dichotomous (a person either has “the gene” or does not) and that each gene serves only one purpose. Neither belief is true.

When activated, genes create proteins that then play a part in necessary bodily functions. For example, neurotransmitters allow cellular communication within the nervous system and proteins serve as neurotransmitters, as transporters of neurotransmitters, as receptors of neurotransmitters, and as enzymes that help to activate the genes that produce neurotransmitters, transporters, or receptors. Alterations in any of these functions may affect the quality of neuronal communication and therefore socio-political behavior. But nature is a notorious double-dipper and any given neurotransmitter will be involved in all kinds of activities. Dopamine, for example, has been connected to risk taking and “acting out” behaviors but also to muscle control and Parkinson’s disease. A gene related to a certain class of dopamine receptors, say DRD4, therefore, even if it is found to correlate with political orientation, is not “a gene for liberalism” but rather is a gene for a certain class of dopamine receptors that may

have relevance to a variety of downstream behaviors including muscle movement, personality tendencies, and perhaps politics.¹⁴

On its own, neither DRD4 nor any other gene could do anything. Genes are collections of chemicals that remain inert absent the introduction of additional chemicals (usually generated by an environmental event) that are necessary to start the process of converting genes to proteins. Moreover, even when the needed environmental stimulus is present, all sorts of other genes must interact with the target gene in order for it to be expressed and even when it is expressed it will not have an effect without the presence of the necessary substrates and transporters. This intricate dance is why, with only a limited number of exceptions (such as Huntington’s Disease), variation in the chemical composition of any given gene is likely to account for only a small portion of the variance in a phenotypic trait—regardless of whether this trait is a physical characteristic, a mental aptitude, or a social tendency. To cite a well-known illustration, despite height being extremely heritable, no single gene is responsible for more than a few percent of the variation in height.

For all their contributions, Mendel’s experiments on peas may have performed something of a disservice. The traits Mendel identified were each the product of a single gene and were essentially dichotomous. Many people still seem to view genes in this fashion; a single gene is responsible for a particular trait and the presence of a particular genetic variant translates directly into one phenotype, its absence, to another. In reality, genes do not come in just two flavors and each gene typically influences numerous traits. The traits of interest to social scientists certainly are neither single gene nor dichotomous. One famous example of a gene with more than two versions occurs in a flanking region of *avpr1a*, a gene affecting vasopressin receptors (*avpr1a*). When this region is very long (because of multiple nucleotide repeats) vasopressin receptors tend to be more plentiful (in voles and most likely in humans) and offspring and mate-tending behaviors are enhanced; when the region is of moderate length, vasopressin receptors and offspring-tending behaviors increase only modestly; and when the region is short, vasopressin receptors are few and offspring-tending rare.¹⁵

Additional variation is introduced by epigenetic factors. Besides the DNA itself, nearby chemical compounds, such as methyl and histone groups, affect gene expression. These compounds are partially heritable but heavily influenced by the environment.¹⁶ They can make it marginally or substantially (or some level in between) more difficult for genes to produce proteins. Finally, all traits of interest to social scientists are quite sensitive to the environment. Much interest in genetics these days surrounds gene by environment (GxE) interactions and this situation is likely to continue.¹⁷ Genes interact with each other, with epigenetic factors, and with the

environment in wonderfully complex fashions to shape who we are mentally, emotionally, behaviorally, and physically.

This digression into genetics was necessary because the more people know about genetics the less unrealistic the connection between genetics and political orientation appears. It is understandable that those whose genetic knowledge begins and ends with peas would be suspicious of a possible role for genetics in human political behavior. In Mendel's world, a single, dichotomous, impervious-to-the-environment gene yielded either green peas or yellow peas. Transferred to politics, this Mendelian perspective would mean that a single, dichotomous gene yields either liberals or conservatives regardless of the environment. But, as I have indicated, contemporary genetics is not Mendelian and the genetics relevant to the social sciences is complex, multi-gene, continuous, and interactive. In sum, no geneticists, behavioral or otherwise, are genetic determinists because being a genetic determinist requires misunderstanding the manner in which genes work. The determinism critique does, however, raise an interesting question. If students of biology and politics are labeled biological determinists because they add biological explanatory variables to environmental explanatory variables, are those who include only environmental variables in their models guilty of environmental determinism?

Misconception #3: Biology Is Reductionist

Besides determinism, another “-ism” frequently employed to describe biology and politics is reductionism. This term is actually used in two different ways. In the first, students of biology and politics are alleged to oversimplify causal structures. Similar to Misconception #2, the charge is that adherents of the biology and politics movement draw a direct line from biology to politics and call it a day. This is not the case and, in fact, I would like to suggest that political scientists who do not incorporate biology are the more “reductionist” in this sense of the term. If biology is set totally aside, the discipline finds itself back in Skinnerian behaviorism. Environmental stimuli in the form of anticipated rewards and punishments shape behavior and that is the end of the story. It is difficult to imagine anything more reductionist than theory built solely on environmental explanatory variables. The organism engaging in the behavior of interest becomes irrelevant because all that matters is the environment.

Of course, most political scientists are not pure behaviorists in the Skinnerian mold. They recognize long-term differences across people that are likely to lead to individual variation in response to specific immediate stimuli. These standing differences have been variously called “antecedent conditions,” “long-term predispositions,” or “ingrained habits.”¹⁸ A recent study notes that when it comes to politics, “you’ve either got it or you don’t.”¹⁹

Despite this acknowledgment, political scientists have been reticent to investigate the nature and source of these long-term influences, typically noting that such analyses are “beyond the scope” of their studies or assuming that they result entirely from socioeconomic factors.²⁰

This is where the study of biology holds great potential since it can help to identify the cognitive and physiological signatures of political predispositions. As such, biology and politics is more enriching than reductionist; it is not content to take a pass on understanding the mechanics of political orientations but rather seeks to explicate the richness of attitude formation. The requisite tools exist to investigate the nature and composition of the long-term predispositions that political scientists acknowledge to be so important.

In pursuing such issues, however, students of biology and politics are sometimes pronounced guilty of committing the other version of reductionism: the desire to move all explanations back a step and then another step and then another, through psychology, into biology, then chemistry, all the way to the universal laws of physics. What would be accomplished, the critics ask, by looking at ever more antecedent and distal variables?

It should be noted that scientists find this a strange critique. When I have described this version of reductionism to them, biologists’ response is often “. . . and that is a bad thing?” To many in the scientific community, defining and investigating sub-problems and ever more distal explanations is what scientific investigation is all about and they see no need to apologize for it. Indeed, they wonder what the alternative is. All empirical science—social or otherwise—constitutes an effort to enhance understanding by finding relationships and explanations that push farther away from the event of interest. Some critics’ apparent dissatisfaction with the biology and politics movement may actually be with the nature of the scientific process itself.

Moreover, the slippery slope argument—that if biology is incorporated into the social sciences today, physics must follow tomorrow—misunderstands the purpose and direction of the biology and politics movement. The primary research questions of biologists deal with variation: Why do some organisms get sick and some not, or why do some organisms respond to environmental stimuli differently than others? The movement addressed in this essay is biology and politics, not physics and politics, and many in the movement (certainly those in the research group with which I am connected) are interested in explaining variation across real people, not in reducing the human condition to a set of mechanical laws. Accordingly, we spend little time pondering the role of physics in accounting for variations in political participation or ideology. Ironically, some observers accuse biology and politics research of not being reductionist enough. Engelmann’s central critique of my recent work follows these

lines, arguing that its central flaw is a failure to be driven by a one-size-fits-all theory of human nature.²¹ Is biology and politics reductionist or not reductionist enough? It cannot be both, yet both charges are leveled.

The “reductionist” criticism of the biology and politics movement often is traceable to the belief that human life is so intricate, wonderful, emergent, and rich that efforts to break it down into biological components are hopeless and trivialize the human condition. Those subscribing to this belief do not accept that who we are is confined to a couple of pounds of carbon-based neurons, support cells, and organs resting on top of our necks, and that free-will, self-awareness, consciousness, and metaphysics are biological at root. They may be correct in this belief but the issue needs to be resolved with empirical evidence and not wishful thinking. The fact that so many scholars and laypeople alike believe a non-biological component of the human conditions legitimates and dignifies our species only enhances the need for the biology and politics research agenda. Broader recognition of the role of gritty biological realities could inject much-needed humility into the self-perceptions of homo sapiens. In any event, efforts to understand human biological and social life should not be abandoned—or labeled reductionist—merely because the conclusions reached have the potential to be humbling.

Misconception #4: It Is Useless to Peer Inside the Body

One of the most frequent retorts I hear is that the tools being employed by students of biology and politics, from brain imaging to candidate gene association studies and from physiological tests to endocrinological assays, are a waste of time. Peering inside the body or, as it is dismissively called, the “black box,” is not necessary and does not provide any information beyond that permitted by traditional social science techniques such as survey research. As I was reading a letter of recommendation for a recent job applicant, I happened upon the following comment from a leading political scientist: “It is not clear that biology imposes that many constraints on social behavior.” This claim is startling in its sweeping implications. It calls into question not just the nascent biology and politics movement but a significant portion of what is done in the fields of cognitive psychology and neuroeconomics, not to mention biology.

Do critics really believe that biological differences are irrelevant to the manner in which each of us behaves in social environments? If so, they must agree with actor Tom Cruise that post-partum depression is not related in any fashion to the massive hormonal changes accompanying childbirth. If so, they must believe that sexual orientation is entirely environmental. If so, they must believe that drugs such as Adderall (that perform the quite biological function of adjusting neurotransmitter systems) are incapable of treating ADHD and other disorders.²² If so,

they must never have seen someone’s social behavior change as a result of alcohol or recreational drug usage, coffee consumption, or the biological changes resulting from sleep deprivation. No two humans have exactly the same neurotransmitter systems. Since it is undeniable that artificially manipulating these systems affects social behavior, what is the basis for claiming that naturally-occurring variation does not affect social behavior? Each of us is a distinct biological organism and, as much as some might wish to the contrary, these distinctions are relevant to all facets of behavior. What are the grounds for believing politics will end up being the only feature of all life on the planet that is unrelated to biology?

Perhaps the primary reason for incorporating biological measures into research on politics is that many of the forces shaping orientations, political and otherwise, do not reach the level of conscious awareness. Empirical political scientists currently rely heavily on survey self-reports. The basic approach is to ask people to describe their reactions, moods, perceptions, and thoughts. The problem with this approach—and I should add that I use survey self-reports extensively in my own research—is that people simply are not aware of a significant portion of their general emotional states or of their full responses to stimuli.

Particularly when higher-order decisions such as morality and politics are involved, people often believe their decisions and orientations to be the result of conscious, rational reflection. Extraneous, sub-threshold factors might be conceded to affect trivial decisions, such as which brand of a product to buy, but the suggestion that these factors are relevant to morality and politics is resisted. Nonetheless, the evidence clearly shows that politics and morality are not confined to conscious, rational thought. People sitting in a messy, malodorous room tend to make harsher moral judgments than those who are in neutral rooms, and disgusting ambient odors increase expressed dislike of gays.²³ Sitting on a hard, uncomfortable chair leads people to be less flexible in their opinions than if they are seated on a soft, comfortable chair.²⁴ People reminded of physical cleansing, perhaps by being placed near a hand sanitizer, are more likely to render harsher moral judgments than those who were not given such a reminder.²⁵ People even can be made to change their moral judgments as a result of hypnotic suggestion.²⁶

Politics is no different. People whose polling place happens to be a church are more likely to vote for right-of-center candidates and ballot measures than are those whose polling place is a public school.²⁷ People in Italy who believed themselves to be neutral on an upcoming referendum on the expansion of a nearby US military base but who in an Implicit Association Test were quicker to associate images of American GIs with negative concepts were more likely to vote against the referendum than were those who also said they were undecided but did not display this

implicit bias.²⁸ In other words, in certain situations it is possible to know people's voting behavior before they do.

Milton Lodge and his colleagues demonstrate the importance of hot cognition or automaticity in political judgments.²⁹ They show that political stimuli often produce extremely quick emotional reactions that then affect more deliberate cognitive processes such as memory recall, attention, and information processing. In other words, rapid, pre-conscious responses color the manner in which people reflect and ultimately act on political matters. People tend to think their reflections are dispassionate and conscious, but they have in fact been heavily influenced by forces operating outside of conscious thought, a concept that receives further development in the important work of psychologist John Jost on motivated social reasoning.³⁰ Survey self-reports, as valuable as they are, are unable to measure that which has not entered conscious awareness.

Biological measures can help. For example, in research done in our lab, we used a standard disgust sensitivity survey battery to measure respondents' self-reported disgust sensitivity.³¹ Later, we recorded changes in respondents' electrodermal activity (EDA, sometimes called skin conductance) when they were shown disgusting images on the computer screen. We found that self-reported disgust sensitivity was not related to physiological responses to disgusting images but that both measures related independently to particular political attitudes, especially attitudes toward gay marriage.³² In another study, while they were attached to equipment that allowed us to record several physiological responses (most notably, EDA), we showed people a picture of Barack Obama. Later, we showed respondents the image again and asked them to self-report how the image made them feel. We then used the self-report and the physiological response generated by the image to explain variations in people's job approval of Barack Obama and found that each variable independently predicted job approval.³³

The message of these empirical studies is that survey self-reports are important. Their effects do not evaporate when physiological readings capable of tapping sub-threshold responses are included so, apparently, people's conscious perceptions of their states and responses are important. Perhaps more surprisingly, even when these conscious reports are controlled, physiological responses of which people are not aware also make a substantively and statistically significant contribution to explaining political attitudes. These results, along with the remarkably inaccurate testimony of eye witnesses in criminal cases, illustrate the danger of relying exclusively on self-reports.³⁴

Misconception #5: Political Culture Is Too Idiosyncratic to Succumb to Biology

A common belief among some political scientists is that issues and cultures are so different from country to coun-

try that generalizations regarding the factors shaping attitudes are impossible. This belief is perfectly understandable as variation across time and across cultures in the political issues that are central and salient, as well as in the preferred means for dealing with these issues, is substantial. Greece's financial crisis beginning in 2010 temporarily diverted attention from its long-simmering conflict with Turkey over Cyprus. The decision of a private Danish citizen to publish a cartoon depicting the prophet Mohamed temporarily thrust relations with the Islamic world to the forefront in Denmark. Two-thirds of residents of the United States support the death penalty compared to only 40 percent of the people in France. Conservatives in the United States were isolationists in the years preceding World War II but were interventionists in the years after. A liberal in Australia advocates limited governmental intervention in the economy but a liberal in the United States supports activist economic policies. In light of quirks and irregularities such as these, how could biology (or any other broad force) be useful in understanding the variables that concern political scientists?

These idiosyncrasies, however, exist against the backdrop of bedrock dilemmas of politics—basic issues that must be resolved in any political system—and it is at the level of bedrock dilemmas and not issues-of-the-day that commonality can be glimpsed amidst cultural variations. A complete list of these bedrock dilemmas is yet to be compiled but a good start has been made. Social units are never completely isolated from other social units, never enjoy unlimited resources, and never are in 100 percent agreement on appropriate approaches to life. Thus, all social units need to decide how to structure leadership arrangements, distribute resources, secure protection from out-groups, punish misbehavior of in-group members, and orient members to traditional or to new societal arrangements. These and other bedrock dilemmas of mass society are suggested in the literature.³⁵ Whether the United States should join the Allies to battle fascism in Europe is an issue-of-the-day; protecting society from out-group threats is a bedrock dilemma of politics. Whether convicted murderers should be put to death by lethal injection is an issue-of-the-day; handling norm violators is a bedrock dilemma of politics. Whether to repeal the Bush era tax cuts for millionaires is an issue-of-the-day; distributing societal resources is a bedrock dilemma of politics.

The value of analyzing the biology-politics connection depends on the type of question being posed. By way of apologizing for a particularly vituperative set of reviews, one journal editor wrote to me, "you know, the reason they don't like your approach is that they are convinced it is going to put them out of a job." If this is true, the worry is misplaced. Some topics will benefit from biological techniques but many others are best seen as culturally elaborated. If interest is limited to issues-of-the-day, broad

biologically-informed constructs are of less use; if, however, interest is at the level of bedrock dilemmas, the potential value increases. Biological approaches are not useful in explaining why individuals deeply concerned with the security of the United States advocated isolationism in 1935 and interventionism in 1955 (for this we need to turn to research on framing) but biological approaches are useful in explaining that certain people are more biologically and cognitively sensitive to threats and that these individuals, on average, will be more likely to support whatever policies they believe will best promote national security.³⁶ From this perspective, it does not matter that the label applied to people who are particularly desirous of security (or the preferred means of enhancing security) might be different across space and time since the potential interface with biology comes well before the labels of the day. A “national security” argument will be more persuasive to some people than to others and biology can help to explain this variation.

Research on the connection of political views to personality traits, psychological tendencies, personal values, moral foundations, and patterns of perception, attention, and cognition shows remarkable consistency across cultures.³⁷ As biological variables begin to be tested in multiple countries, it is likely they will parallel these results. Even though far fewer French than Americans support the death penalty, a hypothesis derived from biology and politics is that, whether in France or the United States, those who support harsher treatment for norm violators will tend to share similar physiological and cognitive traits. Just as people have deeper predispositions associated with their personality traits, sexual orientation, risk propensity, and exchange behavior, they also have deeper predispositions associated with their preferences for the proper resolution of bedrock political dilemmas.

Rather than debate whether each political culture should be treated *sui generis* or lumped together with all other cultures for the purpose of making broad generalizations, the approach we are highlighting has the potential to identify the elements of politics that are unique as well as those that are pan-cultural. Concluding *a priori* that there can be no cross-polity commonality because so many cultural differences are apparent is as much a mistake as assuming that all politics is of a piece.

Misconception #6: The Study of Biology and Politics Has a Conservative Bias

Many liberals (in the American sense of the word) seem bothered by the application of broad, sometimes biological approaches to behavioral traits. They are sensitive to the implications of the fact that people have different characteristics. If such differences have a biological basis, they may not be readily amenable to the societally-constructed fixes favored by liberals. Many liberals are

particularly concerned that acknowledging the relevance of biology to individual behavioral differences will legitimize the role of biology in explaining mean differences across ethnic, racial, and gender groups. In a variety of cultural contexts, liberals have been demonstrated to be more concerned than conservatives with equality,³⁸ and to believe more strongly in the perfectibility of the human condition,³⁹ so it is not surprising that they would possess these sensitivities. Some liberals even point out that Hitler and the Nazis believed in biologically-based behavioral differences.

For several reasons, these concerns are misplaced. First, if it were widely accepted that behaviors and orientations, attitudes and aptitudes, were based in part in biology, can we be sure that the treatment of those who are different would change for the worse? The primary area in which debate over the role of biology in shaping behavior has reached public consciousness is sexual orientation, and it is revealing that in this debate it is liberals who often champion the position that behavior is biologically based. Those opposing expanding homosexual rights are more likely to believe that sexual orientation is the product of environmental forces, often going so far as to believe it possible to retrain gays and lesbians by sending them to boot camps specializing in heterosexual conditioning. Liberals, for the most part, are repulsed by such ideas and typically believe that biology and maybe even genetics has much to do with making some people gay and some straight. Setting aside the intellectual acrobatics necessary to conclude that sexual orientation is biologically based but all other orientations are not, do liberals believe that recognizing the behavioral relevance of biology makes people more tolerant when the topic is homosexuality but less tolerant when the topic is any other behavior? In point of fact, just as acknowledging a role for biology in sexual orientations promotes tolerance, so does acknowledging a role for biology in political orientations. Those who are looking for a reason to be intolerant will certainly jump on biological evidence if it is available to them but, as the case of sexual orientation indicates, their intolerance will persist and may well intensify if the cause of difference is believed to be environmental.

Ironically, if the role of biology were openly acknowledged, the biggest increase in tolerance could come in the area of differences across groups. Genetically and otherwise, evidence reveals surprisingly large biological differences from person to person within geographical and ethnic groups.⁴⁰ Baseline differences in EDA and in endocrine levels (such as the stress hormone cortisol) are marked.⁴¹ It appears that individual-level biological differences dwarf mean biological differences from group to group. If people can get past their knee-jerk reaction to the existence of behaviorally-relevant biological differences, they would soon see that the existence of these individual-level differences actually makes it more difficult to emphasize

the differences between one group and another. The greater the degree of biological variation within groups, the more difficult it becomes to stereotype groups. Some liberals paint themselves into a corner by thinking that in order to minimize group differences they must deny the existence of individual-level differences. This position should be rethought both because it is wrong and because those who deny the existence of any behaviorally-relevant biological differences are fast becoming this era's equivalent of the flat earth society.

Indeed, refusal to acknowledge the full range of individual-level behaviorally-relevant biological differences perpetuates damaging dichotomous distinctions. For example, it is often alleged that variation exists only when something has gone really wrong biologically, resulting in an individual who is "abnormal" or "can't tell right from wrong." Those not falling into the "deficient" categories are assumed to be biologically and cognitively identical. In truth, an awareness that every person has distinct, behaviorally relevant biological differences removes the stigma typically applied to those who are labeled "abnormal" and instead leads to the (distinctly liberal) conclusion that there is no "normal."

Regarding liberals' desire to believe in the malleability and perfectibility of the human condition, recall that many biological traits are indeed changeable. Innate genetics constitutes only one portion of our biological identities. Behaviorally-relevant biological characteristics (such as an intensely held political attitude) can be altered by persistent environmental manipulations, such as propaganda, but it will take more time than if the characteristic is not biologically instantiated. Behaviorally-relevant biological traits are sticky and in this sense constitute an individual-level parallel of societal institutions. Political scientists certainly recognize that institutions, for all their inertia, can and do change. Well, the same is true of biologically-influenced behavioral tendencies. The belief that studying biology restricts analysis to traits that are unchangeable is a misconception.

Finally, the assumption that liberals are more likely than conservatives to deny the relevance of biology and even genetics to behavioral traits appears to be inaccurate. In an intriguing study, Elizabeth Suhay and Toby Jayaratne begin with the standard hypothesis that liberals will be less likely than conservatives to subscribe to the belief that genetic variables are relevant to behavior but find just the opposite.⁴² Whether the behavior of interest is sexual orientation or mental aptitudes, liberals are more likely than conservatives to see the relevance of biology to human behavior. Thus, the indignity frequently displayed by liberal academics when the possibility of behaviorally-relevant biological differences is raised does not seem to be shared by rank-and-file liberals. My hunch is that, down deep, liberal academics do not really believe biology is irrelevant either.

Misconception #7: The Study of Biology and Politics Has a Liberal Bias

Many conservatives (in the American sense of the word) seem bothered by the application of broad, sometimes biological, approaches to behavioral traits. They seem especially sensitive to the possibility that the results will indicate that conservatives are deficient. In one respect, they have a right to be worried. Previous efforts to understand the traits and characteristics of various ideologies have not been kind to conservatives. Long ago, McCloskey concluded that conservatism is characteristic of "social isolates, of people who think poorly of themselves, who suffer personal disgruntlement and frustration, who are submissive, timid and wanting in confidence, who lack a clear sense of direction and purpose, who are uncertain about their values, and who are generally bewildered by the alarming task of having to thread their way through a society which seems to them too complex to fathom."⁴³ Fifty years later, the message was not much different: Block and Block report that "conservatives are easily victimized, easily offended, indecisive, fearful, rigid, inhibited, relatively over-controlled, and vulnerable."⁴⁴ Statements such as these, combined with the predominantly liberal tilt of academe, understandably put conservatives on guard. The media do not help: The headline of a London newspaper's story on a study done by our lab was "Scientists Call Conservatives Chicken," when in fact the research merely showed that conservatives are more physiologically responsive to certain negative stimuli.

The prevailing notion of many conservatives and some liberals seems to be that the only motivation for research on the deeper basis of political differences must be to affirm the political beliefs of the researchers or, more likely, to demean the political beliefs of others. This assumption renders research in this area particularly likely to be labeled "junk science," the definition of which seems to be any scientific study containing findings disliked by the person proffering that designation. People differ in an amazing variety of ways and many of these differences correlate with variations in political attitudes, orientations, and involvement. Is it possible to discuss these differences without casting aspersions, or being thought to cast aspersions, on one ideological group or another? Yes, but the people doing the research must be more careful and the people consuming the research must be less suspicious.

Consider two findings our lab has published on the cognitive differences of liberals and conservatives. The first employed a standard gaze-cueing paradigm in which participants are asked to hit the keyboard space bar as soon as they see a black dot on the screen. Before the black dot appears, however, a face comes on the screen with eyes looking one way or another. The extent to which the participant is "cued" by the gazes of others can be measured by noting the difference in response time when the eyes

are looking away from rather than toward the place where the black dot eventually makes its appearance. Even though participants are told that the face and eyes have nothing to do with where the dot will appear, self-professed liberals are more affected by gaze cues than are conservatives.⁴⁵ In the second study we provided evidence that, when a collage of images is presented on the computer screen and eye tracking technology is used to record the specific parts of the collage at which participants tend to look, conservatives spend more time than liberals attending to the negative images (wrecked cars, messy toilets, houses on fire, etc.) than to the positive images (beach balls, sunsets, happy people, etc.).⁴⁶

Are these findings demeaning to conservatives? It would be possible to spin them that way. To wit: “Conservatives are oblivious and insensitive to the people around them, apparently unaffected by the most basic social cues. Moreover, they fixate on the negative aspects of life, obsessing over threats and dangers when they could be appreciating beauty and joy. They are emotionally distant pessimists.” But the door swings both ways and these same findings could be employed to conclude that “liberals are lemmings and Pollyannas. They mindlessly follow the lead of others, even when doing so is misleading. Further, they naively ignore obvious dangers in order to indulge their hedonistic tendencies. Liberals just don’t get it.”

In truth, none of these cognitive patterns is necessarily negative. Conservatives may attend more to negative images but they are more optimistic than liberals even after controlling for SES,⁴⁷ and liberals may score high on hedonism but they are more empathetic toward other people.⁴⁸ Any tendency can be overdone but there is no reason to attach value judgments to every tendency, to assume those conducting the research must have ulterior motives, or to become ideologically defensive. It is interesting that when the gaze-cuing task is described in the abstract, liberals generally believe people should be sensitive to the gaze of others (presumably to demonstrate being in tune with the people around them) and conservatives generally believe people should not be (presumably to facilitate independence of thought) so empirical research appears to confirm the desired traits of particular ideological groups. Similarly, personality researchers find that conservatives consistently score higher than liberals on conscientiousness and lower on openness to unspecified new experiences.⁴⁹ Conservatives sometimes bristle at the latter finding but it is likely that if conservatives were asked to describe themselves a high comfort level with the tried and true as opposed to the unknown would be an important part of their self-image.

Biological and psychological research is showing that conservative individuals are deeply different from liberal individuals. Given that biological measures are continuous and multifaceted, one of their many strengths is in showing that political orientations are not reducible to merely two groups (liberals and conservatives) but rather consist of an

array of dimensions, moderates, libertarians, and apathetics. Acknowledging deeper differences across the political spectra should not be taken to imply that certain political groups are therefore better or worse than others. Everyone needs to develop thicker skin when deep-seated cognitive and biological differences are being discussed—and researchers need to be extra vigilant to use designs and language that are as neutral as possible. If the past is any indication, readers will not be reluctant to let us know when they believe we have not been sufficiently vigilant.

Misconception #8: The Study of Biology and Politics Seeks to Replace Traditional Political Science

This misconception can be addressed relatively quickly. The goal of the biology and politics movement is not to convert all political scientists to the study of biology. As mentioned earlier, many of the questions political scientists seek to answer will not be clarified by the adoption of biological techniques and approaches. We need researchers who will continue to conduct research with the methods long-employed by political scientists. The biological turn is best seen as a fruitful addition that, when used alongside traditional social science approaches, holds substantial potential. It does indeed suggest alterations in the way politics has been viewed—but new perspectives are beneficial.

At the annual meeting of the International Society of Political Psychology a few years ago, I had the opportunity to hear a presentation by leading psychologist John Cacioppo. His topic was depression and the matter-of-fact way he considered the topic from an incredible variety of approaches was refreshing. After describing the history of depression and the once-dominant influence of Freudian psychoanalysis, he addressed numerous social and environmental correlates of depression, then turned to the role of biology, including endocrinology, physiology, and neurology, before finishing with reference to twin studies and possible candidate gene associations. Along the way, he mentioned policy implications of research on depression, both in terms of patient treatment and possible statutory changes. The biological and genetic portions of the presentation were offered in conjunction with environmental factors and fit seamlessly into the larger picture. There were no gasps from the audience at the mention of biology, no expressed fears of an attempted hostile takeover by the life sciences, and no accusations of biological determinism. Cacioppo’s impressively broad approach to the topic of depression serves as my ideal for political science: a discipline in which biology is an important part of what we do but is kept in proper perspective.

The hope that this vision might be realized is bolstered by the history of the introduction of rational choice or formal theory into the discipline of political science. I remember the early days of that movement and the negative reactions to it. The similarity of the complaints

raised then to those being raised now with regard to biology and politics is difficult to miss. Early practitioners of rational choice were viewed as alien and possibly threatening. They spoke a foreign language—albeit of axioms, proofs, and calculus rather than of genes, physiology, and neuroscience—and were accused of trying to take over the discipline and failing to appreciate the complexities of real politics. Those outside the movement alleged that, even if the suggested new direction was useful, too much retooling would be involved. It was thought rational choice approaches demeaned the richness of the human condition.

Today, rational choice is mostly incorporated into political science. Formal theoretical approaches are commonly integrated with earlier styles of empirical political science. For the most part, this confluence is now a relatively normal and accepted part of graduate training and research agendas. The phrase rational choice is not even used that much any more and current graduate students probably would be mystified that there was once such a tumult. It remains to be seen the extent to which the trajectory of the biology and politics movement will parallel that of rational choice. After all, assumptions of rationality tend to downplay individual differences while the biology and politics movement, as I see it, highlights these differences. Still, biology may eventually be seen as much less threatening and different than it appears now. The jobs of those who choose not to adopt biological approaches are not in jeopardy and the long-run goal is for as wide a variety of techniques as possible to be placed in the service of greater political knowledge and understanding.⁵⁰

Misconception #9: The Study of Biology and Politics Is Devoid of Policy Implications

Perspectives on Politics was born of a desire to offer a forum for political scientists to speak more directly to real-world policy issues. As such, the misconception that biology and politics has nothing to contribute to practical politics is of special concern here. This topic returns us to the misconception that biology is all genetics, that genetics is fixed at birth and that therefore, to the extent the claims of biology and politics are correct, they suggest everything is predestined. If it were true that people are born liberals, conservatives, or apathetics and nothing could be done about it, campaigns and consulting firms would be rendered unnecessary. In such a world, policy outcomes could not be debated meaningfully, gridlock would be preordained, and political scientists would have little civic purpose.

As I hope to have made clear by now, this is not the way biology operates. Much of biology is environmentally shaped and changeable, if inertial. The evidence suggests that some people are relatively locked in to their political views, just as they are relatively locked in to their person-

ality traits. This same evidence, however, indicates that many people are largely devoid of politically relevant biological or psychological predispositions. In our own research on physiology, the results often make much more sense when we exclude the many people who are not clearly on one side of the political spectrum or the other. This pattern encourages speculation that many people's political orientations are not the result of strong and broad predispositions but it may seem as though they are because individuals who *are* predisposed tend to play a role in the political arena far exceeding their numbers.

Research on biology and politics does not suggest that political change is impossible. Indeed, it holds the promise of making change more likely, by identifying the strategies that are most promising for bringing about change in any given individual, perhaps through media framing, persuasion styles, and micro-targeting. By way of illustration, we are currently involved in a project that reports an inverse correlation between cortisol (a stress hormone) levels and political participation.⁵¹ On the basis of this finding we go on to hypothesize that non-voters with high cortisol levels will respond to different get-out-the-vote strategies than non-voters with low cortisol levels. For example, it may be that increasing turnout rates among high cortisol individuals could best be accomplished not by appeals to civic duty (since a lack of civic feelings is not the reason they are reluctant to vote) but rather by adopting and encouraging less stressful voting procedures such as mail-in ballots. Increasing voter turnout by tailoring approaches to the biological traits of particular non-voting individuals is just one example of the concrete potential of placing politics in the context of the life sciences.

Another potential contribution is that evidence of the depth of political orientations could lead to more tolerance and less acrimony in the political arena.⁵² People need to recognize that their political opponents are not necessarily uninformed or unintelligent but rather that, at a very basic level, they experience and interpret the world differently. These sensory and processing differences lead to distinct ideas for the appropriate way to organize mass-scale social life. If the depth of these differences is accepted, tolerance of political diversity may be enhanced in the same fashion that recognition of the deeper, biological bases of sexual orientation leads to greater tolerance of homosexuality. Research in the area of biology and politics could have real-world implications and should not be dismissed before the research is conducted.

Misconception #10: Political Scientists Are Incapable of Utilizing Biological Techniques and of Appreciating Problems with These Techniques

It is not to be denied that incorporating biological techniques will entail start-up costs for political scientists, but

these costs are more than worth it. I have heard political scientists despair that they can never come up to the cutting edge in such diverse and complicated fields as neuroscience and molecular genetics. The good news is that the nature of scientific research as it is practiced in most disciplines suggests that it is not necessary for us to do so. The norm in biology is for statisticians, theoreticians, bench scientists, technicians, and experts in the model organism of choice, to come together to investigate the identified research question. No one is expected to become a master of each facet; teamwork is the key, and multiple co-authors the norm. Our political physiology lab at the University of Nebraska–Lincoln is fortunate in that leading geneticists, neuroscientists, and endocrinologists have taken an interest in the questions we are asking and have worked with us as co-PIs, co-authors, and co-conspirators. The division of labor is not without limits, however, and it is necessary for political scientists to become conversant enough with the approaches and issues in question to be able to communicate effectively with others on the team and to appreciate the pitfalls and potential of the various techniques. Additional effort is required and coordination across labs and disciplines is often frustrating but the rewards of interdisciplinary work easily outweigh the demands. If nothing else, it is exciting to learn from these colleagues and from extant work in diverse areas.

A common approach adopted by critics of the biology and politics movement is to point out that the biological techniques being employed, including fMRI, EEG, electrodermal activity, and molecular genetics are “controversial” within the biological community. If the definition of controversial is that scientists who question the technique can be found somewhere, then every research technique—including those traditionally employed in political science (survey research, experiments, case studies, theorem proving, qualitative research)—is controversial. A similar debating approach is employed by critics of global warming and evolution when they point out that some scientists dispute the evidence for evolution and for human contributions to global warming, thereby making these topics “controversial.” What is the implication of this logic? Are we to avoid any technique and disavow any concept that is disliked or challenged by any scientist anywhere? If the intended message is that biologically-informed techniques should be used carefully, there is no argument—though is it not the case that all research should be done carefully?

Critics sometimes imply that political scientists are badly out of their comfort zones in applying biological techniques to politics, wandering wide-eyed into fields they do not understand, grabbing techniques at random merely for the sake of trying something new, and applying them to poorly measured phenotypes without an adequate comprehension of the limitations of these techniques. Though no researcher ever knows enough, my colleagues in the

biology and politics movement are hardly naïve with regard to the complexities and challenges involved. Rather than making vague allusions to complexity and knowledge levels, a more useful critique would focus narrowly on the data and research designs that led to specific empirical results in the biology and politics literature. The process of scientific replication and extension would then be able to correct any mistaken conclusions.

Conclusion

Theoretically, procedurally, and empirically, the biology and politics subfield is remarkably diverse. Some researchers concentrate on genetics, some on neuroscience, some on endocrinology, and some on psychophysiology.⁵³ With regard to theory, many individuals, including most in the intrepid and long-suffering biopolitics group, use the concepts of evolutionary psychology to guide their investigations.⁵⁴ They often analyze whether humans in general are equipped for democracy or for rational decision making.⁵⁵ In contrast, our lab (and therefore this essay) stresses individual differences rather than overall human tendencies. I do not pretend to speak for this diverse group of colleagues and no doubt if others in the biology and politics movement had been encouraged to write this piece, it would have a markedly different emphasis. Nonetheless, I think there would be consensus among those in the movement on the existence of the misconceptions I have addressed and on the desire to correct them so that progress can be made.

I respect those who question the value of using biological concepts to better understanding political orientations and the political arena. They should continue to speak out. But the quality of the dialogue would be improved if they made clearer the stage at which they fall off the wagon. Do critics believe humans are conscious of all that is going on in their bodies relevant to stimulus response? Might not biologically-informed techniques be of some assistance in measuring sub-threshold forces? If biology is not relevant to politics, do critics believe it is relevant to any area of human behavior? If so, which ones and why only those? Is schizophrenia partially biological? Autism? Personality tendencies? Sexual orientations? Tastes in food? Risk taking? Ability to remember London street locations? The manner in which people behave around other people? Do critics honestly believe that “biology does not impose many constraints on social behavior” or do they instead believe biology is relevant to many social behaviors but not to politics? If the latter, where is the line between social and political behaviors and why is politics unique?

I am attracted to the study of biology and politics because politics is the supreme test for biological explanations. Politics as the organizing element of mass-scale social life (rather than small-scale dominance hierarchies), after all, is a recent and seemingly contrived addition to the human

repertoire—more distant from biology than activities like mating and eating. Distance, however, is not tantamount to irrelevance. Political scientists should not continue to remain aloof while our colleagues in neuroscience, behavioral genetics, social psychology, endocrinology, neuroeconomics, and biomarkers increasingly direct their attention to the realm of politics. I encourage my disciplinary colleagues to become more involved in the biology and politics movement not merely as a way of defending our turf but because I honestly believe political scientists, with their detailed knowledge of political variations across cultures and across people, have something very important to offer.

The relevance of biology to politics should be tested in the caldron of science and the biology and politics movement should be discarded only when the empirical evidence demonstrates that biology is irrelevant and unhelpful. Contrary to the sentiment of some critics, the movement should not be discarded peremptorily because biology seems irrelevant to politics—human intuitions are too woefully inaccurate for that—and certainly should not be discarded on the basis of basic misconceptions regarding the nature of biology and of politics.

Notes

- 1 Engelmann 2010, 56.
- 2 The quote is from Sigelman 2006, 172; the article being referenced is Alford, Funk, and Hibbing 2005.
- 3 Charney 2008, 300.
- 4 Charney 2008; Charney and English 2012.
- 5 Theodoridis and Nelson 2012.
- 6 Alford, Funk, and Hibbing 2005; Hatemi et al. 2007; Fowler, Baker, and Dawes 2008; Settle et al. 2010.
- 7 Bogaert 2006.
- 8 Prescott, Johnson, and McArdle 1999.
- 9 Maguire, Woollett, and Spiers 2006.
- 10 It is likely that research on steroids in food, lead in water, and pollutants in the air will identify a growing list of behavioral consequences as scholars such as Roger Masters (Masters and Coplan 1999) have long argued.
- 11 Tesser 1993.
- 12 Jennings and Niemi 1968; see also Jennings, Stoker, and Bowers 2009.
- 13 Inbar, Pizarro, and Bloom 2009; Inbar et al. 2009.
- 14 Settle et al. 2010.
- 15 Hammock and Young 2002; Walum et al. 2008.
- 16 Kaminsky et al. 2009.
- 17 See, for example, Caspi et al. 2003; Fowler and Dawes 2008.
- 18 Marcus et al. 1995; Zaller 1992; Plutzer 2002; Gerber, Green, and Schachar 2003.
- 19 Prior 2010.
- 20 Zaller 1992, 23; Barker and Tinnick 2006: 251; Hetherington and Weiler 2009, 36.

- 21 Engelmann 2010.
- 22 Eagleman 2011.
- 23 Schnall et al. 2008; Inbar et al. 2009; Inbar, Pizarro, and Bloom 2012.
- 24 Ackerman, Nocera, and Bargh 2010.
- 25 Helzer and Pizarro 2011.
- 26 Wheatley and Haidt 2005.
- 27 Berger, Meredith, and Wheeler 2008; Rutchick 2010.
- 28 Galdi, Arcuri, and Gawronski 2008.
- 29 Lodge and Hamill 1986; Lodge and Taber 2005.
- 30 Jost et al. 2003; Jost 2006; Carney et al. 2008; Jost and Amodio 2011.
- 31 <http://people.virginia.edu/~jdh6n/disgustscale.html>.
- 32 Smith et al. 2011a.
- 33 Anderson et al. 2012.
- 34 For an excellent discussion of the tension between neurobiology and humans' beliefs in their conscious rationalizing, see Searle 2006.
- 35 Feldman 2003a and 2003b; Petersen 2009; Piurko, Schwartz, and Davidov 2011; and Smith et al. 2011b.
- 36 Oxley et al. 2008.
- 37 Caprara, Barbaranelli, and Zimbardo 1999; Golec 2002; Jost et al. 2003; Graham, Haidt, and Nosek 2009; Mondak 2010; Carraro, Castelli, and Macchiella 2011; Piurko, Schwartz and Davidov 2011.
- 38 Jost et al. 2003; Graham, Haidt, and Nosek 2009; Piurko, Schwartz, and Davidov 2011.
- 39 Pinker 2002, ch. 16.
- 40 Cochran and Harpending 2009.
- 41 Huizenga et al. 1998; Cohen and Hamrick 2003.
- 42 Suhay and Jayaratne 2012.
- 43 McCloskey 1958, 37.
- 44 Block and Block 2006.
- 45 Dodd, Hibbing, and Smith 2011.
- 46 Dodd et al. 2012.
- 47 Vigil 2010.
- 48 Hirsh et al. 2010.
- 49 Caprara, Barbaranelli, and Zimbardo 1999; Mondak 2010; Gerber et al. 2010.
- 50 Wilson 1998.
- 51 French et al. 2011.
- 52 See our own work as well as that by Haidt and Jost, among others.
- 53 McDermott 2004; Fowler and Schreiber 2008; Hatemi and McDermott 2011.
- 54 Somit and Peterson 1998.
- 55 Somit and Peterson 1997; Simon 1991; Jones 2003.

References

- Ackerman, Joshua M., Christopher C. Nocera, and John A. Bargh. 2010. "Incidental Haptic Sensations Influence Social Judgments and Decisions." *Science* 328(5986): 1712–15.

- Alford, John R., Carolyn L. Funk, and John R. Hibbing. 2005. "Are Political Orientations Genetically Transmitted?" *American Political Science Review* 99(2): 153–67.
- Anderson, Kristen, Michael Wagner, Carly M. Jacobs, Kevin B. Smith, and John R. Hibbing. 2012. "Beyond Survey Self-Reports: Using Physiology to Tap Political Orientations." Presented at the annual meeting of the International Society of Political Psychology, Chicago, July 6–9.
- Barker, David C., and James D. Tinnick. 2006. "Competing Visions of Parental Roles and Ideological Constraint." *American Political Science Review* 100(2): 249–63.
- Berger, Jonah, Marc Meredith, and S. Christian Wheeler. 2008. "Contextual Priming: Where People Vote Affects How They Vote." *Proceedings of the National Academy of Science* 105(26): 8846–49.
- Block, Jack, and Jeanne H. Block. 2006. "Nursery School Personality and Political Orientation Two Decades Later." *Journal of Research in Personality* 40(5): 734–49.
- Bogaert, Anthony F. 2006. "Biological versus Nonbiological Older Brothers and Men's Sexual Orientation." *Proceedings of the National Academy of Sciences* 103(28): 10771–74.
- Caprara, Gian Vittorio, Claudio Barbaranelli, and Phillip G. Zimbardo. 1999. "Personality Profiles and Political Parties." *Political Psychology* 20(1): 175–97.
- Carney, Dana R., John T. Jost, Samuel D. Gosling, and J. Potter. 2008. "The Secret Lives of Liberals and Conservatives: Personality Profiles, Interaction Styles, and the Things They Leave Behind." *Political Psychology* 29(6): 807–40.
- Carraro, Luciana, Luigi Castelli, and C. Macchiella. 2011. "The Automatic Conservative: Ideology-Based Attentional Asymmetries in the Processing of Valenced Information." *PLoS ONE* 6(11): e26456. doi:10.1371/journal.pone.0026456.
- Caspi, Avshalom, Karen Sugden, Terrie E. Moffitt, Alan Taylor, Ian W. Craig, Honalee Harrington, Joseph McClay, Jonathan Mill, Judy Martin, Antony Braithwaite, and Richie Poulton. 2003. Influence of Life Stress on Depression: Moderation by a Polymorphism in the 5-HTT Gene." *Science* 18(July): 386–89.
- Charney, Evan. 2008. "Genes and Ideologies." *Perspectives on Politics* 6(2): 299–320.
- Charney, Evan, and William English. 2012. "Candidate Genes and Political Behavior." *American Political Science Review* 106(1): 1–34.
- Cochran, Gregory, and Henry Harpending. 2009. *The 10,000 Year Explosion: How Civilization Accelerated Human Evolution*. New York: Basic Books.
- Cohen, S., and N. Hamrick. 2003. "Stable Individual Differences in Physiological Response to Stressors." *Brain, Behavior, and Immunity* 17: 407–14.
- Dodd, Michael D., Amanda Balzer, Carly M. Jacobs, Michael W. Gruszczynski, Kevin B. Smith, and John R. Hibbing. 2012. "The Political Left Rolls with the Good; The Political Right Confronts the Bad." *Philosophical Transactions of the Royal Society of London, Biological Sciences* 367(1589): 640–9.
- Dodd, Michael D., John R. Hibbing, and Kevin B. Smith. 2011. "The Politics of Attention: Gaze Cuing Effects Are Moderated by Political Temperament." *Attention, Perception, and Psychophysics* 73(1): 24–9.
- Eagleman, David M. 2011. *Incognito: The Secret Lives of the Brain*. New York: Pantheon.
- Engelmann, Stephen G. 2010. "Theory Trouble: The Case of Biopolitical Science." *Austrian Journal of Political Science* 2010(1): 55–71.
- Feldman, Stanley. 2003a. "Enforcing Social Conformity: A Theory of Authoritarianism." *Political Psychology* 24(1): 41–74.
- Feldman, Stanley. 2003b. "Values, Ideology, and the Structure of Political Attitudes." In *Oxford Handbook of Political Psychology*, eds. David O. Sears, Leonie Huddy, and J. Jervis. New York: Oxford University Press.
- Fowler, James H., Laura A. Baker, and Christopher T. Dawes. 2008. "Genetic Variation in Political Participation." *American Political Science Review* 102(2): 233–48.
- Fowler, James H., and Christopher T. Dawes. 2008. "Two Genes Predict Voter Turnout." *Journal of Politics* 79(3): 579–94.
- Fowler, James H., and Darren Schreiber. 2008. "Biology, Politics, and the Emerging Science of Human Nature." *Science* 322: 912–14.
- French, Jeffrey A., Kevin B. Smith, Adam Guck, John R. Alford, Andrew K. Birnie, and John R. Hibbing. 2011. "The Stress of Politics: Endocrinology and Voter Participation." Presented at the annual meeting of the International Society of Political Psychology, Istanbul, July 9–12.
- Galdi, Silvia, Luciana Arcuri, and Bertram Gawronski. 2008. "Automatic Mental Associations Predict Future Choices of Undecided Decision-makers." *Science* 321(5892): 1100–102.
- Gerber, Alan S., Donald P. Green, and Ron Schachar. 2003. "Voting May Be Habit-Forming: Evidence from a Randomized Field Experiment." *American Journal of Political Science* 47(3): 540–50.
- Gerber, Alan S., Gregory A. Huber, David Doherty, Conor M. Dowling, and Shang Ha. 2010. "Personality and Political Attitudes: Relationships across Issue Domains and Political Contexts." *American Political Science Review* 104(1): 111–33.
- Golec, Aleksandra. 2002. "Need for Cognitive Closure and Political Conservatism: Studies of the Relationship." *Polish Psychological Bulletin* 33: 5–12.

- Graham, Jesse, Jonathan Haidt, and Brian A. Nosek. 2009. "Liberals and Conservatives Rely on Different Sets of Moral Foundations." *Journal of Personality and Social Psychology* 96(5): 1029–46.
- Hammock, Elizabeth A.D., and Larry J. Young. 2002. "Variation in the Vasopressin V1a Receptor Promoter and Expression: Implications for Inter- and Intraspecific Variation in Social Behavior." *European Journal of Neuroscience* 16: 399–402.
- Hatemi, Peter K, and Rose McDermott. 2011. *Man Is by Nature a Political Animal: Evolution, Biology, and Politics*. Chicago: University of Chicago Press.
- Hatemi, Peter K., Sara Medland, Kate Morley, Anthony C. Heath, and Nicholas G. Martin. 2007. "The Genetics of Voting: An Australian Twin Study." *Behavior Genetics* 37(3): 435–48.
- Helzer, Erik G., and David A. Pizarro. 2011. "Dirty Liberals! Reminders of Physical Cleanliness Influence Moral and Political Attitudes." *Psychological Science* 22(4): 517–22.
- Hetherington, Marc J., and Jonathan D. Weiler. 2009. *Authoritarianism and Polarization in American Politics*. New York: Cambridge University Press.
- Hirsh, Jordan B., Colin G. DeYoung, Xiaowen Xu, and Jordan B. Peterson. 2010. "Compassionate Liberals and Polite Conservatives: Associations of Agreeableness with Political Ideology and Moral Values." *Personality and Social Psychology Bulletin* 36(5): 655–64.
- Huizenga, Nannett A.T.M., Jan W. Koper, Peiter de Lange, Huibert A.R. Pols, Ronald P. Stolk, Diederick E. Grobbee, Frank H. de Jong, and Steven W.J. Lamberts. 1998. "Interperson Variability but Intraperson Stability of Baseline Plasma Cortisol Concentrations, and Its Relation to Feedback Sensitivity of the HPA Axis to a Low Dose of Dexamethasone in Elderly Individuals." *Journal of Clinical Endocrinology and Metabolism* 83(1): 47–54.
- Inbar, Yoel, David A. Pizarro, and Paul Bloom. 2009. "Conservatives are More Easily Disgusted than Liberals." *Cognition and Emotion* 23(4): 714–25.
- Inbar, Yoel, David A. Pizarro, and Paul Bloom. 2012. "Disgusting Smells Cause Decreased Liking of Gay Men." *Emotion* 12(1): 23–27.
- Inbar, Yoel, David A. Pizarro, J. Knobe, and Paul Bloom. 2009. "Disgust Sensitivity Predicts Intuitive Disapproval of Gays." *Emotion* 9(3): 435–39.
- Jennings, M. Kent, and Richard G. Niemi. 1968. "The Transmission of Political Values from Parent to Child." *American Political Science Review* 62(1): 169–84.
- Jennings, M. Kent, Laura Stoker, and Jake Bowers. 2009. "Politics across Generations: Family Transmission Reexamined." *Journal of Politics* 71(3): 782–99.
- Jones, Bryan. 2003. "Bounded Rationality in Political Science: Lessons from Public Administration Theory." *Journal of Public Administration Theory* 13: 395–412.
- Jost, John T. 2006. "The End of the End of Ideology." *American Psychologist* 61(7): 651–70.
- Jost, John T., and David M. Amodio. 2011. "Political Ideology as Motivated Social Cognition: Behavioral and Neuroscientific Evidence." *Motivation and Emotion* 36(1): 55–64.
- Jost, John T., Jack Glaser, Arie W. Kruglanski, and Frank J. Sulloway. 2003. "Political Conservatism as Motivated Social Cognition." *Psychological Bulletin* 129(3): 339–75.
- Kaminsky, Zachary A., et al. 2009. "DNA Methylation Profiles in Monozygotic and Dizygotic Twins." *Nature Genetics* 41: 240–45.
- Lodge, Milton, and Ruth Hamill. 1986. "A Partisan Schema for Political Information Processing." *American Political Science Review* 80(2): 505–20.
- Lodge, Milton, and Charles S. Taber. 2005. "The Automaticity of Affect for Political Leaders, Groups, and Issues: An Experimental Test of the Hot Cognition Hypothesis." *Political Psychology* 26(3): 455–82.
- Maguire, Eleanor A., Katharine Woollett, and Hugo J. Spiers. 2006. "London Taxi Drivers and Bus Drivers: A Structural MRI and Neuropsychological Analysis." *Hippocampus* 16: 1091–101.
- Marcus, George W., John L. Sullivan, Elizabeth Theiss-Morse, and Sandra Wood. 1995. *With Malice Toward Some: How People Make Civil Liberties Judgments*. New York: Cambridge University Press.
- Masters, Roger D., and Myron S. Coplan. 1999. "Water Treatment with Silicofluorides and Lead Toxicity." *International Journal of Environmental Studies* 56(4): 435–49.
- McCloskey, Herbert. 1958. "Conservatism and Personality." *American Political Science Review* 52(1): 27–45.
- McDermott, Rose. 2004. "The Feeling of Rationality: The Meaning of Neuroscientific Advances for Political Science." *Perspectives on Politics* 2(4): 691–706.
- Mondak, Jeffrey J. 2010. *Personality and the Foundations of Political Behavior*. New York: Cambridge University Press.
- Oxley, Douglas R., Kevin B. Smith, John R. Alford, Matthew V. Hibbing, Jennifer L. Miller, Mario Scalora, Peter K. Hatemi, and John R. Hibbing. 2008. "Political Attitudes Vary with Physiological Traits." *Science* 321(5896): 1667–70.
- Petersen, Michael Bang. 2009. "Public Opinion and Evolved Heuristics: The Role of Category-Based Inference." *Journal of Cognition and Culture* 9(3): 367–89.
- Pinker, Stephen. 2002. *The Blank Slate*. New York: Viking Press.
- Piurko, Yuval, Shalom H. Schwartz, and Eldad Davidov. 2011. "Basic Personal Values and the Meaning of Left-Right Political Orientations in 20 Countries." *Political Psychology* 32(4): 537–61.

- Plutzer, Eric. 2002. "Becoming a Habitual Voter: Inertia, Resources, and Growth in Young Adulthood." *American Political Science Review* 96(1): 41–56.
- Prescott, Carol A., Ronald C. Johnson, and John J. McArdle. 1999. "Chorion Type as a Possible Influence on the Results and Interpretation of Twin Study Data." *Twin Research* 2(December): 244–49.
- Prior, Markus. 2010. "You've Either Got It or You Don't? The Stability of Political Interest Over the Life Cycle." *Journal of Politics* 72(3): 747–66.
- Rutchick, Andrew M. 2010. "Deus ex Machina: The Influence of Polling Place on Voting Behavior." *Political Psychology* 31(2): 209–25.
- Schnall, Simone, Jonathan Haidt, Gerald L. Clore, and Alexander H. Jordan. 2008. "Disgust as Embodied Moral Judgment." *Personality and Social Psychology Bulletin* 34(8): 1096–109.
- Searle, John R. 2006. *Freedom and Neurobiology: Reflections on Free Will, Language and Political Power*. New York: Columbia University Press.
- Settle, Jaime E., Christopher T. Dawes, Nicholas A. Christakis, and James H. Fowler. 2010. "Friendships Moderate an Association between Dopamine Gene Variant and Political Ideology." *Journal of Politics* 72(4): 1189–198.
- Sigelman, Lee. 2006. "Report of the Editor of the *American Political Science Review*, 2004–5." *PS: Political Science and Politics* 39(1): 171–73.
- Simon, Herbert A. 1991. "Bounded Rationality and Organizational Learning." *Organizational Science* 2: 125–34.
- Smith, Kevin B., Douglas R. Oxley, Matthew V. Hibbing, John R. Alford, and John R. Hibbing. 2011a. "Disgust Sensitivity and the Neurophysiology of Left-right Political Orientations." *PLoS ONE* 6(10): e25552.
- Smith, Kevin B., Douglas R. Oxley, Matthew V. Hibbing, John R. Alford, and John R. Hibbing. 2011b. "Linking Genetics and Political Attitudes: Reconceptualizing Political Ideology." *Political Psychology* 32(3): 369–97.
- Somit, Albert, and Stephen A. Peterson. 1997. *Darwinism, Dominance, and Democracy: The Biological Bases of Authoritarianism*. New York: Praeger.
- . 1998. "Biopolitics after Three Decades—A Balance Sheet." *British Journal of Political Science* 28(3): 559–71.
- Suhay, Elizabeth, and Toby Epstein Jayaratne. 2012. "When Does Biology Justify Ideology? Political Ideology and the 'Nature v. Nurture' Debate." Unpublished manuscript, Lafayette College.
- Tesser, Abraham. 1993. "The Importance of Heritability in Psychological Research: The Case of Attitudes." *Psychological Review* 100: 129–42.
- Theodoridis, Alexander, and Amy J. Nelson. 2012. "Of BOLD Claims and Excessive Fears." *Political Psychology* 33(1): 27–43.
- Vigil, Jacob M. 2010. "Political Leanings Vary with Facial Expression Processing and Psychosocial Functioning." *Group Processes and Intergroup Relations* 13(5): 547–58.
- Walum, Hasse, Lars Westberg, Susanne Henningsson, Jenae M. Neiderhiser, David Ross et al. 2008. "Genetic Variation in the Vasopressin Receptor 1a Gene (AVPR1A) Associates with Pair bonding Behavior in Humans." *Proceedings of the National Academy of Sciences* 105(37): 14153–56.
- Wheatley, Thalia, and Jonathan Haidt. 2005. "Hypnotic Disgust Makes Moral Judgments More Severe." *Psychological Science* 16: 780–84.
- Wilson, E.O. 1998. *Consilience: The Unity of Knowledge*. New York: Vintage Books.
- Zaller, John. 1992. *The Nature and Origins of Mass Opinion*. New York: Cambridge University Press.