"Mass Political Behavior and Biology"

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INTRODUCTION

Mass political behavior is a broad term that encompasses a number of aggregated activities of ordinary citizens and groups (versus elites and institutions) related to political outcomes. Its most manifest forms include voting and other visible aspects of participation such as contacting officials, signing petitions, marching in demonstrations, wearing campaign buttons, and placing yard signs. But it also includes latent forms such as cognitively engaging public matters, forming opinions on public issues, and consuming political mass communication.

Scholars have identified a number of conventional factors that affect mass political behavior (e.g., Leighley & Vedlitz, 1999; Lewis-Beck, Jacoby, Norpoth, & Weisberg, 2009). Socioeconomic status frequently emerges as an important factor (e.g., Verba & Nie, 1972; Verba, Schlozman, & Brady, 1995; Wolfinger & Rosenstone, 1980). This perspective suggests mass political behavior is driven by access to high levels of socioeconomic resources such as education, income, and occupational status (Gimpel, Lay, & Schuknecht, 2003), which provide time and financial flexibility for political activities. It also implies the acquisition of psychological orientations such as political interest, political efficacy, political trust, and civic duty, which serve as a second factor that motivates political participation (e.g., Aldrich, 1993; Rosenstone & Hansen, 1993). Social connectedness between individuals and within the larger social and political milieu is another factor in political participation. In this case, psychological orientations (e.g., Lane, 1954) such as alienation and trust achieved through organizational involvement, home ownership, and marital status (e.g., Putnam, 2000) motivate people to engage the political domain. Group consciousness also catalyzes engagement (Miller, Gurin, Gurin, & Malanchuk, 1981; Sanchez, 2006). Researchers focusing on this factor argue that increased group consciousness motivates psychological orientations such as political efficacy that contribute to increased participation (e.g., Shingles, 1981). A number of scholars have argued that group conflict is a factor that also drives political participation. In this case, intergroup interactions drive competition over resources, power, and cultural values (e.g.,

Sherif, 1953). A final factor is governmental institutions. This perspective suggests the mechanisms and structures of political interaction, such as, electoral systems, regime types, and party systems, shape the beliefs and actions that constitute mass political behavior (e.g., Geys, 2006; Jackman, 1987).

Generally speaking, these factors are broadly grounded in models related to either rational choice, in which behaviors are driven by ordered preferences that result in a self-determined best course of action, or socialization, in which behaviors are driven by social conditioning (Stewart, 2014). While important and widely used, these factors generally account for a relatively small proportion of the variance in mass political behavior, leaving open questions and opportunities for the evaluation of previously ignored factors. Clearly absent from the conventional list of factors in political behavior are biological factors, which often initiate automatic responses that occur beyond conscious control (Fowler & Schreiber, 2008; Jost, Nam, Amodio, & Van Bavel, 2014). Some scholars have noted this is a non-trivial oversight. As renowned biologist E. O. Wilson asserted, "the social sciences are intrinsically compatible with the natural sciences. The two great branches of learning will benefit to the extent that their modes of causal explanation are made consistent" (1998, p. 205).

The idea of mixing biology with politics became tainted as a result of the eugenics movements of the late 19th and early 20th centuries and in particular with the Nazi atrocities before and during World War II. As a result, it became taboo in most social sciences to consider that biology could affect behavior (in political science see, for example, Arnhart, 1995). What emerged has been called the "standard social scientific model" (Tooby & Cosmides, 1992), in which people argue human behavior is completely learned from the environment, and biology is unrelated to human behavior. That approach is understandable given the heinous uses to which biology was put in regards to social behavior in the past, but the connection between biology and behavior, including political behavior, is clear. For instance, political scientists have found people's probability of voting consistently increases until about age 75, at which point it starts to decrease. At that age, people tend to become more feeble of both mind and body, and it is physically harder to leave home to vote and cognitively harder to keep up with political events (Wolfinger & Rosenstone, 1980).

Although thoughtful scholars made earlier attempts to use biology to inform political science (e.g., Arnhart, 1994, 1995; Corning, 1971; Masters, 1990; Schubert, 1983a, 1983b; Somit, 1968, 1972; Somit & Peterson, 1997; Wahlke, 1979), biopolitics gained widespread attention in political science in 2005 with a genetic study strongly suggesting that political ideology is partially genetically heritable (Alford, Funk, & Hibbing, 2005). This opened the door for more studies of genetic effects as well as

studies that measure neurological and physiological responses to political stimuli and use evolutionary theory as a source for hypotheses related to political behavior.

The objective of this chapter is to introduce readers to research that addresses the effects of biological forces on behaviors central to democracy: voting, forming political opinions, and cognitively engaging public issues. The next section provides an overview of the literature on mass political behavior and behavioral genetics. This includes the substantial body of heritability studies (e.g., twin studies) and the small but growing number of genomic studies (e.g., genome-wide association studies). The following section introduces political neuroscience, which has been driven by the emergence of fMRI scans and is poised to explore a vast and mostly untouched behavioral territory. The next section reviews biological perspectives on mass political behavior that have not received as much attention but appear to be well-positioned to grow: evolution, biological signals and cues, behavioral endocrinology, and health status. The last section speculates about how biologically informed research can help scholars more thoroughly understand mass political behavior.

"GENOPOLITICS"

Introduction

Genopolitics rests at the intersection of political science, molecular biology, genetics, psychology, and statistics. It yields a theory of political behavior that generates testable hypotheses that are generally assessed with specialized genetic techniques. It is grounded in behavioral genetics, which evaluates the potential for causal relations between genes and behavior. It accomplishes this using methods that separate genetic influences on behavior from environmental influences. Behavioral genetic models address where preferences come from—genes, family environment, unique personal experiences, and/or other varying contexts. A great deal of research in the field of behavioral genetics suggests many social attitudes and behaviors are genetically influenced (Alford, Funk, & Hibbing, 2005).

The process through which genes affect behavior is extremely complicated. As noted by Hatemi, Byrne, and McDermott (2012, p. 312), "uncovering how genes shape individuals and their behaviors is a monumental task." In simplified political science terms, "genes are the institutions of the human body…they regulate the neurological processes that drive social and political behavior" (Fowler & Schreiber, 2008, p. 914). More specifically, but still in vastly simplified form, a gene is a segment of the molecule that carries most of the instructions used in the development and functioning of living organisms (i.e., the DNA molecule). Genes provide instructions for the production of proteins, which play many key roles in cells and are required for the structure, function, and regulation of tissues and

organs. Proteins, consequently, initiate hormonal and other biological processes in a complicated network of interacting genes resulting in biochemical paths situated in the complicated cognitive and emotive systems. These systems, in turn, interact with the environment as humans experience their physical and social worlds. It is important to note that in terms of behavioral genetics, the environment, which includes all processes encountered across a lifespan such as prenatal hormones, childhood events, family social and economic conditions, lifetime diet, lifetime environment, and emotional bonding, controls the degree to which genes operate and are expressed (Hatemi, Byrne, & McDermott, 2012).

There are two general types of genetic studies (Hatemi, Byrne, & McDermott, 2012). Heritability studies, the first type, seek to identify and separate overall genetic and environmental effects on behavior. For instance, twin studies compare correlations in behavior between monozygotic (MZ or "identical") twins, who share nearly 100% of their genes, with correlations between dizygotic (DZ or "fraternal") twins, who share about 50% of their genes. When MZ twins behave more similarly than DZ twins, behavioral geneticists conclude genes contribute to the given behavior, with the assumption that environmental contributions (e.g., uterine environment, parenting, economic resources, educational attainment, and community) are similar for twins and, therefore, accounted for. In one example of twin studies, Bouchard (2004) reports genes account for 30 to 45% of the differences in religiosity between adults in the population of affluent Western societies, while shared environment accounts for 20 to 40%. Other types of heritability studies include extended kinship, adoption, and twins-reared-apart studies.

Genomic studies, the second general type of genetic study, seek to identify specific genetic markers or "candidate genes" that suggest a process through which genes may affect behavior via changing proteins or other biochemical processes. For example, candidate gene association studies are theoretically informed analyses of specific genetic markers to determine their relation to particular behaviors. Iofrida, Palumbo, and Pelligrini (2014), for instance, report that four specific polymorphisms, or natural variations in genes, are associated with increased antisocial behavior in socially harsh environments. On the other hand, genome-wide association studies (GWAS), which assume no *a priori* knowledge of the underlying relation, scan the entire genome for genetic markers that are associated with a particular behavior. For instance, Benjamin et al. (2012) report from a GWAS that single nucleotide polymorphisms (SNPs) explain over 20% of variance in trust and that the effect is the result of many genes with small effects. It is very important to note, though, that it is the cumulative effect of thousands of genetic differences between individuals that help influence any behavioral differences in a

population. Benjamin and his co-authors assert (2012, p. 8029), "genetic variants that individually explain a substantial share of the variation in complex traits are unlikely to exist." In more specific political science terms, Hatemi, Byrne, and McDermott conclude (2012, p. 309), "We will never find 'the' gene for liberalism because it does not exist."

Research

The initial round of genopolitical studies has focused on the basics of behavioral genetics and their application to the study of core political features. Genopolitics first significantly captured the interest of political science with the publication in 2005 of Alford, Funk, and Hibbing's "Are political orientations genetically transmitted?" in *American Political Science Review*. In twin studies of American and Australian subjects, they found genetics explained about half of the variance between individuals in political conservatism, while shared environment, including parental influence, explained only about 10%. These results are consistent with a number of later studies including a GWAS that found several genomic regions are associated with liberal-conservative ideology (Hatemi et al., 2011) and another study of the heritability of ideology from the alternative perspective, environmental-only explanations, with results indicating conventional environmental explanations (i.e., socialization) are "substantially incomplete" in the absence of genetic explanations (Smith, Alford, Hatemi, Eaves, & Hibbing, 2012, p. 17).

Voter turnout is another core political concept that has been evaluated using genetic methods. Fowler and his co-authors found in two twin studies that genetic factors accounted for 53% and 72%, respectively, of the variance in validated and self-reported voter turnout (Fowler, Baker, & Dawes, 2008) and in a candidate gene association study that two genes were significantly associated with self-reported voter turnout (Fowler & Dawes, 2008). Following an extensive critique of Fowler and Dawes (Charney & English, 2012), Deppe and colleagues (2013) confirmed using an independent sample the original conclusion related to one of the two candidate genes as well as several of the critiques.

Finally, genopolitical scholars have examined partisan identification and intensity. Also in their groundbreaking article, Alford, Funk, and Hibbing (2005) found that the heritability of a specific party identification was relatively low, with genetics explaining only 14% of its variation, while, on the other hand, it was moderate for affective affinity toward the major parties, with genetics explaining 31% of its variation and shared environment explaining 17%. Another team of researchers later found similar results regarding party identification but also found that genetics play a key role in shaping the strength of a person's party identification (Hatemi, Alford, Hibbing, Martin, & Eaves, 2009). Most recently,

researchers concluded that the heritability of party identification is dependent on context, in particular increasing partisan polarization (Fazekas & Littvay, 2015).

The preceding review is just a small sampling of the large number of studies that have focused on these core political issues, but scholars have also used genetic methods to examine economic attitudes (Benjamin et al., 2012; Hatemi, 2013), directional voting (Fazekas & Littvay, 2012), political efficacy (Klemmensen, Hatemi, Hobolt, Petersen, Skytthe, & Nørgaard, 2012), political interest (Klemmensen, Hatemi, Hobolt, Skytthe, & Nørgaard, 2012), out-group preferences (Hatemi, McDermott, Eaves, Kendler, & Neale, 2013), political trust (Sturgis et al., 2010), and attitudes toward abortion and gay rights (Eaves & Hatemi, 2008).

Genopolitics is still in its infancy, so there are numerous opportunities for future research. Many of these involve the integration of behavioral genetics with conventional behavioral approaches such as rational choice and socialization. These techniques could shed light on attitude formation such as the relation between personality and attitudes. They could inform scholars on the structure of ideology such as the debate about a single versus multiple dimensions of liberalism and conservatism. Genopolitics could play a role in expanding our understanding of political institutions in terms of how they affect the expression of genes in gene-environment interactions. Finally, they could help clarify explanations of differences between countries such as partitioning variation into widespread genetic effects and environmental, country-specific effects (Hatemi, Byrne, & McDermott, 2012).

Limitations

Top journals in political science such as *American Political Science Review*, *American Journal of Political Science*, and *Journal of Politics* have published numerous genopolitical studies, so the approach has been the subject of numerous peer reviews. Nonetheless, the genetic approach has generated substantial debate in political science. Critics express concerns about the ability of researchers to meaningfully distinguish genetic from environmental effects given their interactive nature (Charney, 2008). Part of this is related to concerns over the complexity of the process of translating genetic effects into behavior in general. Part is recognition that much of the overall effect of genetics on behavior is the result of a very large number of genetic markers each having a very small but cumulative effect. And part is the realization that the large number of markers with small effects mean analyses require enormous samples, sometimes impossibly large in practical terms, for the required multiple tests with the result that in many cases studies are statistically underpowered (Benjamin et al., 2012).

"NEUROPOLITICS"

Introduction

Neuropolitics rests at the nexus of political science, biology, cognitive neuroscience, and psychology (Jost, Nam, Amodio, & Van Bavel, 2014). It yields a theory of political behavior that generates testable hypotheses that are generally assessed with specialized neuroscientific techniques. It is broadly grounded in behavioral neuroscience, which evaluates the neural bases of and processes by which the nervous systems affect and are affected by behavior, generally looking at the level of brain circuitry, neurons, and neurotransmitters. The physiological measurement techniques that it employs are appealing because they do not rely on self-reports, which are frequently subject to pressures to give socially acceptable responses, but are technically sophisticated, direct, and objective measures of neural activity.

The mechanisms through which neural activity affects and is affected by behavior is complex. In simplified form, mental processes initiate the movement of electrical signals through nerve cells in the central and peripheral nervous systems, which extends throughout the body. These nerve cells are called neurons, and sets of neurons interact to produce behavior. These electrical signals can be detected through the heightened electrical activity they generate in a region or regions of the brain in which they are occurring. Heightened activity in one region of the brain does not indicate the activated region is the sole location for that mental process. Although some situations are localized, the brain is widely integrated and activation often occurs in many locations.

While behavioral neuroscience also uses research techniques that decrease or enhance neural function, such as transcranial magnetic stimulation, most studies at this early stage of political neuroscience—the first substantial politically focused neuroscientific research was published in 2006 (Knutson, Wood, Spampinato, & Grafman, 2006; Westen, Blagov, Harenski, Kilts, & Hamann, 2006)—"simply" identify and measure neural activity to answer questions about where in the brain a process is initiated. Neuropolitics in particular looks at neural activity associated with political perceptions, thoughts, and behaviors (Schreiber, 2011). Neuroscientific findings may suggest, for instance, that the same brain region is involved in processing faces of partisan leaders and in emotional reactions and learning, which to political neuroscientists may suggest the neural manifestation of partisan bias (Knutson, Wood, Spampinato, & Grafman, 2006). In general, interested researchers have used the methods of neuroscience to look at racial prejudice and intergroup relations, partisan bias and motivated cognition, political ideology, and several political attitudes (Jost, Nam, Amodio, & Van Bavel, 2014). The neuroscientific tools often used include functional magnetic resonance imaging [fMRI],

Positron Emission Tomography [PET] scanning, electroencephalography [EEG], magnetoencephalography [MEG], galvanic skin response (GSR) or skin conductance response (SCR) also known as electrodermal activity (EDA) studies, and lesion studies.

Research

Generally, researchers have found a number of brain regions or structures that may be pertinent to political behavior. These include the amygdala (regarding emotions, social cognition, motivation, fear, and pleasure), the fusiform face area (FFA; processing faces), the insula (empathy and social exclusion), the basal ganglia (reward processing, decision making, and learning), the anterior cingulate cortex (ACC; conflict monitoring and error detection), the prefrontal cortex (social cognition, moral judgments, executive function, and decision making), the ventral striatum (reward and value processing), and the temporoparietal junction (TPJ; theory of mind) (Jost, Nam, Amodio, & Van Bavel, 2014; Schreiber 2011). Very broadly speaking, after an extensive review of the literature, Jost and his co-authors (2014, p. 30) conclude the amygdala, ACC, and prefrontal cortex play substantial roles in racial prejudice and intergroup relations (e.g., Cunningham, Johnson, Raye, Gatenby, Gore, & Banaji, 2004); the amygdala, insula, and ventral striatum play substantial roles in partisan bias and reactions to out-groups (e.g., Tusche, Kahnt, Wisniewski, & Haynes 2013); and the ACC, amygdala, and insula play meaningful roles in political ideology and attitudes (e.g., Amodio, Jost, Master, & Yee, 2007; Zamboni, Gozzi, Keruger, Duhamel, Sirigu, & Grafman, 2009).

Researchers have identified a number of other associations as well. For instance, an fMRI study showed preferred political candidates stimulated a stronger response in the amygdala than non-preferred candidates in both American and Japanese subjects (Rule, Freeman, Moran, Gabrieli, Adams, & Ambady, 2010). Another fMRI study found that when subjects with stronger activation in the dorsolateral prefrontal cortex viewed a negative campaign video they rated the candidate they originally preferred much lower compared to those with weaker activation in that region, while subjects with stronger activation in the medial prefrontal cortex rated the candidate they originally preferred higher than those with weaker activation (Kato, Kabashima, Kadota, Takano, & Kansaku, 2009). Others suggest fMRI-measured neural responses to disgusting images predict political conservatism even though self-reported affective responses to the images do not (Ahn et al., 2014). Democratic partisans show greater insula activation during a risk-taking task, while Republican partisans show greater amygdala activation (Schreiber et al., 2013). Similarly, self-identified liberals had more volume in the ACC, while self-reported conservatives had more volume in the amygdala (Kanai, Feilden, Firth, & Rees, 2011). Several electrodermal activity studies show that political conservatives physiologically respond more strongly to

negative and aversive images than political liberals (Oxley et al., 2008; Smith et al., 2011), and in some cases certain categories of images are related to conservative issues such as gay marriage (Smith et al., 2011). In another study using facial electromyography (EMG) and skin conductance, conservatives exhibited greater blink amplitude (i.e., "startle response") and skin conductance to unexpected and unpleasant auditory stimuli. Further, individuals with lesser physiological responses were more likely to take liberal positions on issues such as supporting foreign aid, gun control, lenient immigration policies, and pacifism, while individuals with greater physiological responses were more likely to take conservative positions such as supporting capital punishment, defense spending, the Iraq War, and patriotism (Oxley et al., 2008). Outside the ideological-partisan context, studies using facial EMG, skin conductance, and heart rate indicate that the facial expressions of a political leader directly affect the emotional reactions of viewers (McHugo, Lanzetta, Sullivan, Masters, & Englis, 1985).

Overall, these result show promise for future research, particularly as the technology continues to improve. This progress suggests neuropolitics offers broader possibilities in political cognition, evaluation, and behavior (Jost, Nam, Amodio, & Van Bavel, 2014, p. 3). There are ample opportunities to bring political science into the neuroscience lab. For example, researchers could assess physiological responses to different types of appeals to vote such as civic duty, social pressure, or descriptive norm messages (Murray & Matland, 2014). There are also opportunities to bring the neuroscience lab to political science methodology. For instance, researchers could capture both self-reported and physiological responses in experiments (Smith et al., 2011). Much of the field of political science remains untouched by the newly emerging techniques of neuroscience, so the opportunities are almost limitless (Jost, Nam, Amodio, & Van Bavel, 2014; Schreiber, 2011).

Limitations

The responses to political neuroscience have been wide ranging, from enthusiastic to indifferent (McDermott, 2009; Theodoridis & Nelson, 2012; Tingley 2006). Many brain sciences have taken big steps forward in recent years as new tools have given researchers access to previously unglimpsed biological processes. In essence, nascent political neuroscience provides evidence regarding the biological underpinnings, or not, of political behavior. This in itself is important and, until recently, difficult to assess.

On the other hand, scholars from disciplines with longer histories with neuroscientific methods than political science have cautioned against over-exuberance. As one of the founders of social neuroscience, psychologist John T. Cacioppo, noted with colleagues: "one cannot assume that changes in brain activity are a direct, invariant measure of the neural instantiation of the investigator's favorite

construct or that the contemporary neurobiological theory regarding the function of a specific brain structure or system is everlasting" (Cacioppo et al., 2003, p. 653). Further, studies of animals as well as humans have shown that brain structure and activity can change in response to training and experience (e.g., Fu & Zuo, 2011; Klimecki, Leiberg, Richard, & Singer, 2014), which complicates discussions regarding cause and effect. For example, researchers found that individuals who completed a multi-year taxi driver training program in London had substantially increased volume in their hippocampus after successfully completing their training than before they started (Woollett & Maguire, 2011).

Further, neuroscientists often conduct their studies in highly artificial settings with little ecological validity. Subjects must often remain motionless while connected by wires to monitoring devices and, in the case of fMRI, located within a small enclosure. In many cases, the studies are expensive to conduct (often up to hundreds of dollars per hour), so subject pools are frequently small with the result of statistically underpowered and difficult-to-replicate results. Further, the temporal and/or spatial resolution of many techniques is limited. Tasks often are not localized in the brain and multiple regions may be activated simultaneously, so it is not easy to attribute specific behaviors to a given brain region or, for that matter, the specific function being activated. On the other hand, the activation of one area does not exclude activation in other, unmeasured areas (Saad & Greengross, 2014).

BIOPOLITICS WITH "OTHER NAMES"

Although substantial research has been published in the areas of political genetics and neuroscience, there are other biologically based approaches to political science that have begun to emerge. Darwin's theory of evolution implies human behavior is the result of long-term evolutionary forces applied through natural selection—that is, variation between individuals giving some individuals an increased probability of survival and reproduction—that resulted in psychological mechanisms that solved ancestors' challenges regarding survival and reproduction (Darwin, 1859; Mayr, 2001). Evolutionary explanations strive to offer ultimate versus proximate explanations for behavior; that is, they attempt to explain why a behavior occurs versus how it occurs (Scott-Phillips, Dickens, & West, 2011). For instance, political scientists know socioeconomic resources affect voting (e.g., Verba & Nie, 1972; Verba, Schlozman, & Brady, 1995; Wolfinger & Rosenstone, 1980)—a proximate explanation. But socioeconomic resources do not explain why people vote—an ultimate explanation—which an evolutionary approach might suggest is related to desire to be seen as a good group member (e.g., Panagopoulos, 2014).

By one application of evolutionary theory to political behavior, people are "wary cooperators," whose evolutionary desire to survive and reproduce is facilitated by an innate tendency to cooperate, within limits, with their social group's members (Alford & Hibbing, 2004). By another, egalitarianism is evolutionarily advantageous because it is a reverse hierarchy in which weak group members join together to dominate strong group members (Boehm, 2001). Evolution through natural selection yields a theory of political behavior that generates testable hypotheses that are generally assessed with standard social science techniques (e.g., Arnhart, 1994, 1995; Corning, 1971; Masters, 1990). For instance, a lack of food threatened survival in the evolutionary environment, so human ancestors adopted an adaptive strategy to motivate others to share food during times of shortages. This suggests hunger may make people more supportive of social welfare policies, an assertion for which scholars recently presented evidence (Aarøe & Petersen, 2013; Petersen, Aarøe, Jensen, & Curry, 2014). Similarly, motivation to acquire resources to survive and reproduce should influence follower preferences regarding group leaders, which research supported with findings showing followers tend to prefer more physically formidable leaders, who presumably help them acquire and protect important resources (e.g., Murray, 2014; Murray & Schmitz, 2011; Sorokowski, 2010; Stulp, Buunk, Verhulst, & Pollet, 2013). Because people have an evolutionary motivation to survive, they are sensitive to threats of disease, which suggests they should adopt disease-avoidance strategies. Researchers presented evidence that people who are more disease avoidant are also more avoidant of people with different skin complexions, the novelty of which may suggest a greater likelihood of infectious disease (Faulkner, Schaller, Park, & Duncan, 2004).

Scholars have identified a number of biologically based signals/cues that specifically affect follower evaluations of political leaders. Often theoretically related to arguments regarding physical formidability, researchers have found, for instance, that voters prefer leaders with lower-pitched voices (e.g., Klofstad, 2015) and that this preference is related to perceptions of greater strength and competence (Klofstad, Anderson, & Nowicki, 2015; Laustsen, Petersen, & Klofstad, 2015). Research on leader facial displays suggests that contextual conditions affect preferences for leaders with masculine versus feminine faces (Little, Burriss, Jones, & Roberts, 2007; Spisak, Dekker, Kruger, & Van Vugt, 2012). Further research has shown that individuals can differentiate between subtle facial displays by political leaders (Stewart & Ford Dow, 2013) and that these displays, including very brief micro-expressions, can alter the emotional state of viewers (Bucy, 2000; McHugo, Lanzetta, Sullivan, Masters, & Englis, 1985; Stewart, Waller, & Schubert, 2009; Sullivan & Masters, 1988). Other research indicates that voters also infer leadership traits from leader body language. For instance, individuals infer leader personality traits

from leaders' body motion during speeches (Koppensteiner & Grammer, 2010), while some evidence suggests body language plays a larger role in voter evaluations of candidates than the perceived persuasiveness of the message a candidate delivers (Dumitrescu, Gidengil, & Stolle, 2015). Finally, combining several aspects, researchers found that facial displays and physical gestures better predicted follower responses during a presidential debate than candidates' message persuasiveness, verbal utterances, and voice tone (Shah, Hanna, Bucy, Wells, & Quevedo, 2015).

Another biologically based approach uses behavioral endocrinology to understand political behavior. It yields a theory of political behavior that generates testable hypotheses that are generally assessed with specialized endocrinological techniques. In particular, hormones, which are chemical substances that control and regulate cell activities, affect behavior and cognition through organizational effects on brain function and structure as well as activational or transient effects during postnatal life. Activational effects in particular directly connect biology to attitudes and behavior (Stewart, 2014). Hormones, such as cortisol, dopamine, estrogen, melatonin, oxytocin, progesterone, serotonin, testosterone, and vasopressin, influence politically relevant social interactions related to attention, communication, feelings, learning, memory, and recognition (McDermott, 2011). For instance, there is evidence of elevated cortisol levels in voters on election day, which suggests voting is a stressful event that may have implications for risk-seeking behavior and memory retrieval (Waismel-Manor, Ifergane, & Cohen, 2011) and, indeed, a greater probability of voting (French, Smith, Alford, Guck, Birnie, & Hibbing, 2014). There is evidence that testosterone in men decreases and cortisol increases when a favored candidate loses an election (Stanton, Beehner, Saini, Kuhn, & LaBar, 2009; Stanton, LaBar, Saini, Kuhn, & Beehner, 2010), including when later reading about the loss (Blanton, Strauts, & Perez, 2012).

Other researchers have begun assessing the effects of general health on political participation. The resource perspective on political behavior suggests that political participation is physically, psychologically, and cognitively costly, and anything that limits the resources an individual has to devote to participation will also limit the individual's participation. Minimally, sickness limits the physical resources people have to devote to politics. Motivated by this logic, earlier research found that poor health is associated with lower levels of political participation (Peterson, 1990; Schwartz, 1976) and more passive political views (Schwartz, 1976). More recently, a team of researchers found in a survey of 30 European countries that people reporting "very good" health were much more likely to say they voted than those reporting "very bad" health (Mattila, Söderlund, Wass, & Rapeli, 2013). Another team found very similar results among American respondents but also found that pre-voting age health similarly affected later voting turnout, which suggests health may have long-term consequences for

political participation. They also found that health was related to partisanship such that those in good health were more likely to identify with the Republican Party (Pacheco & Fletcher, 2015).

MASS POLITICAL BEHAVIOR AND BIOLOGY: THE FUTURE?

When we talk about mass political behavior, we are talking about behaviors at the very heart of democracy, such as, voting, forming political opinions, and cognitively engaging public issues. These are the activities of "ideal citizens," whom we hope our families, friends, and communities strive to emulate. But current models of political behavior fail to provide satisfactory knowledge of these important behaviors, so it is difficult to do much to inspire less-than-ideal citizens beyond imploring them to "please vote."

The connection between biology and behavior is well known, but political science has ignored the potential of biology as an explanatory factor for the good part of a century. Not that all scholars failed to try. Caldwell published "Biopolitics: Science, ethics, and public policy" in the *Yale Review* in 1964. Somit published "Toward a more biologically oriented political science" in the *Midwest Journal of Political Science* in 1968 and "Biopolitics" in the *British Journal of Political Science* in 1972. Schubert published "Evolutionary politics" in the *Western Political Quarterly* and "Psychobiological politics" in the *Canadian Journal of Political Science* in 1983. Yale University Press released Masters' *The Nature of Politics* in 1989, and he published "Evolutionary biology and political theory" in *American Political Science Review* in 1990. And Praeger released Somit and Peterson's *Darwinism, Dominance, and Democracy: The Biological Bases of Authoritarianism* in 1997, while Palgrave-MacMillian released their *Human Nature and Public Policy* in 2003.

But new life has been breathed into biopolitics following Alford, Funk, and Hibbing's provocative article in 2005 on genes and ideology as well as technological breakthroughs like fMRI scanners and advanced genetics methods that literally allow glimpses into previously uncharted political features of the human body and mind. One can only speculate on the new understandings political scientists will gain about their discipline, particularly as the technology advances even further and the boundaries of what can be understood are probed and established. Will candidate gene association studies become powerful enough for political scientists to reliably map the full array of biomarkers that are influenced by the environmental factors associated with the decision to vote or abstain? Will fMRI brain scans be augmented by some as-yet-discovered neural technique that will allow political scientists to capture the full extent of neural activation as individuals consider the political implications of an out-partisan's policy position? Given the meteoric advances in biological sciences, can scientists even conceive of what

they might be able to discern about biopolitical processes in the next decade? Political science is just now starting to seriously explore previously unknown territory. Some of it will be fruitful and some barren, but the potential for discovery is awesome.

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